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J. Dennis Thomas

Nikon®

D5200™

Digital Field Guide



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About the Author

J. Dennis Thomas is a freelance photographer and author based out of Austin, Texas. He has nearly 25 years of experience working with Nikon cameras. His work has been published in many regional and national publications, including *Rolling Stone*, *SPIN*, *Elle*, *EBONY*, *W*, *Country Weekly*, *Us Weekly*, *Thrasher Magazine*, and many more.

He has written 20 highly successful Nikon Digital Field Guides, a comprehensive book about concert and live music photography, and a book about urban and rural decay photography. Dennis also writes articles for *Digital Photo* magazine and <http://masteringphoto.com/>, and maintains a blog about Nikon cameras and Nikon Digital Field Guides at <http://nikondfg.com>.

As always, to my girls, Henrietta and Maddie.

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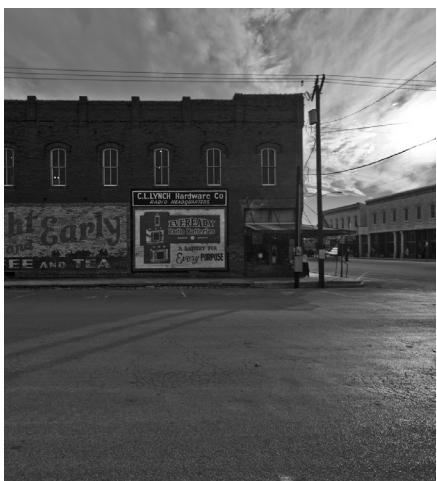
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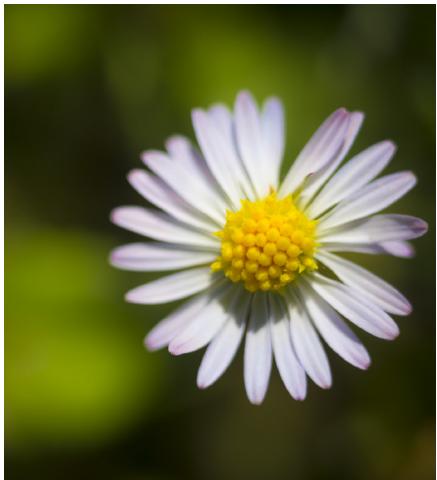
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Introduction

The D5200 wasn't due for an upgrade, so when Nikon announced it, people were a little surprised. The Nikon 5000 series of dSLR cameras are the only models that feature the Nikon Vari-angle articulated LCD Monitor, so from a marketing standpoint, it made sense to upgrade this camera, rather than another model that shares more features with other cameras. On the exterior, the D5200 looks almost exactly like its predecessor with a few minor changes, such as the addition of a Drive mode button and an integrated stereo microphone, which is a first on any Nikon dSLR.

Inside is where the D5200 receives most of its upgrades, some of which are inherited from both the pro-level D800 and the semi-pro D600. These include an increased resolution of 24MP (which puts it on par with Nikon's flagship high-resolution camera, the D3X), a new EXPEED 3 image processor, the Multi-CAM 4800DX 39-point autofocus system, and the 2016-pixel Color Matrix Metering II metering system.

This compact camera offers most of the key features of more professional models, but with a smaller footprint. It also offers a plethora of scene modes that allow you to capture creative images in any shooting situation, no matter your level of experience.

In-camera editing is also a feature of the D5200, so you don't necessarily need to be computer savvy to add effects to your images. It also allows you to edit RAW files.

The D5200 will appeal to videographers, as well, due to the full high definition 1080p video, and the ability to control exposure settings manually and record stereo sound. The fully articulated Vari-angle LCD Monitor is a real plus over any of the other Nikon HDSLRs because it allows you to shoot at awkward angles.

With the D5200, Nikon has truly created an amazing, full-featured, DX-format camera that is also very affordable and easy to handle.

About the Digital Field Guide

The Nikon Digital Field Guide book series is intended to act as an adjunct to the manual that comes with your camera. While the manual gives you a great overview of the camera, a photographer didn't write it. The *Nikon D5200 Digital Field Guide* gives you all the information you need about the camera from a working photographer's perspective.

The goal of this guide is to help photographers — from novices to advanced amateurs — grasp all of the features of their new camera. It includes tips learned from working with the camera in the field, as well as some basic information to help newer photographers get up to speed quickly.

This full-color guide walks you through setting up your camera, offers insight about which settings to use, and tells you why each setting is useful in particular situations. Full-color images demonstrate different photography concepts and show you some of the things the D5200 is able to accomplish.

The *Nikon D5200 Digital Field Guide* will help you familiarize yourself with your camera more quickly, so that you can not only navigate and handle it better, but also more easily achieve your photographic vision.

Quick Tour

Welcome to the Quick Tour. This section covers some of the basic functions, so you can start using your D5200 right away. If you've already used a Nikon dSLR, a lot of this may be familiar to you. In fact, if you upgraded from a D5100, the setup for the D5200 is very similar. If you are upgrading from a compact digital camera or another brand of dSLR, you probably should read the entire Quick Tour to familiarize yourself with the camera and menu layout.

You should have already unpacked the camera, charged the batteries, and inserted the memory card. If you haven't done these things, do them now.



The D5200 can grab awesome shots right out of the box.

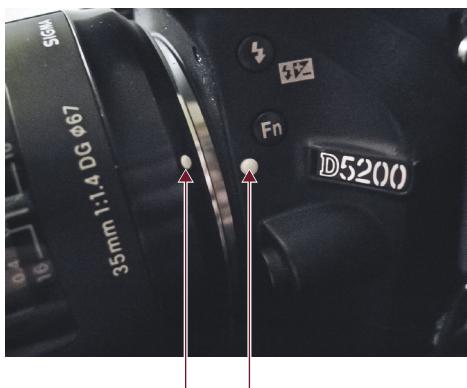
Getting Started

If you're anything like me, you're ready to get out there right away and start taking pictures with your new camera. The great thing about the D5200 is that you can start taking great photos right out of the box. The D5200 has some automatic shooting modes that choose the proper settings for you. All you really have to do is point the camera at something and shoot!

Mounting the Lens

If you bought the D5200 as a kit, it came with the NIKKOR 18-55mm f/3.5-5.6G VR lens. If you aren't sure what all of these letters and numbers mean, don't worry; all of that and more is covered in Chapter 4. The lens needs to be mounted to the camera. First, locate the white lens mounting index dots: one is located on the camera body near the opening and the other is located on the base of the lens. Line these two dots up and gently rotate the lens counterclockwise until it locks firmly into place.

You want to get the lens mounted as quickly as possible to reduce the exposure of the inside of the camera to the elements as dust may accumulate inside the camera and eventually find its way to the sensor. You also want to make sure that the camera is turned off to minimize any static charges, which tend to attract dust particles. Another good rule of thumb is to keep the lens opening facing downward to discourage any dust that finds its way into the camera from settling inside the body.



Lens mounting index dots

QT.1 The lens mounting index dots.



Image courtesy of Nikon, Inc.

QT.2 Rotate the lens counterclockwise to lock it in place.

Once the lens is properly mounted, you can turn the camera on. The On/Off switch is located on top of the camera, surrounding the shutter-release button. Flick the switch to the right, and your D5200 is fired up and ready to go.

Setting the Shooting Mode

To get started quickly, set the shooting mode to Auto (). To change the shooting mode, just rotate the Mode dial, located on top of the camera. The shooting mode also appears in the top-left corner of the LCD screen when the shooting info is displayed. The Auto mode () is a simple, point-and-shoot mode. Everything is adjusted for you, including the shutter speed, aperture, ISO, and image quality. Even the flash is activated if there isn't enough light. If you're not familiar with any of these terms, don't fret; I explain them all in this book.

If you want to take a look at your settings, simply press the Info edit button (, which is just to the right of the viewfinder — a short stretch from where your thumb naturally rests when holding the camera. Press this button to display the shooting info on the LCD screen. The shooting info screen displays everything you need to know about your settings. Double-press the Info edit button () to change the camera settings on the LCD screen using the multi-selector. However, if the camera is in Auto mode () , your selections are limited because the camera is choosing most of the settings for you.



QT.3 The Shooting mode dial and Info button.

Focusing

Once you've set the Shooting mode, it's time to focus. Put your eye up to the viewfinder and look through it. Point the camera lens at your intended subject and press the shutter-release button halfway to engage the autofocus. When the camera has locked focus, a red bracket lights up quickly in the viewfinder — this is the focus point. You also hear a beep indicating that the focus has locked.

By default, in Auto mode ()¹, the camera focuses on the closest object. Once the camera achieves focus, fully press the shutter-release button to take the photo, and voilà! Quite simple, isn't it?

CROSS REF Focus modes are covered more extensively in Chapter 2.

Viewing Your Images

After you shoot some images with your D5200, you can look at them on the big, bright, high-resolution 3-inch LCD screen. To view your images, press the Playback button () on the rear of the camera just above the multi-selector. The most recent photo taken is the first image displayed. You can press the multi-selector left () or right () to scroll through the images. Press the multi-selector right () to view the images in the sequence in which they were taken. Press the multi-selector left () to display the images in reverse order. You can also press the multi-selector up () or down () to check the settings and other information.

The following options are also available when the camera is in Playback mode ():

- ▶ **Press the Thumbnail/Zoom out button () to view thumbnails.** You can choose to view 4, 9, or 72 images at a time, or you can view the thumbnails in a calendar view. When in Thumbnail mode, use the multi-selector to navigate among the thumbnails and highlight one. You can then press the OK button () to enlarge the selected image to a full-size preview.
- ▶ **Press the Zoom in button () to magnify the image.** This allows you to check for sharpness or look for details. You can also press this button to exit the thumbnail preview.

- ▶ **Press the AE-L/AF-L (AE-L)/Protect (○)** button to save images from being deleted.
- The AE-L/AF-L button doubles as the Protect button. This locks the image to prevent you from accidentally erasing it when editing your images in the camera.

CAUTION When you format a memory card, all images (including those that have been protected) are erased.

- ▶ **Use the multi-selector to view image data.** To see which settings were used when a photograph was taken, press the multi-selector up (▲) or down (▼). This also allows you to check the *histogram*, which is a visual representation of the tonality of an image.
- ▶ **Press the OK button (OK) while in Playback mode (■) to enter the Retouch menu (■) and edit images.** Here, you can do some rudimentary, in-camera editing, such as applying Active D-Lighting, fixing red-eye, and cropping.

CROSS REF For more detailed information on the Retouch menu (■) and in-camera editing, see Chapter 3.

- ▶ **Press the Delete button (>Delete)** to erase images.
- This permanently deletes an image from the memory card. When you first press the Delete button (>Delete), the camera asks for confirmation. Press the Delete button (>Delete) again to complete the process.



Exploring the Nikon D5200

The D5200 is different from most other Nikon cameras because, in order to implement the Vari-angle LCD monitor, the amount of buttons and dials has been minimized, and most options are accessed via the D5200 menu system and the multi-selector.

This makes for a very streamlined camera, but there are still a number of buttons, dials, knobs, and switches with which you should become familiar. Additionally, there are ports and general features that are common to dSLR cameras, but which may be new to you. If you have upgraded from the D5100, you'll be instantly at home with the D5200. However, if you are stepping up from the D5000, you will notice a distinct change in the button layout on the rear of the camera.



Image courtesy of Nikon, Inc.

The Vari-angle LCD monitor is specific to the 5000 series of Nikon dSLR cameras.

Key Components of the D5200

As I mentioned previously, the D5200 doesn't have the plethora of buttons and dials that other Nikon camera models do, so the controls on the camera are important. Most of them perform numerous duties depending on the camera mode, so understanding how each control functions is key to controlling your camera quickly so that you don't miss a shot. The following sections break the camera features down into segments and go over each control.

The top of the camera

Most of the important buttons are on the top of the D5200. This makes it easier to find them, especially when you have your eye to the viewfinder. This is where you find the dials to change the shooting modes, as well as the all-important shutter-release button and the relatively new Movie record button.

The following list includes the controls/buttons on top of the camera:

- ▶ **On/Off switch.** Located concentric to the shutter-release button, this switch turns the camera on and off. Push it to the right to turn the camera on or to the left to turn the camera off.
- ▶ **Shutter-release button.** In my opinion, this is the most important button on the camera. Pressing this button halfway activates the camera's autofocus and light meter. Fully depressing this button releases the shutter, and a photograph is taken. When the camera has been idle, and has "gone to sleep," lightly pressing the shutter-release button wakes it up. When the Auto info display is set to On, half-pressing and holding it turns the Info Display off, while releasing it turns the Info Display on. When the image review is on, lightly pressing the shutter-release button turns off the LCD screen and prepares the camera for another shot.
- ▶ **Movie-record button.** When the camera is in Live View mode (**Lv**), you press this button (which has a simple red dot on it) to start recording video. Press it a second time to stop recording.
- ▶ **Exposure compensation (\pm)/Aperture (\circ) button.** Press this button while spinning the Command dial to modify the exposure set by the D5200 light meter when it is in the Programmed auto (**P**), Shutter-priority auto (**S**), or Aperture-priority auto (**A**) modes. Turning the Command dial to the right increases the exposure, while turning the dial to the left decreases the exposure. When set to Manual exposure mode (**M**), you can press this button and rotate the Command dial to adjust the aperture settings.



Image courtesy of Nikon, Inc.

1.1 The controls on top of the camera.

- **Info button (Info).** Press this button to display information on the LCD screen. The information display shows all of the exposure and camera setting options.
- **Release mode (©).** Press this button to display the release mode options on the LCD screen. Use the multi-selector to choose an option.

CROSS REF See Chapter 2 for a complete list and description of the Release modes.

- **Live View mode switch (Lv).** Of all Nikon cameras, the D5200 has my favorite implementation for Live View mode (Lv). A quick flick of the Live View mode switch (Lv), which is right next to the Mode dial, puts the camera in Live View mode (Lv), so you can shoot stills or videos using the LCD monitor as a viewfinder.

- ▶ **Mode dial.** This is an important dial. Rotating the Mode dial allows you to change your shooting mode quickly. You can choose one of the scene modes, the Effects mode, one of the semiautomatic modes, or Manual exposure mode, which lets you pick the exposure settings.

CROSS REF For a detailed description of all exposure modes, see Chapter 2.

- ▶ **Hot shoe.** This is where you attach an accessory flash to the camera body. The hot shoe has an electronic contact that tells the flash to fire when the shutter is released. A number of other electronic contacts allow the camera to communicate with the flash, enabling the automated features of a dedicated flash unit such as the SB-700.
- ▶ **Stereo microphone.** The D5200 is the first Nikon camera to employ a built-in stereo microphone.
- ▶ **Speaker.** This small speaker allows you to hear the sound of the video playback. The fidelity isn't very good, but it will give you a close approximation of what the sound will be like.
- ▶ **Focal plane indicator.** This marks the plane where the front of the sensor lies. Nikon uses this as the mark of the closest focus length of a lens, and when measuring distances for manual flash calculations, this is where the measurement to the subject from the camera should start.

On top of the kit lens, you find the following three features:

- ▶ **Focus ring.** Rotating the focus ring allows you to focus the lens manually. The location of the focus ring varies by lens. With old AF (non-AF-S) lenses, and even older manual-focus lenses, you turn the ring to focus the lens. Newer AF-S lenses, such as the kit lens, have a switch labeled A and M. Select M before attempting to manually focus. If you don't switch it over first, you can damage the lens. Some higher-end AF-S lenses have a switch labeled A/M and M. With these lenses set to the A/M position, you can manually override the autofocus at any time without damaging the lens.

CROSS REF For more information on lenses and compatibility, see Chapter 4.

- ▶ **Zoom ring.** Rotating the zoom ring allows you to change the focal length of the lens. Prime lenses do not have a zoom ring.
- ▶ **Focal length indicators.** These numbers indicate (in millimeters) to which focal length your lens is zoomed.

The back of the camera

The back of the camera is where you find the buttons that mainly control playback and menu options, although a few buttons control some of the shooting functions. Most of the buttons have more than one function. Additionally, you use many of them in conjunction with the Command dial or multi-selector. On the back of the camera, you also find several key features, including the all-important LCD screen and viewfinder.



Image courtesy of Nikon, Inc.

1.2 The controls on the back of the camera.

The following are all of the controls on the back of the camera:

- ▶ **Vari-angle LCD monitor.** This is the most prominent feature on the back of the camera. This 3-inch, 930,000-dot liquid crystal display (LCD) is a very bright, high-resolution screen. The LCD is where you view all of the current camera settings and review your images after shooting. It also displays the video feed for Live View mode (**Lv**) and video recording. The Nikon D5000 series cameras are the only ones that feature this type of display, which allows you to position and swivel the screen, which aids in composing photos at odd angles when shooting photos or video.

- ▶ **Viewfinder.** This is what you look through to compose your photographs. Light coming through the lens is reflected from a series of five mirrors (called a *pentamirror*), enabling you to see exactly what you're shooting. The rubber eyepiece around the viewfinder gives you a soft place to rest your eye and blocks any extra light from entering the viewfinder as you compose and shoot your images.
- ▶ **Diopter adjustment control.** Just to the right of the viewfinder (hidden behind the eyecup) is the diopter adjustment control. Use this control to adjust the viewfinder lens to suit your individual vision strength (not everyone's eyesight is the same). The best way to do this is to look at the viewfinder display and rotate the dial until the information in the viewfinder display is sharp.
- ▶ **AE-L/AF-L () /Protect () button.** The Auto Exposure/Autofocus Lock () /Protect () button locks the Auto Exposure (AE) and Autofocus (AF). You can customize this button in the Custom Setting menu ( f2 to provide AE/AF Lock, AE Lock only, AF Lock only, or AF-ON. AE Lock (hold) locks the exposure when you press the shutter-release button once; the exposure remains locked until you press the button again or the shutter releases. AF-ON engages the AF in the same way that half-pressing the shutter-release button does. When the camera displays an image in Playback mode, press this button to lock the image and protect it from being deleted.

CROSS REF See Chapter 3 for more detailed information about the AE-L/AF-L button ().

- ▶ **Info edit button ()**. Press this button once to bring up the information display on the LCD screen. Press it again to use the multi-selector to adjust the camera settings.
- ▶ **Command dial.** You use this dial to change a variety of settings, depending on the button with which you are using it. By default, it changes the shutter speed when the camera is in Shutter-priority auto (**S**), Programmed auto (**P**), and Manual exposure (**M**) modes. When shooting in Aperture-priority auto mode (**A**) it changes the aperture setting. It can also adjust exposure compensation and change the flash mode.
- ▶ **Playback button ()**. Press this button to activate playback. By default, it displays the most recently taken photograph. You can also view other pictures by pressing the multi-selector left () and right () .
- ▶ **Multi-selector.** This is another button that serves several purposes. When playing back images, you use it to scroll through the photographs you've taken or to view image information, such as histograms and shooting settings. When the D5200 is in Single-point AF () or Dynamic-area AF () mode, you can use the

multi-selector to change the active focus point. You can also use the multi-selector to navigate through the menu options.

- ▶ **OK button (OK).** When viewing menus, press the OK button (OK) to select the highlighted menu item. In Playback mode (▶), press the OK button (OK) to display the Retouch Menu (▣) options. When actively shooting, press the OK button (OK) to reset the active focus point to the center.
- ▶ **Memory card access lamp.** This light blinks when the memory card is in use. Under no circumstances should you remove the memory card when this light is on or blinking. You could damage the card or your camera, and lose any information in the camera's buffer. If the buffer is full when you switch the camera off, the camera will stay powered on, and this button will continue blinking until the data finishes transferring from the buffer to the memory card.
- ▶ **Delete button (☒).** If you are reviewing your pictures and find some that you don't want to keep, press this button to delete them. To prevent you from accidentally deleting images, the camera displays a dialog box asking you to confirm that you want to erase the picture. Press the Delete button (☒) a second time to erase an image permanently.
- ▶ **Zoom in button (Q).** When reviewing your images or using the Live View option (Lv), you can press the Zoom in button (Q) to get a closer look at the details of your image. This is a handy feature for checking the sharpness and focus of your shot. When the camera is zoomed in, use the multi-selector to navigate around within the image. To view your other images at the same zoom ratio, you can rotate the Command dial. To return to full-frame playback, press the Thumbnail/Zoom out button (Q☒). You may have to press the Thumbnail/Zoom out button (Q☒) multiple times, depending on how much you zoomed in previously.
- ▶ **Thumbnail/Zoom out button (Q☒).** When reviewing images, press this button to switch from full-frame playback (that is, viewing the whole image) to viewing thumbnails. The thumbnail view displays 4, 9, or 72 images. You can also view images by calendar date. When you're viewing the menu options, press this button to display a help screen that explains the functions of that particular menu option. This button also zooms out of an image on which you have zoomed.
- ▶ **Menu button (MENU).** Press this button to access the D5200 menu options. There are a number of different menus, including Playback (▶), Shooting (CAMERA), Custom Setting menu (setFlash), and Retouch (▣). Use the multi-selector to choose the menu you want to view, and then press the OK button (OK) to enter the specific menu screen.
- ▶ **Rear Infrared receiver.** This receiver picks up the infrared signal from the optional wireless remote, the ML-L3.

The front of the camera

While this is the main business end of the camera, there really aren't many controls here. The most important part is pointed right at you — the lens.



Image courtesy of Nikon, Inc.

1.3 The front of the Nikon D5200.

The features are as follows:

- ▶ **Lens release button.** This button disengages the locking mechanism of the lens, allowing the lens to be rotated and removed from the lens mount.
- ▶ **AF-assist illuminator.** This is an LED that shines on the subject to help the camera focus when the lighting is dim. The AF-assist illuminator only lights up when in Single Servo AF mode (**AF-S**) or Full-time-servo mode (**AF-F**) and the center AF point is selected. This LED also lights up when you set the camera to Red-Eye Reduction flash (**FE**) using the camera's built-in flash.

- ▶ **Front Infrared receiver.** This receiver picks up the infrared signal from the optional wireless remote, the ML-L3.
- ▶ **Reflex mirror.** This is where the dSLR gets its name. The reflex mirror is used to reflect light coming through the lens up through the viewfinder so the photographer can see exactly what is coming through the lens. When making an exposure, the reflex mirror flips up, exposing the shutter; this opens and exposes the sensor to light.

The left side of the camera

On the left side of the camera (with the lens facing away from you, as you would normally hold it), you find the output terminals and a few other important buttons. The terminals connect accessories or link your camera to a computer or other external source for viewing. The terminals are hidden under a rubber cover that helps keep out dust and moisture.



Image courtesy of Nikon, Inc.

1.4 The left side of the Nikon D5200.

The features are as follows:

- ▶ **Flash pop-up/Flash mode (Flash icon)/Flash compensation button (Flash Compensation icon).** When you're using the Programmed auto (P), Shutter-priority auto (S), Aperture-priority auto (A), or Manual (M) exposure modes, press this button to open and activate the built-in flash. Pressing this button and rotating the Command dial on the rear of the camera allows you to choose a flash mode. Depending on the Shooting mode (CAMERA), you can choose from among the default Front curtain sync (Flash icon), or the Red-Eye Reduction (Flash icon with eye), Red-Eye Reduction with Slow Sync (Flash icon with slow shutter), Slow Sync (Flash icon with slow shutter), Rear-curtain sync (Flash icon with rear curtain), or Rear-curtain Slow Sync (Flash icon with slow shutter and rear curtain). After the flash pops up, press this button in conjunction with the Exposure Compensation button (EV) while rotating the Command dial to adjust the Flash Compensation (Flash Compensation icon). This enables you to adjust the flash output to make the flash brighter or dimmer depending on your needs. When you shoot in the Automatic (AUTO) or scene modes, the flash automatically activates, but some flash sync modes aren't available in some scene modes. The following flash modes are available when using the scene modes:
 - **Automatic (AUTO), Portrait (Flash icon), Child (Flash icon), and Close-up (Flash icon).** In these flash modes, you can use the default, Auto-flash (Flash icon with AUTO), Auto with Red-Eye Reduction (Flash icon with AUTO and eye), or set it to Off.
 - **Night Portrait Scene mode (CAMERA).** In this mode, you can select Red-Eye Reduction (Flash icon with AUTO and slow shutter), the default, Auto with Slow Sync (Flash icon with AUTO and slow shutter), or Off (Off).
 - **Programmed auto (P), Aperture-priority auto (A).** In these modes, you can select Red-Eye Reduction (Flash icon with eye), Red-Eye Reduction with Slow Sync (Flash icon with slow shutter), Slow Sync (Flash icon with slow shutter), or Rear-curtain Slow Sync (Flash icon with slow shutter and rear curtain).
 - **Shutter-priority auto (S), Manual (M).** These modes allow you to use Red-Eye Reduction (Flash icon with eye) or Rear-curtain sync (Flash icon with rear curtain).
- ▶ **Function button (Fn).** You can set the Function button (Fn) to a number of settings so that you can access them quickly, rather than searching through the menu options manually. You can set the button to change the ISO sensitivity (default), image quality, white balance, or Active D-Lighting settings via the Info display. Depending on which option you select, you can press the Function button (Fn) and rotate the Command dial to change the settings. You can change the setting options in the Setup menu (Y) in Custom Setting menu (C) f1.

CROSS REF For the complete list of options you can control with the Function button, see Chapter 3.

- ▶ **Lens mounting mark.** Most lenses have a white or red mark to help you align it, so you can then rotate and lock it into place. Use this white mark to line up with the mounting mark on the lens.
- ▶ **Microphone port.** You can use this port to connect an external microphone, which records sound for your videos at a better quality than you can get from the built-in microphone.
- ▶ **USB port/AV out port.** This is where you plug in the USB cable to attach the camera to your computer, and transfer images directly from the camera to the computer. You can also use the Nikon Camera Control Pro 2 software to control the camera from a computer. Using the included EG-CP16 A/V cable, you can also use this port to connect your camera to a standard-definition TV.
- ▶ **GPS/Accessory port.** This accessory port allows you to connect the optional Nikon GP-1 or a third-party GPS accessory for geo-tagging your images. This is also where you can connect an accessory remote, such as the Nikon MC-DC2, or the WR-R10 wireless remote control.
- ▶ **HDMI port.** This terminal is for connecting your camera to a high-definition (HD) TV or monitor. It requires a type C mini-pin HDMI cable, which is available at any electronics store.

If you purchased the camera with a kit lens, there are a few switches on it. (If you’re using a different Nikon lens or one from a third party, the switches may be different or there may be none at all.)

The following switches are on the lens:

- ▶ **Autofocus switch.** You use this switch to choose between using the lens in Auto or Manual focus.
- ▶ **VR switch.** This switch allows you to turn Vibration Reduction (VR) on or off. When you’re shooting in normal or bright light, it’s best to turn VR off to reduce battery consumption.

The right side of the camera

On the right side of the camera (with the lens facing away from you, as you would normally hold it), you find the memory card slot cover. To open the cover and insert or remove a memory card, slide it toward the back of the camera.



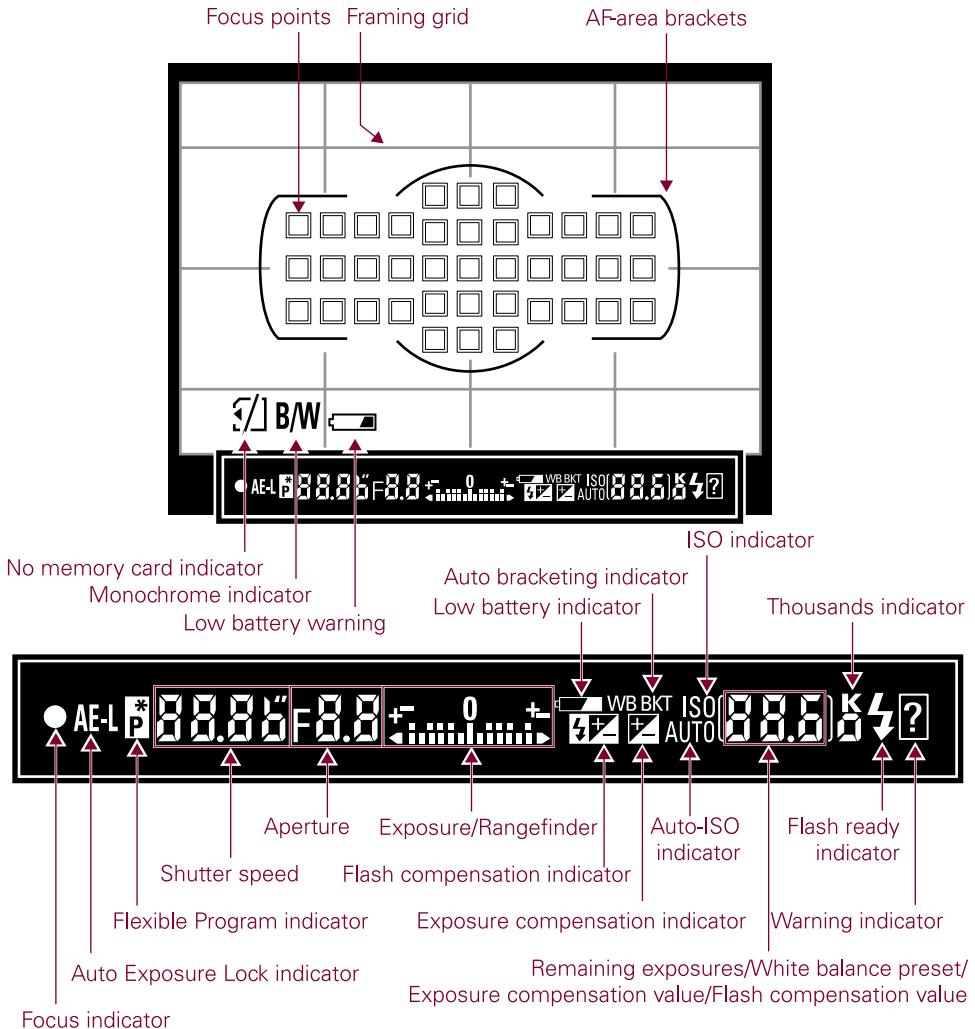
1.5 The memory card slot.

The Viewfinder Display

The viewfinder display is kind of like the heads-up display in a jet plane. It allows you to see a lot of useful information about the settings of the camera. This aids you in setting up the shot without having to take your eye away from the viewfinder to check on your settings. Most of the information also appears in the Information display, but it is less handy when you are looking through the viewfinder composing a shot.

Here is a complete list of the information you find in the viewfinder display:

- ▶ **Framing grid.** When you turn on this option in Custom Setting menu (MENU) d2, a grid displays in the viewing area. Use the grid to line up elements of your composition to ensure they are straight (or not).



1.6 The viewfinder display.

- ▶ **Focus points.** The first thing you are likely to notice when looking through the viewfinder is a small rectangle near the center of the frame. This is your active focus point. Note that only the active focus point is shown full time when you use the Single-point (□), Dynamic-area (□), or 3-D tracking (□) autofocus settings. When you set the camera to Auto area AF mode (□), you don't see the focus point until you press the shutter-release button halfway and the camera achieves focus.

- ▶ **No memory card indicator (SD).** You see this icon if there is no memory card in the camera. This warns you that no images can be recorded.
- ▶ **Monochrome indicator (B/W).** This icon appears only when you set the Picture Control to Monochrome (B/W).
- ▶ **Low battery warning (■).** When the camera's battery is nearly depleted, this icon appears. If it is flashing, the battery is completely exhausted and you can't take any more pictures.
- ▶ **AF-area brackets.** These brackets indicate the boundaries of the autofocus points. The autofocus system does not recognize anything that lies outside the brackets. In the middle of the AF-area brackets on the top and bottom, there is a semicircle, which is the 12mm, center-weighted metering circle.
- ▶ **Focus indicator.** This green dot lets you know whether a scene is in focus. When the camera achieves focus, the green dot lights up; if the camera is not in focus, the dot isn't displayed.
- ▶ **Auto Exposure Lock indicator (AE-L).** When this indicator lights up, you know that the Auto Exposure is locked.
- ▶ **Flexible Program indicator (P*).** This indicator appears when you use the Programmed auto mode (P) and Flexible Program is activated.
- ▶ **Shutter speed.** This indicator shows how long the shutter is set to stay open, from 30 seconds (30") up to 1/4000 (4000) second. If the Function button is set to Auto area AF mode (■), this shows one of the following autofocus mode settings: Auto Servo AF (AF-A), Continuous Servo AF (AF-C), or Single Servo AF (AF-S).
- ▶ **Aperture.** This indicator shows the current aperture setting. The words *aperture* and *f-stop* are used interchangeably. The aperture setting indicates the width of the lens opening and appears as a number (1.4, 2, 2.8, 4, 5.6, and so on).
- ▶ **Exposure Indicator/Exposure compensation display/Rangefinder.** When the bars are in the center, the camera is at the proper settings to get a good exposure. By default, when the bars are to the left, the image is underexposed, and when they are to the right, the image is overexposed (you can reverse this in Custom Setting menu [F] f5). This option only appears when in Manual (M) mode, when Exposure Compensation (±) is applied, or if the camera is under- or overexposing at the current settings. This display also doubles as a digital rangefinder to help you when manually focusing lenses. If the display is on the left, the focus is falling in front of the subject; if the display is on the right, the focus is behind the subject. Rotate the focus ring until the rangefinder option is centered and you see a 0 above the innermost 2 rangefinder lines. The focus indicator also appears when the camera achieves focus.

- ▶ **Low battery indicator (■).** This appears when the battery is low. When the battery is completely exhausted, this icon blinks and the shutter-release button is disabled.
- ▶ **Flash compensation indicator (⚡).** When this indicator appears, Flash compensation is on. You adjust FEC by pressing the Flash mode button (flash) in conjunction with the Exposure Compensation button (EZ) and rotating the Command dial.
- ▶ **Auto-bracketing indicator (BKT).** This indicator appears when Auto-bracketing is engaged. Bracketing is set up in Custom Setting menu (C) e2. You can activate it in the Info Display menu.
- ▶ **Exposure compensation indicator (EZ).** When you see this icon, exposure compensation is applied to the exposure setting. To set exposure compensation, press the Exposure Compensation button (EZ) and rotate the Command dial.
- ▶ **ISO indicator (ISO).** If you set the Function button (Fn) to ISO (the default), this indicator appears when you press the button to let you know that the numbers you see are the ISO numbers. This also occurs when Custom Setting menu (C) d3 is set to On.
- ▶ **Auto ISO indicator (AUTO).** This indicator appears when you activate Auto ISO (AUTO) to let you know that the camera is controlling the ISO settings. You can turn on Auto ISO (AUTO) in the ISO sensitivity settings, located in the Shooting menu (CAM).
- ▶ **Remaining exposures/White balance preset/Exposure compensation value/Flash Exposure Compensation value.** By default, this set of numbers lets you know how many more exposures can fit on the memory card. The actual number of exposures may vary according to file information and compression. When you press the shutter-release button halfway, the display shows how many exposures can fit in the camera's buffer before it is full and the frame rate slows down. The *buffer* is in-camera RAM that stores your image data while that data is written to the memory card. This also shows the White Balance preset recording indicator (PRE), as well as the Exposure compensation (EZ) and Flash compensation (⚡EZ) values. When Custom Setting menu (C) d3 is set to On, the ISO setting appears here until you press the shutter-release button halfway; it then displays the number of exposures remaining in the buffer. When you connect the camera to a computer, PC appears here.
- ▶ **Thousands indicator (K).** This indicator lets you know that there are more than 1,000 exposures remaining on your memory card.

- ▶ **Flash-ready indicator (■).** When this indicator appears, the flash, whether it is the built-in flash or an external Speedlight attached to the hot shoe, is fully charged and ready to fire at full power.
- ▶ **Warning indicator (■).** When an error occurs with the camera, this icon flashes. Press the Help button (■).

The Information Display

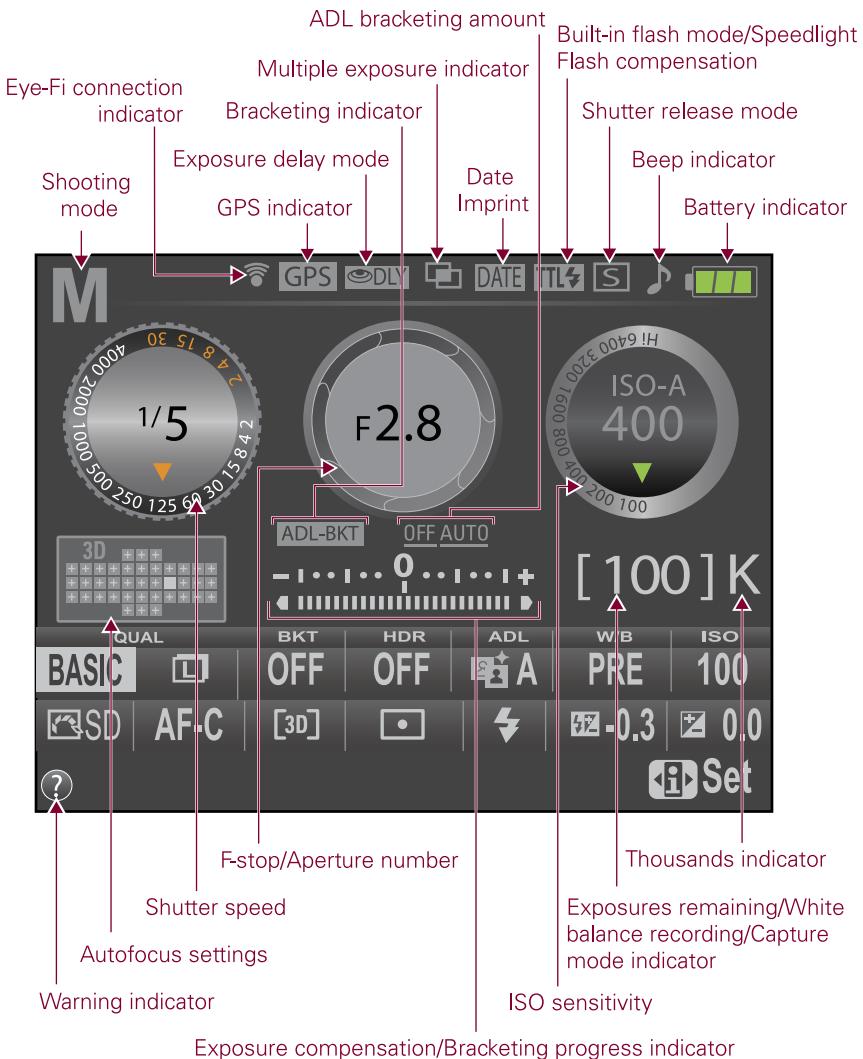
The Information display (referred to as the Info display for brevity) shows all of the relevant shooting and camera information. You can also change some of the most important camera settings quickly in the Info display without having to enter the camera menu system, which can take up important time when shooting.

You activate the Info display by pressing the Info button () located on top of the camera directly behind the shutter-release button, or by pressing the Info edit button () located directly to the right of the viewfinder. Once the Info display is activated and appears on the monitor, press the Info edit button () to enter the Info edit menu, which allows you to change some key settings on the camera (see Figure 1.8). By default, when the Info edit display is active, using the multi-selector highlights the setting you want to change and the D5200 displays the Screen tips to guide you through what each setting does. Once the setting you want to access is highlighted, press the OK button () to view the options for that specific setting.

The information remains on display until no buttons have been pushed for about 10 seconds (the default), or you can press the shutter-release or Info () buttons. This display shows you everything you need to know about your camera settings. Additionally, the camera has a sensor built in that tells it when you are holding it vertically, and the Info display is shown upright, regardless of which way you are holding your camera.

The main display area shows the following important settings:

- ▶ **Shooting mode.** This indicator displays the Shooting mode that your camera is currently set to. This can be one of the scene modes (in which case it displays the appropriate icon), or one of the semiautomatic modes, such as Programmed auto (, P), Shutter-priority auto (, S), Aperture-priority auto (, A), or Manual (, M), in which case it displays the corresponding letter. This display changes when you rotate the Mode dial.



1.7 The Information display.

- **Shutter speed.** This shows the length of time that the shutter remains open during the exposure. This indicator displays the shutter speed setting using a graphic similar to what you might see on a vintage film camera. As the shutter speed changes, the dial appears to move as well.

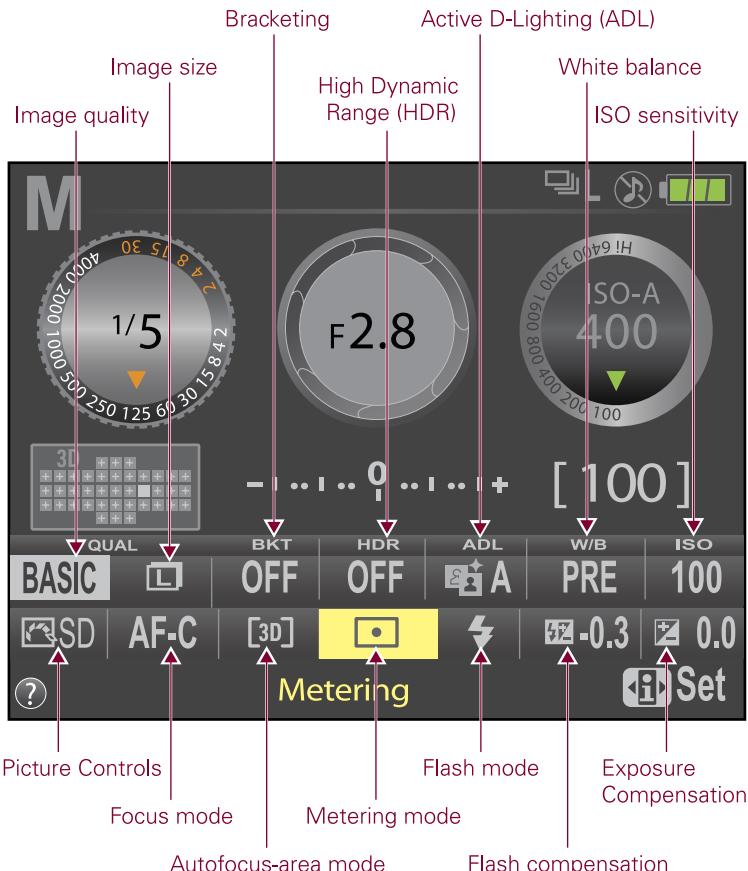
- ▶ **F-stop/Aperture number.** The terms aperture and f-stop are used interchangeably. *Aperture* is the opening in the lens that allows light into the camera. This indicator displays the aperture at which the camera is set. Lower numbers are wider openings that let in more light, and higher numbers are smaller openings that let in less light. As a visual aid, this displays what the aperture might look like if you were looking inside the lens.
- ▶ **ISO sensitivity.** This indicator shows you the ISO sensitivity settings. If the camera is set to ISO-Auto, you notice that ISO-Auto blinks above the sensitivity number.
- ▶ **Autofocus settings.** This area displays info about the autofocus settings, the Auto area AF mode (), as well as the active focus point when the camera is in Single Servo autofocus mode (). It also displays the active focus and surrounding points when in the Dynamic-area autofocus () and 3-D tracking () modes.
- ▶ **Bracketing indicator.** When the Auto-bracketing feature is engaged, this indicator shows the type of bracketing that is being applied: Autoexposure (AE), Active D-Lighting (ADL), or White balance (WB). The auto-bracketing choices are made in Custom Setting menu (e2).
- ▶ **ADL bracketing amount.** When auto-bracketing is set to Active D-Lighting, this indicator displays the amount of ADL bracketing.
- ▶ **Exposure/Exposure compensation/Bracketing progress indicator.** When shooting in Manual exposure mode (, this is displayed and used as a light meter to assess your exposure. When in any other mode, including scene and effects modes, this is only displayed if the settings indicate an under- or overexposure. When in Programmed auto (, Shutter-priority auto (, or Aperture-priority auto () mode, this icon only appears when exposure compensation () is applied. When auto bracketing is on, this is a visual display of the progress of the bracketing series.
- ▶ **Exposures remaining/White balance recording ()/Capture mode indicator ()**. By default, this displays the approximate number of photos that can be recorded to the memory card. When the camera is making a White balance preset, this area displays that icon (). When the camera is connected to a computer using Nikon Camera Control Pro 2, the Capture mode indicator () appears.

- ▶ **Thousands indicator (K).** When a memory card is inserted that allows more than 1,000 images to be recorded, this icon appears.

On the top bar of the Information display, the following indicators display some of the less critical settings, as well as some options related to additional accessories:

- ▶ **Eye-Fi connection indicator.** This indicator is displayed when an optional Eye-Fi wireless SD card is being used.
- ▶ **GPS indicator.** When an optional Nikon GP-1 device or another compatible GPS device is connected via the accessory port this indicator is shown. When the indicator is flashing, the GPS unit is searching for a signal. If a signal connection is being maintained, the indicator stays on.
- ▶ **Exposure delay mode.** When Custom Setting menu (setFlash) d5 is turned on, the mirror is raised for 1 second before the shutter opens to allow the camera vibration to stop before taking a photo to avoid blur. When the delay mode is activated, this indicator is displayed.
- ▶ **Multiple exposure indicator.** When the Multiple exposure setting is activated, this indicator appears. You can set Multiple exposure in the Shooting menu (camera).
- ▶ **Date imprint.** When the camera is set to add the time and date to the image, this indicator is shown. The date option is turned on in Custom Setting menu (setFlash) d6.
- ▶ **Built-in flash mode/Speedlight Flash compensation.** When the built-in flash is activated, the exposure mode, Manual (M \downarrow) or TTL (TTL \downarrow), is displayed here. It also appears if you attach a Speedlight and apply Flash compensation with the controls on the Speedlight, rather than with those on the camera.
- ▶ **Release mode.** This displays the Release mode (mode) to which the camera is set.
- ▶ **Beep indicator.** This icon has two versions: Beep on (♪) and Beep off (♫). One or the other appears at all times. You set this option in Custom Setting menu (setFlash) d1.
- ▶ **Battery indicator.** This indicator shows the amount of power left in the battery, but lacks any other in-depth information.

The Information edit display is where you go to change your most commonly used settings. Press the Info edit button (**i**) twice to access these settings and change them quickly. Use the multi-selector to highlight the desired option, and then press the OK button (**OK**) to view the settings options.



1.8 The Info edit display.

The following options are available in the Info edit menu:

- ▶ **Image quality.** This is where you set the image quality file type. You can set the camera to record RAW files, JPEG files, or RAW+JPEG simultaneously. This is also where you set the JPEG compression options. The JPEG compression options are Fine, Normal, and Basic.

- ▶ **Image size.** When you record JPEGs, you can set the camera to record different file sizes. This option isn't available when shooting RAW files only.
- ▶ **Bracketing.** This option shows the bracketing settings options. When you set Custom Setting menu (setFlash) e2 to Auto Exposure bracketing (AE), the bracketing increment appears here. When you set it to White Balance bracketing (WB) or Active D-Lighting (ADL), this shows whether auto bracketing is on or off.
- ▶ **High Dynamic Range (HDR).** This allows you to activate the camera's built-in HDR option. You can set it to Auto, Extra High, High, Normal, Low, and Off. The HDR setting allows the camera to capture two exposures and blend them together. This creates an image with a greater amount of range from the shadows (dark) to highlight (bright) areas of the image.
- ▶ **Active D-Lighting (ADL).** This option allows you to capture more detail in the highlight and shadow areas when shooting in high-contrast situations. This is similar to HDR, but it only uses one exposure and the effect is much more subtle. You can set Active D-Lighting (ADL) to Auto, Extra High, High, Normal, Low, and Off.
- ▶ **White balance.** This is where you select the white balance settings.
- ▶ **ISO sensitivity.** This option changes the ISO sensitivity settings.
- ▶ **Picture Controls.** Picture Controls affect the coloring, saturation, sharpness, and other qualities of the images. You change them using this menu option.

CROSS REF For more detailed information about Picture Controls, see Chapter 2.

- ▶ **Focus mode.** Use this menu option to change the focus mode from Auto Servo (AF-A), Single Servo (AF-S), or Continuous Servo (AF-C).
- ▶ **Autofocus area mode.** This option changes the autofocus area mode. You can choose from the following options: Single-point AF (□), Dynamic area 9-point (□9), Dynamic area 21-point (□21), Dynamic area 39-point (□39), 3-D tracking (□3D), or Auto area AF (□).
- ▶ **Metering mode.** You change the metering options here. You have the following three options: Matrix (□), Center-weighted (□), or Spot (□) metering.
- ▶ **Flash mode.** This is where the flash mode options are set. The options differ depending on the selected exposure mode.

- ▶ **Flash compensation.** You can set the Flash compensation ( ) here. Flash compensation increases or decreases the amount of light emitted by the flash. This option is only available in the Programmed auto (**P**), Shutter-priority auto (**S**), Aperture-priority auto (**A**), or Manual (**M**) exposure modes.
- ▶ **Exposure compensation.** This is where you can adjust the exposure compensation ( ) to fine-tune the exposure. This option is only available in the Programmed auto (**P**), Shutter-priority auto (**S**), Aperture-priority auto (**A**), or Manual (**M**) exposure modes.

Nikon D5200 Essentials

Once you familiarize yourself with the basic layout of the Nikon D5200's various controls, you can explore what all of these buttons, switches, and dials do. The settings you will change most frequently include the exposure, drive, metering modes, and ISO sensitivity. These settings are very important to learn because a lot of them deal with basic photographic theories. You need to learn when to use them and why, so you can capture your images effectively and creatively.

The essentials are the most important parts of the camera system. There are a lot of different modes, menus, and settings to get acquainted with, and that's where I go in this chapter. There's also quite a bit of information packed in here, so I suggest that you grab your camera, sit down, and read this chapter thoroughly.



Knowing which modes and features to use in any given situation allows you to get a good exposure every time.

Exposure Modes

The *exposure mode* dictates how the aperture and shutter speed are selected. The four main exposure modes are Programmed auto (**P**), Aperture-priority auto (**A**), Shutter-priority auto (**S**), and Manual (**M**). These are all you need to achieve the correct exposure, but for simplicity and ease of use, Nikon also offers scene modes.

When you use scene modes, the camera chooses the correct settings for different situations. Modes designate everything from autofocus and Picture Controls, to flash and ISO settings (although you are able to adjust some of these). To switch among the exposure modes, simply rotate the Mode dial on top of the camera.

Automatic modes

The D5200 has two fully automatic, or Auto, modes that do all the work for you. These are simple grab-and-go camera settings to use when you're in a hurry or you just don't want to be bothered with changing the settings. The Auto modes control everything from shutter speed and aperture to ISO sensitivity and white balance.

TIP To override the Auto ISO setting (**AUTO**), you can change ISO sensitivity in the Info settings. The override remains in effect unless you change the camera to the Programmed auto (**P**), Shutter-priority auto (**S**), Aperture-priority auto (**A**), or Manual (**M**) mode, and then return to one of the scene modes. When you change back to a scene mode from any of the modes mentioned above, the Auto ISO function (**AUTO**) reactivates.

In Auto mode (**AUTO**), the camera takes complete control over the exposure. The camera's meter reads the light, the color, and the brightness of the scene and runs the information through a sophisticated algorithm. The camera uses this information to determine what type of scene you are photographing and chooses the settings that it deems appropriate for the scene.

If there isn't enough light to make a proper exposure, the camera's built-in flash pops up when you half-press the shutter-release button for focus. The flash fires when the shutter is released, resulting in a properly exposed image. This mode is ideal for taking snapshots because you can concentrate on capturing the image and let the camera determine the proper settings.

The Auto Flash off mode (⌚) functions in the same way as Auto mode (.AUTO), except that it disables the flash, even in low-light situations. In instances where the lighting is poor, the camera's AF-assist illuminator provides sufficient light to achieve focus. The camera uses the focus area of the closest subject to focus on.

This setting is preferable when you want to use natural or ambient light for your subject or in situations where you aren't allowed to use flash, such as in museums, or at events where the flash may cause a distraction, such as weddings.

Programmed auto mode

Programmed auto (P) is an automatic mode that's best for shooting snapshots and scenes when you don't necessarily want or need complete control over the settings. This mode is much more useful than the fully auto mode, as you will see.

When the camera is in Programmed auto (P), it decides the shutter speed and aperture settings for you based on a set of algorithms. The camera does its best to select a shutter speed that allows you to shoot handheld without suffering from camera shake while also adjusting your aperture so that you get sufficient depth of field to ensure everything is in focus. When the camera body is coupled with a lens that has a CPU built in (all Nikon AF lenses have a CPU), the camera automatically knows what focal length and aperture range the lens has. The camera then uses this lens information to decide what the optimal settings should be.

This exposure mode chooses the widest aperture possible until it reaches the optimal shutter speed for the specific lens. Then the camera chooses a smaller f-stop and increases the shutter speed as light levels increase. For example, when you use the 18-55mm kit lens at the 24mm setting, the camera keeps the aperture wide open until the shutter speed reaches about 1/30 second (just above minimum shutter speed to avoid camera shake). Upon reaching 1/30 second, the camera adjusts the aperture to increase depth of field.

NOTE When you use the Auto ISO setting (AUTO) in Programmed auto mode (P), the camera tries to hold the shutter speed at the number specified in the Auto ISO (AUTO) sensitivity settings.

The exposure settings selected by the camera appear in both the Information Display and the viewfinder display. Although the camera chooses what it thinks are the optimal settings, it does not know your specific needs. For example, you may want a wider or smaller aperture for selective focus. Fortunately, you aren't stuck with the camera's exposure choice. You can engage what is known as *Flexible Program (P*)*. Flexible Program allows you to deviate from the camera's selected aperture and shutter speed in Programmed auto mode (**P**). You can automatically engage this feature by simply rotating the Command dial until you get the desired shutter speed or aperture. This allows you to choose a wider aperture/faster shutter speed when you rotate the dial to the right, or a smaller aperture/slower shutter speed when you rotate the dial to the left. With Flexible Program, you can maintain the metered exposure while still having some control over the shutter speed and aperture settings.

For example, say that you're shooting a portrait and you want a wider aperture to throw the background out of focus, and the camera has set the shutter speed at 1/60 second with an aperture of f/8.0. If you rotate the Command dial to the right, you can open the aperture to f/4.0, which increases the shutter speed to 1/250 second. This is an *equivalent exposure*, meaning that you get the same exposure but the settings are different.

When Flexible Program is on, an asterisk appears next to the Programmed auto mode icon on the LCD monitor, like this: **P***. Rotate the Command dial until the asterisk disappears to return to the default Programmed auto settings (**P**), or turn the camera off and back on.

NOTE Programmed auto mode (**P**) is not available when you use non-CPU lenses.

Aperture-priority auto mode

Aperture-priority auto (**A**) is a semiautomatic mode. In this mode, you decide which aperture to use by rotating the Command dial, and the camera sets the shutter speed for the best exposure based on your selection. A situation in which you may want to select the aperture is when shooting a portrait and you want a large aperture (small f-stop number) to blur out the background by minimizing depth of field. You can also use Aperture-priority auto (**A**) when shooting a landscape and you want a small aperture (large f-stop number) to ensure the entire scene is in focus by increasing depth of field.



2.1 Shooting in Aperture-priority auto mode and setting a wide aperture of f/1.4 makes the background an indistinct blur, isolating one area so it stands out as the main subject. Exposure: ISO 100, f/1.4, 1/160 second using a Sigma 35mm f/1.4 DG HSM.



2.2 Shooting in Aperture-priority auto mode and setting a smaller aperture of f/11 makes everything in the background more recognizable, and therefore, more distracting. Exposure: ISO 3200, f/11, 1/100 second using a Sigma 35mm f/1.4 DG HSM.

Choosing the aperture to control depth of field is one of the most important aspects of photography. It allows you to control selectively which areas of your image, from foreground to background, are in sharp focus and which are blurred. Controlling depth of field enables you to draw the viewer's eye to a specific part of the image, which can make your images more dynamic and interesting to the viewer.

Shutter-priority auto mode

Shutter-priority auto (**S**) is another semiautomatic mode. In this mode, you choose the shutter speed by rotating the Command dial and the camera automatically sets the aperture. You can choose shutter speeds from as long as 30 seconds to as short as 1/4000 second.

You can also use Shutter-priority auto mode (**S**) to set a slow shutter speed. A slow shutter speed allows you to introduce many creative effects into your photography. Selecting a slow shutter speed of about 2 to 4 seconds allows you to create a motion blur from any subjects that may be moving in the frame. Shooting flowing water with a slow shutter speed gives it a smooth, glassy appearance, while shooting a scene with moving automobiles creates cool light trails from the head- and taillights. Of course, to be able to achieve a slow shutter speed, the lower the light the better; also keep in mind that it's best to use a tripod when attempting long exposures.



2.3 Using Shutter-priority auto mode and a slow shutter speed of 1/5 second allowed me to capture the person moving through this street scene as a blur. (A tripod was required to get the rest of the photo in focus.) Exposure: ISO 200, f/11, 1/5 second using a Sigma 17-35mm f/2.8-4 DG HSM at 17mm.



2.4 Using Shutter-priority auto and a fast shutter speed of 1/4000 second, I was able to freeze the motion of this BMXer doing a no-hander. Exposure: ISO 100, f/2.8, 1/4000 second using a 28-70mm f/2.8 AF-S.

You generally use Shutter-priority auto (**S**) to capture moving subjects or action scenes. Choosing a fast shutter speed allows you to freeze the action of a fast moving subject, such as when shooting sports. Running athletes move extremely fast, so you need to use a shutter speed of about 1/250 second or faster to freeze the motion and prevent blur. This allows you to capture the details of the subject with sharp definition.

Even when you shoot quick action, you may sometimes want to use a slower shutter speed. If you use a slow shutter speed while panning on a moving subject, it blurs the background while keeping the subject in relatively sharp focus. A blurred background is an extremely effective way of portraying motion in a still photograph.

Manual mode

When in Manual mode (**M**), you set both the aperture and shutter speed. You can use the electronic analog exposure display on the D5200 to determine the exposure needed, or if you're using a non-CPU lens you can estimate the exposure or use a handheld light meter. There are smartphone apps that allow you to use your iPhone or similar device as a light meter.

The following are a few situations in which you might want to set the exposure manually:

2

- ▶ **When you want complete control over exposure.** Usually the camera decides the optimal exposure based on technical algorithms and an internal database of image information. However, what the camera decides is optimal may not necessarily be optimal in your mind. You may want to underexpose the image to make it dark and foreboding, or you may want to overexpose it a bit to make the colors pop (making them bright and contrasty). When you set your camera to Manual mode (**M**), you can choose the settings and place your image in whatever tonal range you want without having to fool with exposure compensation settings.
- ▶ **When you use studio flash.** If you use studio strobes or external, undedicated flash units, you don't need the camera's metering system. When using external strobes, you need a flash meter or manual calculation to determine the proper exposure. In Manual (**M**), you can set the aperture and shutter speed to the proper exposure quickly; just be sure not to set the shutter speed above the rated sync speed of 1/200 second.
- ▶ **When you use non-CPU lenses.** The D5200 only functions in Manual mode (**M**) with these older lenses.

Scene Modes

If you're accustomed to using the fully Automatic modes — Auto ( AUTO) and Auto Flash off ( ) — you may have noticed, especially when shooting in difficult lighting situations or other special circumstances, that these modes may not give you the results you desire. The D5200 Scene modes take into account different lighting situations and desired outcomes and modify the way the camera meters the light. Scene modes also control the autofocus settings, the flash settings, and the aperture, shutter speed, Picture Controls, and ISO sensitivity settings.

NOTE When you use scene modes, you cannot adjust the White balance (WB), Picture Controls, or Active D-Lighting (ADL) settings. Each scene mode has default settings for ISO, AF-area, autofocus, and flash modes, but you can change them. These settings return to the default when you turn the camera off or turn the Mode dial to another setting.

The camera may also determine whether there is enough light to make an exposure, and then activate the built-in flash if the light is insufficient. Conversely, in some scene modes, such as Landscape (), the camera also makes sure that the flash is not used, even in low-light situations.

The D5200 has 16 scene modes to cover almost every possible shooting scenario, which allows you to focus on capturing the image without worrying about the camera settings.

NOTE The D5200's High Dynamic Range (HDR) and multiple exposure features are disabled when you use Scene modes.

Rotating the mode dial to the appropriate icon directly accesses the first five scene modes on this list. These are: Portrait (), Landscape (), Child (), Sports (), and Close-up (). To access the other 11 scene modes (aptly called *Other Scenes* in Nikon literature), rotate the Mode dial to Scene mode ( SCENE), and then rotate the Command dial to choose a setting from the menu option on the LCD screen.

You can choose from the following Scene modes on your D5200:

- ▶ **Portrait mode ().** This mode is for taking pictures of people. The camera automatically adjusts the colors to provide natural-looking skin tones. It focuses on the closest subject and, if possible, attempts to use a wide aperture to reduce

the depth of field. This draws attention to the subject of the portrait, leaving distracting background details out of focus. The built-in flash and AF-assist illuminator automatically activate in low-light situations. Picture Control is set to Portrait (PT).

- ▶ **Landscape mode ().** When taking photos of far-off vistas, you want to use this mode. The camera automatically adjusts the colors to apply brighter greens and blues to skies and foliage. The camera also automatically focuses on the closest subject and uses a smaller aperture to provide a greater depth of field to ensure focus throughout the entire image. In this mode, the camera automatically disables the AF-assist illuminator and the flash. Picture Control is set to Landscape (LS).
- ▶ **Child mode ().** This mode is ideal for taking portraits or candid shots of children. The camera automatically adjusts the colors to provide more saturation while still providing a natural skin tone. It automatically focuses on the closest subject and uses a fairly small aperture to capture background details. The built-in flash is automatically activated when the light is low. Picture Control is set to Standard (SD).
- ▶ **Sports mode ().** A fast shutter speed freezes the action of moving subjects when the camera is set to this mode. The camera focuses continuously as long as the shutter-release button is half-pressed. The camera also uses Predictive Focus Tracking based on information from all the focus areas in case the main subject moves from the selected focus point. The camera disables the built-in flash and AF-assist illuminator when you select this mode. Picture Control is set to Standard (SD).

TIP To shoot a quick sequence shot, set the Release Mode () to one of the two Continuous shooting modes: Continuous high-speed (H) or Continuous low-speed (L).

- ▶ **Close-up mode ().** Use this mode for close-up or macro shots. It uses a fairly wide aperture to provide a soft background while giving the main subject a sharp focus. In this mode, the camera focuses on the subject in the center of the frame, although you can use the multi-selector to choose one of the other focus points to create an off-center composition. When light is low, the camera automatically activates the built-in flash. Be sure to remove your lens hood when using the flash on close-up subjects because the lens hood can cast a shadow on your subject by blocking the light from the flash. Picture Control is set to Standard (SD).

CROSS REF It's best to use the Close-up Scene mode () in conjunction with a macro lens or close-up filter. See Chapter 4 for more details on macro lenses and Chapter 8 for general macro shooting advice.



2.5 This shot was taken using the Close-up Scene mode. Exposure: ISO 100, f/4.5, 1/1250 second using a Sigma 35mm f/1.4 DG HSM.

- ▶ **Night Portrait mode ()**. This mode is ideal for taking portraits in low-light situations. The camera automatically activates the flash and uses a longer shutter speed (Slow Sync) to capture the ambient light from the background. This balances the ambient light and the light from the flash, giving you a more natural effect. You may want to use a tripod when you use this mode to prevent blurring from camera shake that can occur during longer exposure times. Picture Control is set to Portrait () .

- ▶ **Night Landscape mode (■).** This mode disables the flash, sets a small aperture, and uses a long shutter speed to capture ambient light. The AF-assist illuminator is automatically turned off. You definitely need a tripod when using this mode. Picture Control is set to Standard (■SD).
- ▶ **Party/Indoor mode (✳).** When you use this mode, it automatically activates the built-in flash and uses the Red-Eye Reduction feature. Use this mode for capturing snapshots of people while retaining some of the ambient light for a more natural look. Picture Control is set to Standard (■SP).
- ▶ **Beach/Snow mode (□).** Sand and snow present a tricky situation for your camera's light meter, and often cause the camera to underexpose the scene, making the sand or snow appear a dingy, dull gray. Beach/Snow mode (□) adds some exposure compensation to ensure the sand or snow appears a natural, gleaming white. This mode sets Picture Control to Landscape (■LS) and disables the flash and AF-assist illuminator.
- ▶ **Sunset mode (▨).** To capture the intense colors that occur during sunset or sunrise, use this mode. The camera boosts color saturation to enhance this effect. The flash and AF-assist illuminator are disabled, and the camera focuses at the center of the frame. A tripod is recommended when using this mode. Picture Control is set to Landscape (■LS).



2.6 This image was taken with the Beach/Snow Scene mode. Exposure: ISO 200, f/10, 1/400 second using a Sigma 10-20mm f/3.5 DC HSM at 10mm.

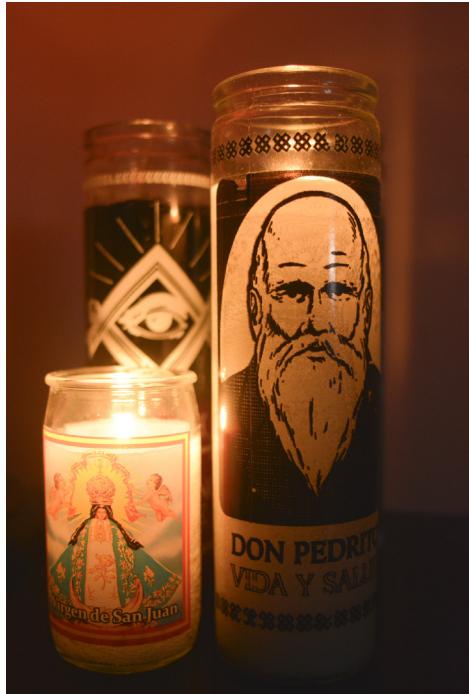
- ▶ **Dusk/Dawn mode (⌚).** This mode is similar to Sunset mode (🌅), but it is intended for shooting *after* the sun sets or *before* it rises. This mode boosts the color saturation to accent the colors that are less visible when the sun has already set (or has yet to rise) and there is little light available. In this mode, the flash and AF-assist illuminator are disabled, and a tripod is strongly recommended. Picture Control is set to Landscape (-NLS).
- ▶ **Pet Portrait mode (🐩).** This is, obviously, the ideal mode for taking photos of pets. This mode uses a faster shutter speed to freeze any movement a frisky pet might make. The flash is set to automatically activate in low light, but the AF-assist illuminator is disabled. Picture Control is set to Standard (NSD).
- ▶ **Candlelight mode (🕯).** Achieving natural colors when shooting in candlelight can be difficult, especially with standard Auto white balance settings. This mode can help you out. The camera also uses wide aperture settings. The flash is disabled and Picture Control is set to Standard (NSD).



2.7 This image was taken using the Dusk/Dawn Scene mode. Exposure: ISO 400, f/10, 1/160 second using a Nikon 10-24mm f/3.5-4.5G at 10mm.



2.8 I shot this image using the Pet Portrait Scene mode. Exposure: ISO 100, f/1.4, 1/160 second using a Nikon 50mm f/1.4G.



2.9 The Candlelight Scene mode. Exposure: ISO 1000, f/1.4, 1/30 second using a Nikon 24mm f/1.4G.

- ▶ **Blossom mode (✿).** This is the ideal mode for shooting landscapes of large fields with colorful flowers. This mode boosts the colors for a more vibrant look. The built-in flash is disabled. Picture Control is set to Landscape (✿).
- ▶ **Autumn Colors mode (✿).** When you select this mode, the camera automatically boosts the saturation of reds, oranges, and yellows as those are the most prevalent colors in fall foliage. The built-in flash is disabled. Picture Control is set to Vivid (✿).
- ▶ **Food mode (†).** This mode is for photographing edible items. It boosts colors and the camera selects a fairly wide aperture. When the lighting is low, the built-in flash is automatically activated. Picture Control is set to Standard (✿).

Special Effects Modes

Special Effects modes are found only on the D5000 series of cameras. Some of the options are similar to Scene modes, but there are key differences. The Special Effects are fully automatic, and you cannot make changes to any of the settings. Most of the options add special effects similar to what you may add using image-editing software on your computer.

These effects are best utilized when shooting in Live View mode (**Lv**) so that you are able to preview the effect (you won't be able to see the effect in the optical viewfinder), but the processing involved taxes the camera's processor somewhat and the video refresh rate is reduced significantly, making the Live View images appear jerky.

In addition, each of the effects has different caveats; some will only autofocus in Live View, some won't autofocus at all. Some of the effects must first be set up using Live View before you can use them when shooting through the viewfinder. These will all be covered in each specific section.

To use these Effects settings, rotate the mode dial to Effects (**EFFECTS**), and then spin the command dial to select an effect. Press the OK button (**OK**) to display any optional settings for an effect.

NOTE When using most of the Special Effects modes, the camera automatically switches to JPEG. RAW images are *only* recorded when shooting in the High (**H**) or Low Key (**L**), and Silhouette (**S**) modes.



2.10 I shot this image using the Food Scene mode. Exposure: ISO 320, f/2.0, 1/60 second using a Nikon 35mm f/1.8G.

Night Vision mode

The Night Vision mode (■) is intended for use only in very low light. It's a monochromatic mode that allows the camera to expand the ISO sensitivity up to the equivalent of 102400. This mode doesn't produce optimal image quality, but the effect can be kind of interesting. Keep in mind that there is no High ISO Noise Reduction and the images will have an extreme amount of noise and banding. Autofocus is only available in Live View mode (Lv). I recommend that you use this option sparingly, if at all.

Color Sketch mode

The Color Sketch mode (◎) gives an image a cartoon-like appearance. This effect must first be set up in Live View mode (Lv) before you can use it to shoot stills through the viewfinder. After you select the Color Sketch mode (◎) from the Special Effects menu (EFFECTS), flip the Live View switch to Live View mode (Lv), and then press the OK button (OK) to adjust the settings. You can then select one of the following two choices by pressing the multi-selector up (▲) or down (▼):

- ▶ **Vividness.** Press the multi-selector right (►) to make the colors super saturated. Press the multi-selector left (◀) to mute the colors for an almost black-and-white effect.
- ▶ **Outlines.** This option controls how thick the lines appear. Press the multi-selector left (◀) to make them appear as if they were drawn by a very fine pen; press the multi-selector right (►) to them appear as if they were drawn by a thick, black marker. You may notice that as the outline thickens, the colors become more saturated.

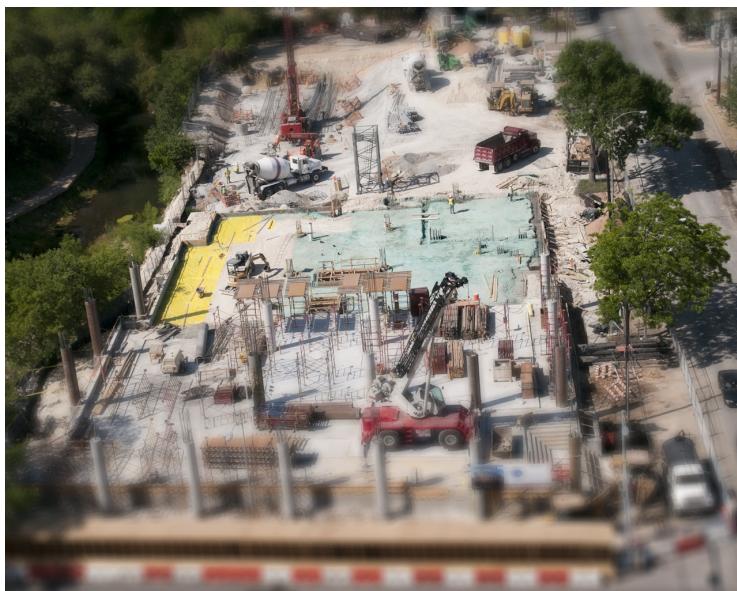
After you select your settings, press the OK button (OK) to set them. You can then continue to shoot in Live View mode (Lv), or you can exit and shoot using the viewfinder while retaining the Color Sketch settings (◎).

When you record videos in Color Sketch mode (◎), the frame rate slows down, and the video is similar to a series of stills linked together and played in sequence.

CAUTION Autofocus is unavailable when you record video in any of the Effects modes (EFFECTS).

Miniature Effect mode

The Miniature Effect mode ( ) applies what is commonly (and erroneously) called the Tilt/Shift effect. This effect applies a simulated shallow depth of field to an image by blurring selected parts of it, and keeping others in sharp focus. This tricks the eye and brain, and causes the subject in the image to appear much smaller than it actually is. This effect works best on images taken from an overhead perspective.



2.11 An example of the Miniature Effect mode. Exposure: ISO 100, f/5.6, 1/4000 with Sigma 17-70mm f/2.8-4 DC HSM OS at 38mm.

You must set this effect in Live View mode () before you can use it. Select Miniature Effect ( ) from the Effects (), and then flip the Live View mode switch (). Use the multi-selector to find a point on which to focus, and then press the shutter-release button halfway to focus.

TIP To confirm focus, press the Zoom in button (). To return to Miniature Effect mode ( , press the Thumbnail/Zoom out button ().

Once you select your focus point and focus, press the OK button (**OK**) to display the effect options. Press the multi-selector up (**▲**) or down (**▼**) to adjust the width of the area you want to remain in focus. Press the multi-selector left (**◀**) or right (**▶**) to choose whether the in-focus area is horizontal or vertical. This effect works best when used horizontally for most applications. Press the OK button (**OK**) to save your settings. You can then continue to shoot in Live View mode (**Lv**), or you can exit and use the viewfinder to compose your shots. Just remember that you cannot preview the effect in the viewfinder.

One very odd feature about this effect is that when you record video the camera compresses the video and plays it back at high speed. According to the manual, 30 to 45 minutes of actual recording yields a movie that is only about 3 minutes in length when played back. Also, be aware that autofocus and sound recording are disabled when you use the Miniature Effect. You can also apply the Miniature Effect mode (**ME**) to existing still images in the Retouch menu (**R**).

Selective Color mode

The Selective Color mode (**🖌**) allows you to choose up to three colors to keep in the image. The camera then automatically turns the remaining colors to black and white. It can give your images an interesting effect that was once only available by using image-editing software such as Photoshop. Now, you can do it right in-camera and preview the effect in Live View mode (**Lv**). Once again, this option *must* be set in Live View mode (**Lv**) before you can use it while shooting through the viewfinder.

After you choose the Selective Color mode (**🖌**) from the Effects menu (**EFFECTS**), flip the switch to enter Live View mode (**Lv**). Press OK (**OK**) to display the options. The first thing you want to do is to decide which color to select. It's best to choose a bright color, such as deep reds, blues,



2.12 The very cool Selective Color mode.
Exposure: ISO 500, f/3.5, 1/1000 second
using a Sigma 17-70mm f/2.8-4 DC HSM
OS at 45mm.

greens, or yellows. The camera's sensor can struggle when trying to detect dull colors, especially grays, tans, and skin tones.

You will notice a white square cursor in the center of the monitor image (similar to the Live View focus point, but smaller and white). Use the multi-selector to move the cursor over the top of the color you want to select. Once the cursor is over the desired color, press the multi-selector up (\blacktriangle) to select the color.

TIP If you want to be more meticulous about the selected color, use the Zoom in button () to get a more detailed look. Press the Thumbnail/Zoom out button () to return to full-screen view.

After you select the color, look at the top right of the screen and you see three boxes, one of which contains the selected color. You will see numbers directly to the right of the box. You can choose from 1 to 7; the default is 3. You can increase the color range (4 to 7) to include similar colors, or you can decrease the range (1 to 2) so that the selected color is more specific.

As I mentioned before, you can select up to three colors. Use the Command dial to select one of the other boxes and repeat the process if you want. You do not have to select three colors; you can choose only one if you prefer. To deselect a color, simply use the Command dial to select a box, and then press the Delete button (). To delete all selected colors, press and hold the Delete button ().

Silhouette mode

In Silhouette mode (, the camera sets the exposure for the bright part of the scene to silhouette the dark subject against a bright background. This option looks best when shooting during dusk or dawn. Flash and the AF-assist illuminator are disabled.

High Key

Use the High Key setting () when shooting a light subject against a light background. The camera applies some exposure compensation to slightly overexpose and add some brightness to the scene.

Low Key

Use the Low Key setting () when photographing dark subjects on a dark background. This mode also punches up the highlights just a bit to get good definition between the shadows and highlights.



2.13 The Silhouette effect. Exposure: ISO 640, f/2.8, 1/10 second using a Tamron 17-50mm f/2.8 VC at 40mm.

Metering Modes

The D5200 has three metering modes — Matrix (▣), Center-weighted (◐), and Spot (□) — to help you get the best exposure for your image. You can change the modes in the Info display menu. Metering modes determine how the camera's light sensor collects and processes the information used to determine exposure. Each of these modes is useful for different types of lighting situations.

Matrix metering mode

The default metering system that Nikon cameras use is a proprietary system called 3D Color Matrix metering II, or just Matrix metering for short. Matrix metering mode (▣) reads a wide area of the frame and sets the exposure based on the brightness, contrast, color, and composition. Then the camera runs the data through sophisticated algorithms and determines the proper exposure for the scene. When you use a NIKKOR D- or G-type lens, the camera also considers the focusing distance.

The D5200's 2016-pixel RGB (Red, Green, Blue) sensor measures the intensity of the light and color of a scene. After the meter takes the measurement, the camera compares it to information from 30,000 images stored in its database. The D5200 determines the exposure settings based on the findings from the comparison.

CROSS REF For more on lenses and lens specifications, see Chapter 4.

In simple terms, it works like this: You're photographing a portrait outdoors, and the sensor detects that the light in the center of the frame is much dimmer than at the edges. The camera takes this information, along with the focus distance, and compares it to the images in the database. The database images with similar light and color patterns and subject distance tell the camera that this must be a close-up portrait with flesh tones in the center and sky in the background. From this information, the camera decides to expose primarily for the center of the frame, although the background may be overexposed. The RGB sensor also reads the quantity of the colors and uses that information as well.

The D5200 automatically chooses a Matrix metering system based on the type of Nikon lens that you use. Here are the options:

- ▶ **3D Color Matrix metering II.** As mentioned earlier, this is the default metering system the camera employs when you attach a G- or D-type lens. Most lenses made since the early to mid-1990s are of these types. The only difference between the G- and D-type lenses is that there is no aperture ring on the G-type lens. All lenses that offer full functionality with the D5200 will use this metering type. When you use Matrix metering mode () , the camera decides the exposure setting based mainly on the brightness and contrast of the overall scene, and the colors of the subject matter, as well as other data. It also considers the distance to the subject, which focus point is used, and the lens focal length to determine which areas of the image are important to get the proper exposure. For example, if you're using a wide-angle lens with a distant subject and a bright area at the top of the frame, the meter considers this when setting the exposure, so the sky and clouds don't lose critical detail.
- ▶ **Color Matrix metering II.** This type of metering is used when a Nikon AI-P CPU lens is attached to the camera. Nikon only offers three of these lenses and they are quite rare, the 45mm f/2.8 AI-P being the most common. The Matrix metering recognizes this, and the camera uses only brightness, subject color, and the focus point to determine the right exposure.

Matrix metering mode (■) is suitable for most subjects, especially when you're dealing with a particularly tricky or complex lighting situation. Given the large amount of image data in the Matrix metering mode (■) database, the camera can make a fairly accurate assessment of what type of image you are shooting and adjust the exposure accordingly. For example, for an image with a high amount of contrast and brightness across the top of the frame, the camera tries to expose for the scene so that the highlights retain detail. Paired with Nikon's Active D-Lighting (ADL), your exposure will have good dynamic range throughout the image.

Center-weighted metering mode

When you switch the camera's metering mode to Center-weighted (◎), the meter takes a light reading of the whole scene but bases the exposure settings mostly on the light falling on the center of the scene. The camera determines about 75 percent of the exposure from an 8mm circle in the center of the frame and 25 percent from the area around the center.

Center-weighted metering mode (◎) is a very useful option, especially when you shoot photos with the main subject in the middle of the frame. This metering mode is useful when photographing a dark subject against a bright background, or a light subject against a dark background. It works especially well for portraits, where you want to preserve the background detail while exposing correctly for the subject.

Using Center-weighted metering mode (◎), you can get consistent results without worrying about the adjustments in exposure settings that sometimes result when using Matrix metering mode (■).

Spot metering mode

In Spot metering mode (·), the camera does just that: meters only a spot. This spot is only 3mm in diameter and only accounts for 2 percent of the frame. The spot is linked to the active focus point, so you can focus and meter your subject at the same time, instead of metering the subject, pressing the Auto-Exposure Lock button (AE-L), and then recomposing the photo. The D5200 has 39 focus points, so it's like having 39 spot meters to choose from throughout the scene.

Choose the Spot metering mode (·) when the subject is the only thing in the frame for which you want the camera to expose. You select the spot meter to meter a precise area of light within the scene. This is not necessarily tied to the subject. For example, when you photograph a subject on a completely white or black background,

you need not be concerned with preserving detail in the background; therefore, exposing just for the subject works out perfectly. This mode works well for concert photography, when the musician or singer is lit with a bright spotlight. You can capture every detail of the subject and just let the shadow areas go black.

Autofocus

The D5200 has an upgraded autofocus (AF) system from the D5100, which is the same as that of the D7000. The Multi-CAM 4800DX has 39 focus points, nine of which are cross-type sensors, providing the ability to detect contrast for focusing purposes.

In simpler terms, the Multi-CAM 4800DX autofocus reads contrast values from a sensor inside the camera's viewing system. The D5200 employs two sensor types: cross and horizontal. As you may have guessed, cross-type sensors are shaped like a cross while horizontal sensors appear as horizontal lines. You can think of them like plus and minus signs. Cross-type sensors are able to read the contrast in two directions, horizontally and vertically. Horizontal sensors can only interpret contrast in one direction. (When you position the camera in portrait orientation, the horizontal sensors are positioned vertically.)

Cross-type sensors can evaluate for focus much more accurately than horizontal sensors, but horizontal sensors can do it a bit more quickly (provided that the contrast runs in the right direction). Cross-type sensors require more light to work properly, so horizontal sensors are also included in the array to speed up the autofocus, especially in low-light situations.

Phase detection

The autofocus system on the D5200 uses *phase detection*, which is determined by a sensor in the camera body. To achieve phase detection, a beam splitter diverts the light coming from the lens into two optical prisms that send the light as two separate images to the AF sensor in the D5200. This creates a type of rangefinder in which the base is the same size as the diameter or aperture of the lens. The larger the length of the base, the easier it is for the rangefinder to determine whether the two images are "in phase" or in focus.

This is why lenses with wider maximum apertures often focus faster than lenses with smaller maximum apertures, especially in low light. This is also why the autofocus usually can't work with slower lenses coupled with a teleconverter, which reduces the effective aperture of the lens. The base length of the rangefinder images is simply too small to allow the autofocus system to determine the proper focusing distance.

The autofocus sensor reads the contrast or phase difference between the two images that are projected onto it. This is the primary way in which the D5200 autofocus system works. This type of focus is also referred to as Secondary Image Registration-Through-the-Lens (SIR-TTL) because the autofocus sensor relies on a secondary image, as opposed to the primary image projected into the viewfinder from the reflex mirror.

Contrast detection

The D5200 only uses contrast detection focus when you use the Live View (**Lv**) and Live View video (**REC**) modes. This is the same method that smaller compact digital cameras use to focus. Contrast detection focus is slower and uses the image sensor to determine whether the subject is in focus. In a relatively simple operation, the sensor detects the contrast between different subjects in a scene on a pixel level. The camera does this by moving the lens elements until it achieves sufficient contrast between the pixels that lie under the selected focus point. With contrast detection, you can focus on a greater area of the frame, meaning you can set the focus area to anywhere within the scene.

2

Contrast detection focus is highly accurate. Because you can pinpoint the focus point more accurately, I highly recommend using Live View mode (**Lv**) when using a tripod, whether you are in the field or a studio.

Focus Modes

Focus modes simply control how the camera achieves focus when you press the shutter-release button halfway. You can choose from the following four settings: Auto Servo AF (**AF-A**), Continuous Servo AF (**AF-C**), Single Servo AF (**AF-S**), and Manual focus (**MF**). Each of these is useful in different situations, which I discuss in the following sections.

CAUTION When the lens autofocus switch is set to Manual, you cannot select an autofocus mode.

To change the focus mode you must enter the Info display edit menu. Press the Info edit button (**i**) to view the Info display, and then press it again to display the cursor and edit the settings. Use the multi-selector to navigate to the focus mode option on the display, and then press OK (**OK**). You can then use the multi-selector left (**◀**) and right (**▶**) to scroll through the focus mode options. After you select the focus mode that you desire, press the OK button (**OK**) to set it.

Auto Servo AF mode

When you use the Auto Servo AF mode (**AF-A**), the D5200 autofocus system determines whether the subject is moving and automatically selects the Continuous Servo AF (**AF-C**) or Single Servo AF (**AF-S**) mode. The shutter is only released when the camera detects that the scene is in focus. This mode is adequate for shooting snapshots, but I wouldn't count on it to work perfectly in situations in which focus is critical.

Continuous Servo AF mode

The Continuous Servo AF mode (**AF-C**) is the autofocus mode you want to use when shooting sports, or in any other situation in which the subject is moving. When you set the camera to Continuous Servo AF mode (**AF-C**), it continues to focus as long as you press the shutter-release button halfway, or if the AE-L/AF-L button (**AE-L**) is set to On (**AF-ON**) in Custom Setting menu (f2). If the subject moves, the camera activates Predictive Focus Tracking. Predictive Focus allows the camera to track the subject and maintain focus by attempting to predict where the subject will be when the shutter is released. When the camera is in Continuous Servo AF mode (**AF-C**), it fires when you fully depress the shutter-release button, but only if the subject is in focus. This is called Focus Priority, and it allows you to get more images in focus when photographing moving subjects.

Personally, I find that Continuous Servo AF mode (**AF-C**) works best when the camera is set to *Release Priority*. This allows you to fire off frames whether the camera has achieved focus or not. If you're photographing a quickly moving subject, you may want to start capturing a sequence of images even if the subject isn't initially in focus. This makes your camera more responsive when shooting action. You can choose between Focus and Release Priority in Custom Setting menu (a1).

Single Servo AF mode

In Single Servo AF mode (**AF-S**) — which is not to be confused with the AF-S lens designation — the camera focuses when you press the shutter-release button halfway. When the camera achieves focus, the focus locks, and it remains so until the shutter is released or the shutter-release button is no longer depressed. By default, the camera does not fire unless it achieves Focus Priority. Single Servo AF (**AF-S**) is the best mode to use when shooting portraits, landscapes, or other photos in which the subject is relatively static. Using this mode also helps ensure that you have fewer out-of-focus images.

Manual focus mode

When you select the Manual focus mode (MF), the D5200 disables the autofocus system. To achieve focus, you rotate the focus ring of the lens until the subject appears sharp when you look through the viewfinder. You can use Manual focus mode (MF) when shooting still-life photographs or other stationary subjects with which you want total control of the focus, or when you are using a non-autofocus lens. Keep in mind that the camera shutter releases, regardless of whether the scene is in focus.

When using Manual focus mode (MF), the D5200 offers a bit of assistance in the form of an electronic rangefinder which can be turned on in Custom Settings menu (C) a4. When the camera or lens is switched to Manual focus, the light meter becomes the electronic rangefinder. If the indicator shows to the right, the focus is behind the subject; an arrow to the left indicates that the focus is in front of the subject. You still need to choose a focus point so that the camera can determine where the subject is in the frame so that the rangefinder can work properly. You can use Manual focus mode (MF) when shooting close-ups and macros, as well as portraits when you need to focus on a specific area.

2

Autofocus Area Modes

The D5200 has the following four AF-area modes: Single-point AF (□), Dynamic-area AF (□□), 3-D tracking (□□□), and Auto area AF (□□□□). Each mode is useful in different situations, and you can modify them to suit a variety of shooting needs. The AF-area modes are set in the Info Edit display. Note that AF-area modes aren't available to change when using certain Scene and Effects modes.

As discussed earlier in this chapter, the D5200 employs an impressive 39 autofocus points. These can be used individually in Single-point AF mode (□), or they can be set to use in groups of 9, 21, or 39 in Dynamic-area AF mode (□□).

The D5200 can also employ 3-D tracking mode (□□□), which enables the camera to automatically switch focus points and maintain sharp focus on a moving subject as it crosses the frame. In 3-D tracking mode (□□□), the camera recognizes color and light information, and uses it to track the subject.

Nikon's Scene Recognition System uses the 2016-pixel RGB sensor to recognize color and lighting patterns in order to determine the type of scene that you are photographing. This enables the autofocus to work faster than in previous Nikon dSLRs, and also helps the D5200 achieve a more accurate exposure and white balance.

Auto area AF mode

Auto area AF mode (■) is exactly what it sounds like: the camera automatically determines the subject and chooses one or more autofocus points to lock focus. Due to the D5200's Scene Recognition System, when you use the camera with NIKKOR G-type AF-S lenses, it is able to recognize human subjects. This means that the camera has a better chance of focusing where you want rather than accidentally focusing on the background when shooting a portrait. I tend not to use a fully automatic setting such as this, but I find it works reasonably well when I'm shooting snapshots with a relatively deep depth of field. When you set the camera to Single Servo AF mode (AF-S), the active autofocus points light up in the viewfinder for about 1 second when the camera attains focus; when you set it to Continuous Servo AF mode (AF-C), you can see the active point tracking the subject as it moves through the frame.

Single-point AF mode

Single-point AF (□) is the easiest mode to use when you shoot slow-moving or completely still subjects. You can press the multi-selector up (▲), down (▼), left (◀), or right (▶) to choose one of the autofocus points. The camera only focuses on the subject if it is in the selected autofocus area.

By default, Single-point AF mode (□) allows you to choose from any one of the 39 autofocus area points. Sometimes selecting from this many points can slow you down; this is why the D5200 also allows you to change the number of selectable points to a more widely spaced array of 11 focus points. If you're upgrading from the D5000 or D5100 you will immediately be familiar with the 11-point pattern. You can choose the number of focus points in Custom Setting menu () a2.

Switching from 39 to 11 points can speed up the shooting process in Single-point AF mode (□). Using 11 points allows you to move the focus point to the preferred area in less than half of the button pushes required when using 39 points. You can use this option if pinpointing the exact location of the area that you need to be in focus. This can be utilized when shooting landscapes or team sports.

Dynamic-area AF mode

Dynamic-area AF mode (▣) also allows you to select the autofocus point manually, but unlike Single-point AF mode (□), the surrounding unselected points remain active; this way, if the subject happens to move out of the selected focus area, the camera's highly sophisticated autofocus system can track it throughout the frame. You can set Dynamic-area AF mode (▣) in the Info display edit menu. Press the Info edit button () twice, and then use the multi-selector to navigate to the AF-area mode

option (next to the Autofocus mode option). Press the multi-selector left (◀) and right (▶) to scroll through the options. Press the OK button (OK) when the desired setting is displayed.

When you set the focus to Single Servo AF mode (AF-S), it operates the same as Single-point AF mode (F1). To take advantage of Dynamic-area AF (F2), you must set the camera to Continuous Servo AF mode (AF-C).

You can then choose from the following options:

- ▶ **Dynamic-area AF 9 (F9).** When you set your D5200 to Dynamic-area AF 9 (F9), you can select any one of the camera's 39 autofocus points to be the primary one. If your subject moves out of the selected focus area, the autofocus system uses the eight autofocus points immediately surrounding the selected point to achieve focus. Use this setting when you shoot subjects that move predictably. For example, baseball players typically run in a straight line, so you don't need many points for autofocus coverage as you track along with the subject.
- ▶ **Dynamic-area AF 21 (F21).** As with the 9-point area autofocus mode, in Dynamic-area AF 21 (F21), you can select the primary focus point from any one of the 39 points. The camera then uses information from the surrounding 20 points if the subject moves away from the selected focus area. The 21-point area gives you a little more leeway with moving subjects because the active autofocus areas are in a larger pattern. This mode is good for shooting sports with a lot of action, such as soccer or football. Players are a bit more unpredictable, and the larger coverage helps you maintain focus when a player cuts left or right. However, the 21-point coverage is small enough that the camera's autofocus is less likely to jump to other players.
- ▶ **Dynamic-area AF 39 (F39).** This option gives you the widest area of active focus points. You select the primary focus point in the same way you do with the 9- and 21-point options. The camera then keeps the surrounding 38 points active in case the subject leaves the selected focus area. This mode is best for situations where a lone subject is against a plain background; for example, it is useful when capturing a bird, or even an airplane, against a plain blue sky or a single person against a simple background.
- ▶ **3-D tracking (F3D).** In this mode, all 39 autofocus points are active. You select the primary autofocus point, but if the subject moves, the camera uses 3-D tracking to select a new primary autofocus point automatically. With 3-D tracking, the camera uses distance and color information from the area immediately surrounding the focus point to determine what the subject is. If the subject

moves, the camera selects a new focus point. This mode works very well for subjects that move unpredictably; however, you need to be sure that the subject and the background aren't similar in color. When you photograph a subject that has a color similar to the background, the camera may lock focus on the wrong area, so use this mode carefully.

Release Modes

Release modes (❸) control how the shutter release operates. A number of different options are useful in many different shooting situations. To change the release mode (❸), press the Release mode button (❸). Use the multi-selector to highlight one of the following options on the LCD screen, and then press the OK button (OK) to set it:

- ▶ **Single-frame shooting mode (s).** When you select the Single-frame shooting mode (s), the camera takes one picture when you fully depress the shutter-release button. Even if you hold the button down, only one frame is captured. The shutter-release button must be completely unpressed to reset it. You can use this mode when shooting portraits, still-life compositions, products, or any other static or still subjects.
- ▶ **Continuous low-speed shooting mode (■L).** In this mode, the camera shoots at 3 frames per second (fps) repeatedly while you hold down the shutter-release button. This is a good mode to use when trying to capture subjects that are not moving too quickly.
- ▶ **Continuous high-speed shooting mode (■H).** When you select this mode, the D5200 shoots up to 5 fps while you press and hold the shutter-release button. This mode is for shooting fast action and sequence shots, or trying to capture a fleeting moment that may never happen again. For best results, you should set the shutter speed to at least 1/200 second and use a fast memory card. Shooting at 1/200 or faster allows you to be sure that you get the full frame rate speed. Once the buffer is full, the frame rate drops, and then resumes after the buffer flushes and the data has been written to the card. Using a faster-rated memory card allows the camera to clear the buffer more quickly.
- ▶ **Self-timer mode (⌚).** The self-timer is a handy option that allows a delay between the pressing of the shutter-release button and the actual release of the shutter. This allows you to quickly jump into the frame for self-portraits or join in on group shots. This feature is also useful when doing timed exposures, as it reduces camera shake caused by pressing the shutter-release button when the camera is on a tripod. You can find the Self-timer settings in Custom Setting menu (MENU) c3. Here, you can select the length of the delay (2, 5, 10, or 20 secs),

and the number of shots (1 through 9). If the number of shots is more than 1, the camera shoots the selected number of frames at a 4-second interval.

- **Remote control mode (LCD).** You use this mode with the ML-L3 wireless remote, available separately from Nikon. This inexpensive remote uses infrared (IR) signals sent to infrared receivers on the front and rear of the D5200. This eliminates the need to press the shutter-release button on the camera. Use Custom Setting menu (C) c4 to select how long the camera waits for a signal (1, 5, 10, or 15 minutes) before cancelling Remote control mode (LCD) and reverting to the previously set Release mode (R). You can then choose one of the following options:

- **Delayed remote mode (LCD).** This provides a 2-second delay from the time that you press the ML-L3 button before the shutter releases.
 - **Quick response remote mode (LCD).** This immediately releases the shutter when you press the ML-L3 button. The shutter releases, regardless of whether the camera is in focus.
- **Quiet shutter release mode (Q).** This mode operates similar to Single-frame shooting mode (S), except that when you hold down the shutter-release button, the reflex mirror is held up in place until you release the button. Normally, the shutter sound emits when the mirror flips up, the shutter opens and closes, and the mirror flips down. In Quiet shutter release mode (Q), you can split the noise into two distinct sounds: One when the mirror flips up and the shutter opens, and another when the mirror flips down when you release the shutter-release button. In theory, this makes the shutter-release button half as noisy. The idea behind Quiet shutter release mode (Q) is that the photographer can snap a photo and move to another area before releasing the reflex mirror to the down position. In practice, however, the Quiet shutter-release mode (Q) isn't much quieter than Single-frame mode (S).

NOTE In Quiet Release mode (Q), the focus confirmation beep is disabled regardless of the setting in Custom Setting menu (C) d1.

ISO Sensitivity

ISO, which stands for *International Organization for Standardization*, is the rating for the speed of film or, in digital terms, the sensitivity of the sensor. Because they are standardized, ISO numbers allow you to be sure that when you shoot at ISO 100, you get the same exposure, no matter which camera you are using.

Unfortunately, the D5200 doesn't have a dedicated button to change the ISO setting. Instead, you change the ISO sensitivity in the Info display's Edit menu screen. To access it, press the Info edit button ( twice, and then use the multi-selector to navigate to the ISO sensitivity option that you want. Press the multi-selector left () or right () to change the settings. When you're finished, press the OK button ().

The D5200 has a native ISO range of 100 to 6400. In addition to these standard ISO settings, the D5200 also offers some settings that extend the available range of the ISO so you can shoot in very dark situations. These options are labeled with an H for high speed. By default, the extended ISO options are set in 1/3-stop adjustments. The high-speed ISO options are:

- ▶ **H0.3, H0.7, and H1.0.** These settings give you up to ISO 12800 in 1/3 steps.
- ▶ **H2.0.** This setting isn't adjustable. You get one H2.0 setting that is equivalent to ISO 25600.

You can also set the ISO in the Shooting menu () under the ISO sensitivity settings option. It should be noted that using the H settings do not produce optimal results. You will notice a large amount of grain and noise in your images. When set to the H option, the camera uses the processor to increase exposure (as opposed to amplifying the signal from the sensor). You can perform these same operations manually in your favorite RAW convertor with better accuracy. For this reason, I don't recommend using the extended ISO settings unless you are shooting JPEGs.

Auto ISO

The Auto ISO setting () automatically adjusts the ISO settings for you in locations in which the light changes, giving you one less setting to worry about. Nikon has made the Auto ISO feature available for a few years now, and I am a big proponent of it. I find that this setting results in many more low-noise images when shooting in low-light situations and at concerts. When I shoot in low light, I almost always enable this option.

In true Nikon fashion, an amazing feature is now even better in the latest cameras. Auto ISO is more intuitive and smarter. To turn on Auto ISO (, go to the Shooting menu (, select ISO sensitivity settings, and then set the Auto ISO sensitivity control to On. Nikon has also added an Auto setting that selects the threshold for shutter speed versus ISO based on focal length, which is especially handy when using a zoom lens (which most people do these days).

Be sure to set the following options in the Shooting menu (under the ISO sensitivity settings option:

- ▶ **Maximum sensitivity.** Choose an ISO setting that allows you to get an acceptable amount of noise in your image. If you're not concerned about noisy images, then you can set it all the way up to H2. If you need your images to have less noise, you can choose a lower ISO; the choices are from ISO 200 to Hi 2 in 1-stop increments.
- ▶ **Minimum shutter speed.** This setting determines when the camera adjusts the ISO to a higher level. At the default, the camera bumps up the ISO when the shutter speed falls below 1/30 second. If you're using a longer lens or you're photographing moving subjects, you may need a faster shutter speed. In that case, you can set the minimum shutter speed up to 1/4000 second. On the other hand, if you're not concerned about camera shake, or if you're using a tripod, you can set a shutter speed as slow as 1 second. When using the Auto ISO setting (**AUTO**), the camera chooses the shutter speed based on the focal length of the lens (provided the lens has a CPU). When you use Auto ISO (**AUTO**), you can specify whether the camera gives priority to shutter speed or ISO sensitivity. Slower prioritizes shutter speed and faster prioritizes ISO sensitivity.

NOTE The camera considers the minimum shutter speed only when it is in the Programmed auto (**P**) or Shutter-priority auto (**S**) modes.

Noise reduction

Noise starts appearing in images taken with the D5200 when you shoot above ISO 1600 or use long exposure times. For this reason, most camera manufacturers have built-in noise reduction (NR) features. The D5200 has two types of noise reduction: Long exposure NR and High ISO NR. Each of these helps reduce noise differently.

Long exposure Noise Reduction

When you activate Long exposure Noise Reduction, the camera applies a noise reduction algorithm to any shot taken with a long exposure (1 second or more). Basically, the camera takes another exposure, this time with the shutter closed, and compares the noise from this dark image to the original one. The camera then applies the noise reduction, which takes about the same amount of time to process as the length of the shutter speed; therefore, you can expect it to take about double the amount of time it takes to make one exposure.

While the camera applies noise reduction, the viewfinder displays the blinking Noise Reduction icon (). You cannot take additional images until this process is finished. If you switch the camera off before the NR is finished, noise reduction is not applied. You can turn Long exposure Noise Reduction on or off in the Shooting menu.

High ISO Noise Reduction

When you activate High ISO Noise Reduction, the camera runs any image shot at ISO 800 or higher through the noise reduction algorithm. This feature works by reducing the coloring in the chrominance of the noise and slightly softening the image to reduce the luminance noise. You can set how aggressively this effect is applied by choosing the High, Normal, or Low settings.

NOTE *Chrominance* refers to the color of noise, and *luminance* refers to the size and shape of the noise.

You should also keep in mind that High ISO Noise Reduction slows down the processing of your images. This can reduce the capacity of the buffer, causing the frame rate to slow down when you shoot in the Continuous high-speed (H) or Continuous low-speed (L) shooting modes.

When you turn off High ISO Noise Reduction, the camera still applies noise reduction to images shot at ISO 2500 and higher, although the amount is less than when you set the camera to Low with Noise Reduction on.

NOTE When shooting in NEF (RAW), the camera doesn't apply any noise reduction to the data, but NR is tagged in the file. To apply the in-camera noise reduction to the final image, you must open and edit the RAW file in Nikon software.

For the most part, I do not use either of these in-camera noise reduction features. In my opinion, even at the lowest setting, the camera is very aggressive when applying noise reduction, and for that reason, there is a loss of detail. For most people, this is a minor quibble and not very noticeable, but I'd rather keep all available detail in my images and apply noise reduction in post-processing. This way, I can decide how much to reduce the chrominance and luminance rather than letting the camera do it.

NOTE Photoshop's Adobe Camera Raw and other image-editing software include their own proprietary noise reduction.

White Balance

Light, whether from sunlight, a light bulb, a fluorescent light, or a flash, has a specific color. The Kelvin scale measures these colors. A color's measurement is its *color temperature*. The White balance (**WB**) allows you to adjust the camera so your images look natural, regardless of the light source. Given that white is most dramatically affected by the color temperature of a light source, this is what you base your settings on — hence the term *white balance*. You can change the white balance in the Shooting or Info edit menus.

You may still wonder how a color can have a temperature. Once you understand the Kelvin scale, things will make a little more sense.

The Kelvin scale

Kelvin is a temperature scale, normally used in the fields of physics and astronomy, where absolute zero (0K) denotes the absence of all heat energy. The concept is based on a theoretical object called a *black body radiator*. As this black body radiator is heated, it starts to glow. When it reaches a certain temperature, it glows a specific color. It is akin to heating a bar of iron with a torch. As the iron gets hotter it turns red, then yellow, and then eventually white before it reaches its melting point (although the theoretical black body does not have a melting point).

The concept of Kelvin and color temperature is tricky as it is the opposite of what you likely think of as *warm* and *cool* colors. For example, on the Kelvin scale, red is the lowest temperature, increasing through orange, yellow, white, and to shades of blue, which are the highest temperatures. Humans tend to perceive reds, oranges, and yellows as warmer, and white and bluish colors as colder. However, physically speaking, as defined by the Kelvin scale, the opposite is true.

White balance settings

Now that you know a little about the Kelvin scale, you can begin to explore the white balance settings. White balance is so important because it helps ensure that your images have a natural look. When you deal with different lighting sources, the color temperature of the source can have a drastic effect on the coloring of the subject. For example, a standard light bulb casts a very yellow light; if the camera doesn't add a bluish cast to compensate for the color temperature of the light bulb, the subject can look overly yellow or amber.

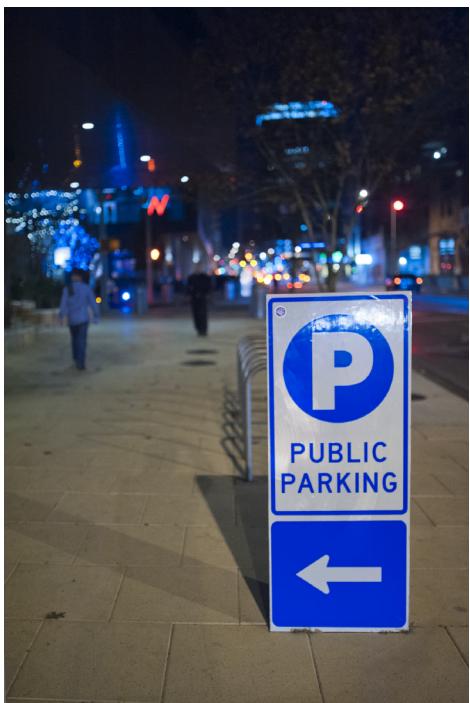
To adjust for the colorcast of the light source, the camera introduces a colorcast of the complete opposite color temperature. For example, to combat the green color of a fluorescent lamp, the camera introduces a slight magenta cast to neutralize the green. Here are the D5200's white balance settings:

- ▶ **Automatic white balance setting (AUTO).** This setting is good for most circumstances. The camera takes a reading of the ambient light and makes an automatic adjustment. This setting also works well when you use a Nikon CLS-compatible Speedlight because the camera calculates the color temperature to match the flash output.
- ▶ **Incandescent white balance setting (★).** Use this setting when the lighting is from a standard household light bulb.
- ▶ **Flourescent white balance setting (⌘).** This setting is ideal when the lighting is coming from a fluorescent-type lamp. You can also adjust for different types of fluorescent lamps, including high-pressure sodium and mercury-vapor lamps. To make this adjustment, go to the Shooting menu (CAMERA), choose White Balance, and then choose Fluorescent. From there, use the multi-selector to choose one of the seven types of lamps.
- ▶ **Direct Sunlight white balance setting (☀).** Use this setting when shooting outdoors in the sunlight.
- ▶ **Flash white balance setting (⚡).** This setting is ideal when using the built-in flash, a hot-shoe Speedlight, or external strobes.
- ▶ **Cloudy white balance setting (☁).** Use this white balance setting under overcast skies.
- ▶ **Shade white balance setting (🏡).** When you shoot in the shade of a tree, a building, an overhang, a bridge, or any location in which the sun is out but blocked, use this setting.
- ▶ **Preset manual white balance setting (PRE).** When you use this setting, you choose a neutral object to measure for the white balance. It's best to choose an object that is either white or light gray. There are some accessories, such as a gray card (which is included in this book) and the ExpoDisc, that you can use to set the white balance. To use the gray card, simply place it in the scene and take the reading from it. To use the ExpoDisc, attach it to the front of the lens like a filter, and then point the lens at the light source to set your White balance (WB). The Preset manual setting works best in difficult lighting situations, such as mixed lighting. *Mixed lighting* means there are two sources lighting a scene. I usually use this setting when photographing with my studio strobes.

Figure 2.14 and Figure 2.15 show the difference that white balance settings can have on your images.



2.14 This shot was taken using the Automatic white balance setting. Exposure: ISO 1250, f/1.4, 1/160 second using a Sigma 35mm f/1.4 DG HSM.



2.15 This shot was taken using a custom white balance set to the white area of the sign. Exposure: ISO 1250, f/1.4, 1/160 second using a Sigma 35mm f/1.4 DG HSM.

Picture Controls

The Picture Control feature (¶) allows you to adjust your image settings quickly, including sharpening, contrast, brightness, saturation, and hue, based on your shooting needs. Picture Controls are only adjustable when using the Programmed auto (P), Shutter-priority auto (S), Aperture-priority auto (A), or Manual (M) modes because they are set automatically in the scene modes. To set Picture Controls, press the Info Edit button (¶) twice to display the Info edit menu, and then use the multi-selector to navigate to the Picture Control option (¶).

You can save Picture Controls to a memory card and import them into Nikon's image-editing software, Capture NX 2 or ViewNX 2. You can then apply the settings to RAW images or even to images taken with other camera models. You can also save and

share these Picture Control files with other Nikon users, either by importing them to Nikon software or by loading them directly onto another camera.

The D5200 comes with the following six Picture Controls, but you can customize up to nine in-camera:

- ▶ **Standard Picture Control (■SD).** This setting applies slight sharpening, and a small boost of contrast and saturation. This is the recommended setting for most shooting situations.
- ▶ **Neutral Picture Control (■NL).** The Neutral setting applies a small amount of sharpening and no other modifications to the image. This setting is preferable if you do extensive post-processing to your images.
- ▶ **Vivid Picture Control (■VI).** Use this setting to give your image a fair amount of sharpening, and boost the contrast and saturation. This setting is recommended for printing directly from the camera or memory card, as well as for shooting landscapes. Personally, I feel that this mode is a little too saturated and often results in unnatural color tones. It is not ideal for portraits because it usually doesn't reproduce skin tones accurately.
- ▶ **Monochrome Picture Control (■MC).** As the name implies, this option makes an image monochrome. This doesn't simply mean black and white; you can also simulate photo filters and toned images such as sepia, cyanotype, and more. You can also adjust the settings for sharpening, contrast, and brightness.
- ▶ **Portrait Picture Control (■PT).** The Portrait setting gives you just a small amount of sharpening, which gives the skin a smoother appearance. The colors are slightly muted to help achieve realistic skin tones.
- ▶ **Landscape Picture Control (■LS).** The Landscape setting is, obviously, ideal for shooting landscapes and natural vistas. It appears to be very similar to the Vivid Picture Control (■VI) with a little more boost added to the blues and greens.

You can customize all of the original Picture Controls to suit your personal preferences. There are myriad options, such as giving the images more sharpening and less contrast.

NOTE Although you can adjust the Original Picture Controls, you cannot save over them, so there is no need to worry about losing them.

You can choose from the following customizations:

- ▶ **Quick adjust.** This option works with the Standard (■SD), Vivid (■VI), Portrait (■PT), and Landscape (■LS) Picture Controls. It exaggerates or de-emphasizes the effect of the Picture Control in use. You can set Quick adjust from -2 to +2.

- ▶ **Sharpness.** This setting controls the apparent sharpness of your images. You can adjust this setting from 0 to 9, with 9 being the highest level of sharpness. You can also set this option to Auto (A) to allow the camera's imaging processor to decide how much sharpening to apply.
- ▶ **Contrast.** This setting controls the amount of contrast applied to your images. In photos of scenes with high contrast (sunny days), you may want to adjust the contrast down; in scenes with low contrast, you may want to add some contrast by adjusting the settings up. You can set the Contrast from -3 to +3, or to A.
- ▶ **Brightness.** This setting adds or subtracts from the overall brightness of your image. You can choose 0 (default), +, or -.
- ▶ **Saturation.** This setting controls how vivid or bright the colors are in your images. You can set it between -3 and +3, or to A. This option is not available in the Monochrome Picture Control setting ().

NOTE The Brightness and Saturation options are unavailable when you turn on Active D-Lighting ().

- ▶ **Hue.** This setting controls how your colors look. You can choose from -3 to +3. Positive numbers make the reds look more orange, the blues look more purple, and the greens look more blue. Negative numbers make the reds look more purple, the greens look more yellow, and the blues look more green. This setting is not available in the MC Picture Control setting. I highly recommend leaving it at the default setting of zero.
- ▶ **Filter effects.** This setting is only available when you set your D5200 to the Monochrome Picture Control setting (). The monochrome filters approximate those traditionally used with black-and-white film, and increase contrast or create special effects. The following are the available Monochrome filter effects:
 - **Yellow.** This adds a low level of contrast. It causes the sky to appear slightly darker than normal and anything yellow to appear lighter. It is also used to optimize contrast for brighter skin tones.
 - **Orange.** This adds a medium amount of contrast. The sky appears darker, giving greater separation between the clouds. Orange objects appear light gray.
 - **Red.** This adds a great amount of contrast, drastically darkening the sky while allowing the clouds to remain white. Red objects appear lighter than normal.
 - **Green.** This darkens the sky and lightens any green plant life. You can use this color filter for portraits as it softens skin tones.

- **Toning.** Toning adds a color tint to your monochrome images. The following toning options are available:

- **B&W.** The black-and-white option simulates the traditional black-and-white film prints developed in a darkroom. The camera records the image in black, white, and shades of gray. This mode is suitable when the color of the subject is not important. You can use it for artistic purposes or, as with the Sepia option, to give your image an antique or vintage look.



2.16 An example of black-and-white toning. Exposure: ISO 100, f/3.5, 1/1600 +2/3EV using a Nikon 10-24mm f/3.5-4.5 at 12mm.

- **Sepia.** The Sepia color option duplicates a photographic toning process that is based on a traditional darkroom technique using silver-based black-and-white prints. Sepia-toning a photographic image requires replacing the silver in the emulsion of the photo paper with a different silver compound, thus changing the color, or *tone*, of the photograph. Antique photographs generally underwent this type of toning; therefore, the sepia color option gives the image an antique look. The images look reddish-brown. You may want to use this option to convey a feeling of antiquity or nostalgia in your photograph. This option works well with portraits, as well as still life and architectural images. You can also adjust the saturation of the toning from 1 to 7, with 4 being the default and the middle ground.
- **Cyanotype.** The cyanotype is another old photographic printing process. When the image is exposed to the light, the chemicals that make up the cyanotype turn deep blue. This method was used to create the first blueprints

and was later adapted to photography. The images you take in this setting are in shades of cyan. Because cyan is considered a cool color, this mode is also referred to as cool. You can use this mode to make very interesting and artistic images. You can also adjust the saturation of the toning from 1 to 7, with 4 being the default setting.

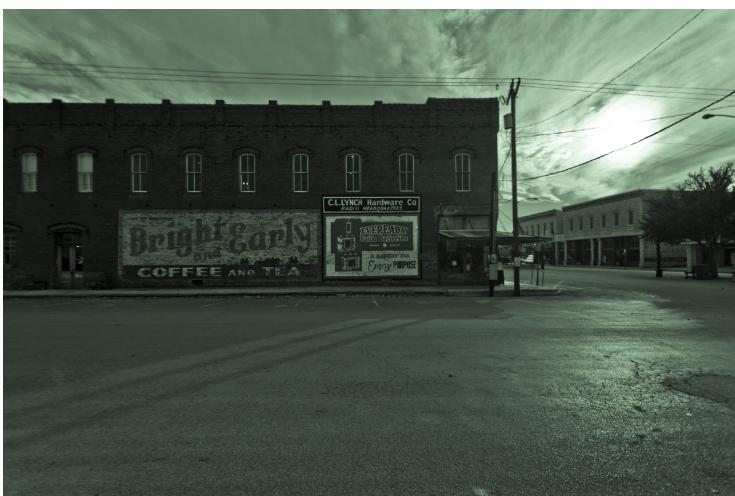


2.17 A Sepia-toned image. Exposure: ISO 100, f/3.5, 1/1600 +2/3EV using a Nikon 10-24mm f/3.5-4.5 at 12mm.



2.18 An image with Cyanotype applied. Exposure: ISO 100, f/3.5, 1/1600 +2/3EV using a Nikon 10-24mm f/3.5-4.5 at 12mm.

- **Color toning.** You can also choose to add colors to your monochrome images. Although color toning is similar to the Sepia and Cyanotype toning options, it isn't based on traditional photographic processes. It simply involves adding a colorcast to a black-and-white image. You can choose from seven color options: red, yellow, green, blue-green, blue, purple-blue, and red-purple. As with Sepia and Cyanotype, you can adjust the saturation of these colors.



2.19 Green color toning. Exposure: ISO 100, f/3.5, 1/1600 +2/3EV using a Nikon 10-24mm f/3.5-4.5 at 12mm.

To customize an Original Picture Control, follow these steps:

1. **Go to the Set Picture Control option (☒) in the Shooting menu (MENU), and then press the multi-selector right (▶).**
2. **Choose the Picture Control that you want to adjust.** Choose the Neutral (☒_{NL}) or Standard (☒_{SD}) Picture Control settings if you want to make smaller changes, because these have relatively low settings (contrast, saturation, and so on). To make bigger changes to color and sharpness, select the Vivid Picture Control setting (☒_{VI}). To adjust monochrome images, choose the Monochrome Picture Control setting (☒_{MC}), and then press the multi-selector right (▶).
3. **Press the multi-selector up (▲) or down (▼) to highlight the setting that you want to adjust (such as sharpening, contrast, brightness, and so on).** When the desired setting is highlighted, press the multi-selector left (◀) or right (▶) to adjust it. Repeat this step until you've adjusted all settings to suit your preference.
4. **Press the OK button (OK) to save the settings.**

To return the Picture Control to the default setting, follow steps 1 and 2, and then press Delete (>Delete). A dialog box appears asking for confirmation. Select Yes to return to the default setting or No to continue to use the Picture Control with the current settings.

NOTE When you alter an original Picture Control setting, an asterisk appears next to it, such as SD*, VI*, and so on.

To save a Custom Picture Control, follow these steps:

- 1. Go to the Manage Picture Control option in the Shooting menu (CAMERA).** Press the multi-selector right (►).
- 2. Press the multi-selector up (▲) or down (▼) to select Save/edit.** Press the multi-selector right (►).
- 3. Choose the Picture Control you want to edit.** Press the multi-selector right (►).
- 4. Press the multi-selector up (▲) or down (▼) to highlight the setting (sharpening, contrast, brightness, and so on) that you want to adjust.** Press the multi-selector left (◀) or right (►) to adjust the setting. Repeat this step until you've adjusted all of the settings you want to change.
- 5. Press the OK button (OK) to save the settings.**
- 6. Use the multi-selector to highlight the Custom Picture Control to which you want to save.** You can store up to nine Custom Picture Controls; they are labeled C-1 to C-9. Press the multi-selector right (►).
- 7. When the Rename Menu appears, press the Thumbnail/Zoom out button (Thumbnail), and then press the multi-selector left (◀) or right (►) to move the cursor to any of the 19 spaces in the name area of the dialog box.** New Picture Controls are automatically named as the Original Picture Control name and a two-digit number (for example, STANDARD_02 or VIVID_03).
- 8. Press the multi-selector without pressing the Thumbnail/Zoom out button (Thumbnail) to select letters in the keyboard area of the dialog box.** Press the OK button (OK) to set the selected letter, and then press the Delete button (Delete) to erase the selected letter in the Name area. After you type the name you want, press the Zoom in button (Zoom in) to save it. The Custom Picture Control is then saved to the Picture Control menu, and you can access it through the Set Picture Control option in the Shooting menu (CAMERA).

To return the Picture Control to the default setting, follow steps 1 through 3, and then press the Delete button (>Delete). A dialog box appears, asking for confirmation; select Yes to return to the default setting or No to continue to use the Picture Control with the current settings.

You can rename or delete your Custom Picture Controls at any time by using the Manage Picture Control option in the Shooting menu (>). You can also save the Custom Picture Control to your memory card so that you can import the file to Capture NX 2 or ViewNX 2. To save a Custom Picture Control to the memory card, follow these steps:

- 1. Go to the Manage Picture Control option (>) in the Shooting menu ().** Press the multi-selector right (►).
- 2. Press the multi-selector up (▲) or down (▼) to highlight the Load/save option.** Press the multi-selector right (►).
- 3. Press the multi-selector up (▲) or down (▼) to highlight the Copy to card option.** Press the multi-selector right (►).
- 4. Press the multi-selector up (▲) or down (▼) to select the Custom Picture Control you want to copy.** Press the multi-selector right (►).
- 5. Select the destination on the memory card to which you want to copy the Picture Control file.** There are 99 slots in which to store Picture Control files. The Custom Picture Controls are saved to the Primary memory card.
- 6. Press the multi-selector right (►).** A message appears confirming that the file has been stored to the memory card.

After you copy your Custom Picture Control file to your card, you can import the file to the Nikon software by mounting the memory card on your computer using a card reader or USB camera connection. See the software user's manual for instructions on importing to the specific program.

You can also upload saved Picture Controls from a memory card to your camera. Follow these steps to do so:

- 1. Go to the Manage Picture Control option in the Shooting menu ().** Press the multi-selector right (►).
- 2. Press the multi-selector up (▲) or down (▼) to highlight the Load/save option.** Press the multi-selector right (►).

3. **Press the multi-selector up (▲) or down (▼) to highlight the Copy to camera option.** Press the multi-selector right (►).
4. **Select the Picture Control you want to copy.** Press the OK button (OK) or the multi-selector right (►) to confirm.
5. **The camera displays the Picture Control settings.** Press the OK button (OK). The camera automatically displays the Save As menu.
6. **Select an empty slot to save to (C-1 to C-9).**
7. **Rename the file if necessary.** Press the OK button (OK).

File Formats, Size, and Compression

The D5200 creates and stores image data in to two types of files: NEF, or RAW, and JPEG. You can select to shoot one or the other or both at the same time. Each file type has its own strengths and weaknesses, although neither is the absolute correct type to shoot. For ease of use, more manageable file sizes, and compatibility with image-editing software (especially older software) JPEGs are great. The drawback is that you lose a lot of image information when the raw data from the sensor is converted into a JPEG file.

2

On the other side of the equation is the NEF or RAW file. This file format stores all of the image data recorded by the sensor as the exposure is made. The imaging processor makes note of the camera settings, but doesn't make any final or lasting changes to the sensor data. This gives you more flexibility during the editing process. RAW files are much larger than JPEGs because they contain more information. A major drawback is that each camera's RAW files are proprietary, and sometimes you may need to upgrade your software to the latest version to use the RAW file.

Each file type has compression algorithms applied to keep file sizes as small as possible, but with JPEGs, you can also set the camera to record a smaller image size by downsampling. I cover all of this and more in the following sections.

NEF (RAW)

Nikon RAW files are referred to as NEF. *NEF* stands for *Nikon Electronic File*. RAW files contain all the image data acquired by the camera's sensor. When a JPEG is created, the camera applies different settings to the image, such as white balance, sharpness, noise reduction, and so on. When you save the JPEG, the rest of the unused image data

is discarded to help reduce the file size. With a RAW file, this image data is saved so it can be used more extensively in post-processing. In some ways a RAW file is like a *digital negative* because you use it in the same way as a traditional photographic negative; that is, you take the RAW information and process it to create your final image.

Although some of the same settings are tagged to the RAW file (white balance, sharpening, saturation, and so on), these settings aren't fixed and applied as they are in a JPEG file. This way, when you import the RAW file into your favorite RAW converter, you can make changes to these settings without detrimental effects. Capturing your images in RAW format allows you to be more flexible when post-processing them, and generally gives you more control over the quality of the images.

JPEG

JPEG, which stands for *Joint Photographic Experts Group*, is a method of compressing photographic files, as well as the name of the file format that supports this type of compression. The JPEG is the most common type of file used to save images on digital cameras. Due to the small size of the file that is created and the relatively good image quality it produces, JPEG has become the default file format for most digital cameras.

The JPEG compression format was developed because of the immense file sizes that digital images produce. Photographic files contain millions of separate colors, and each individual color is assigned a number; therefore, the files contain vast amounts of data, which makes them quite large. In the early days of digital imaging, the huge file sizes and relatively small storage capacity of computers made it almost impossible for most people to store images. A little over ten years ago, a standard laptop hard drive was only about 5GB. For people to efficiently store images, they needed a file format that could be compressed without losing too much of the image data during reconstruction. Enter the Joint Photographic Experts Group. This group of experts came in and designed what is now affectionately known as the JPEG.

JPEG compression is a very complicated process involving many mathematical equations, but the steps involved can be explained quite simply. The first thing the JPEG process does is break down the image into 8-x-8-pixel blocks. A color space transform is then applied to the RGB color information in each 8-x-8 block, and the RGB values are changed to represent luminance and chrominance values. The luminance value describes the brightness of the color while the chrominance value describes the hue.

Once the luminance and chrominance values have been established, the data is run through what is known as the *Discrete Cosine Transform* (DCT). This is the basis of the compression algorithm. Essentially, the DCT takes the information for the 8-x-8 block of pixels and assigns it an average number because, for the most part, the changes in the luminance and chrominance values will not be drastic in such a small part of the image.

The next step involves quantizing the coefficient numbers that were derived from the luminance and chrominance values by the DCT. *Quantizing* is the process of rounding off numbers. This is where file compression comes in. How much the file is compressed depends on the quantization matrix. The *quantization matrix* defines how much the information is compressed by dividing the coefficients by a quantizing factor. The larger the number of the quantizing factor, the higher the quality (and therefore, the less compression). This is what is going on in Photoshop when you save a file as a JPEG and the program asks you to set the quality; you are simply defining the quantizing factor.

Once the numbers are quantized, they are run through a binary encoder that converts the numbers to the 1s and 0s our computers love so much. You now have a compressed file that is on average about one-quarter of the size of an uncompressed file.

JPEG compression is known as a *lossy* compression because when the numbers are quantized, they lose information. For the most part, this loss of information is imperceptible to the human eye. A bigger issue to consider with JPEGs comes from what is known as *generation loss*. Every time you open, alter, and save a JPEG, it loses a small amount of detail. After multiple openings and savings, the image's quality starts to deteriorate, as less and less information becomes available. Eventually the image may start to look pixelated or jagged (this is known as a *JPEG artifact*). Obviously, this can be a problem, but you would have to open and resave the JPEG many hundreds of times before you would notice a reduction in image quality, provided you save at high-quality settings.

Image size

When saving to JPEG format, the D5200 allows you to choose an image size. Reducing the image size is like reducing the resolution on your camera; it allows you to fit more images on the memory card. The size you choose depends on what your output is going to be. If you know you will be printing your images at a large size, you definitely want to record large JPEGs. If you're going to print at a smaller size (8 x 10 or 5 x 7),

you can get away with recording at the Medium or Small setting. Image size is expressed in pixel dimensions. The large JPEG setting records your images at 6000×4000 pixels; this gives you a file that is equivalent to about 24 megapixels. Medium size gives you an image of 4496×3000 pixels, which is in effect the same as a 13.5-megapixel image. The small size gives you a dimension of 3992×2000 pixels, which gives you about a 6-megapixel image.

To determine what size print you can make from your file you need to do a little math. Simply divide the pixel height and width of the file size by the intended output resolution in pixels-per-inch (ppi). Higher ppi numbers give more detailed prints. Most photo quality printers print from 240ppi to 300ppi, the latter being the most common and the best setting to use for just about all of your photo printing needs. So, for example, at the largest size, the D5200 gives you a 24MP image at 6000×4000 pixels. Divide 6000 by 300 and 4000 by 300, and you get approximately 20×13 inches. See Table 2.1 for actual print sizes for each resolution, as well as the closest common print sizes that correspond to the nearest actual measurements. Keep in mind that these sizes are at 300ppi.

Table 2.1 Print Sizes

Size	Actual print size (inches)	Common print size (inches)
Large 6016×4016	20×13	17×11
Medium 4512×3008	15×10	14×11
Small 3008×2008	10×6.7	10×8

You can select the Image size option in the Shooting menu (CAMERA) to change the image size.

NOTE You can only change image size when you shoot in the JPEG file format; RAW files record only at the largest size.

Image quality

With JPEGs, in addition to the size setting, which changes the pixel dimension, you have the Quality setting, which determines the compression ratio that is applied to your JPEG image. Your choices are Fine, Normal, and Basic. JPEG Fine files are compressed to approximately 1:4, Normal files are compressed to about 1:8, and Basic files are compressed to about 1:16.

RAW versus JPEG

Choosing RAW or JPEG files depends on the final output of the file. You don't have to choose one file format and stick with it. You can change the settings to suit your needs, or you can choose to record both RAW and JPEG simultaneously.

Here are some reasons to shoot JPEGs:

- ▶ **Small file size.** JPEGs are much smaller than RAW files; therefore, you can fit many more of them on your memory card and later on your hard drive. If space limitations are a problem, shooting JPEG allows you to get more images in less space.
- ▶ **Printing straight from the camera.** RAW files can't be printed without first being converted to JPEG (which you can do in-camera with the D5200).
- ▶ **Continuous shooting.** JPEG files are smaller than RAW files, so they don't fill up the camera's buffer as quickly, allowing you longer bursts without slowing the frame rate.
- ▶ **Less post-processing.** If you're confident in your ability to get the image perfect at capture, you can save time by not having to process the image in a RAW converter and go straight to JPEG.

Here are some reasons to shoot RAW files:

- ▶ **More detail.** The sensor captures more highlight and shadow detail in RAW files, which can be retrieved during post-processing, if needed.
- ▶ **16-bit images.** The D5200 can capture RAW images in 12- or 14-bit. When converting a file using Adobe Camera Raw (ACR) or Capture NX 2, you can save your images as 16-bit files. When the information is written to JPEG in the camera, the JPEG is saved as an 8-bit file. This gives you the option of working with more colors in post-processing.
- ▶ **White balance.** The white balance setting is tagged in the RAW file, but it isn't fixed in the image data. Changing the white balance on a JPEG image can cause posterization, and usually doesn't yield the best results. Changing the white balance settings of a RAW file doesn't degrade the image.
- ▶ **Sharpening and saturation.** These settings are also tagged in the RAW file, but not applied to the actual image data. You can add these in post-processing to your own specifications.
- ▶ **Image quality.** Because the RAW file is unfinished, you can make many changes to the details of the image without any degradation of quality.



Setting up the Nikon D5200

To create a simpler, more intuitive operating experience, the D5200 menu system isn't quite as extensive as that of other cameras, such as the Nikon D800 or D600. The menu system of the D5200 has most of the extraneous frills stripped away, but it is still a highly customizable camera with the most important features.

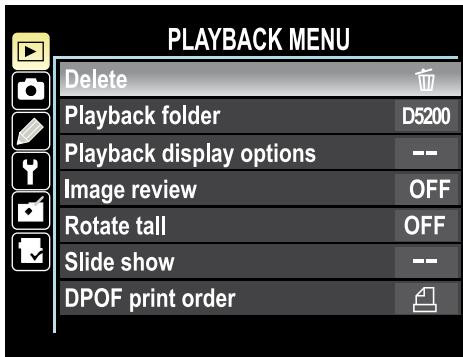
Understanding the menu options is pretty much the key to making the camera an extension of your vision. If you don't know the menu system well, you will constantly be searching through them, and possibly, missing photographic opportunities. Learning the D5200 menu system is also important because, as mentioned previously, the Vari-angle LCD monitor keeps the external controls at a minimum. To enter the Nikon D5200 menu system, simply press the Menu button (**MENU**), and then use the multi-selector to navigate through the options.



Setting up your camera effectively allows you to focus on your art.

The Playback Menu

The Playback Menu (▶) displays options that allow you to control how your images are stored. You can also select how the camera displays the images during image review, and what information is displayed while reviewing your images. Press the Menu button (MENU), and then use the multi-selector up (▲) or down (▼) to highlight the Playback menu (▶), and then press the OK button (OK) or multi-selector right (▶) to access the options.

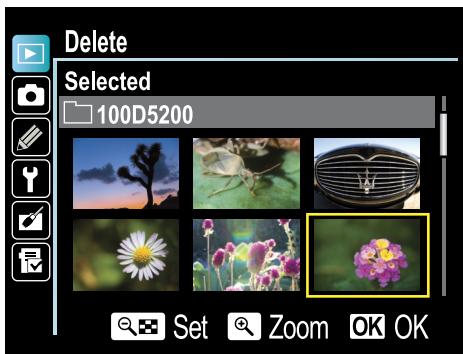


3.1 The Playback menu.

Delete

The Delete option allows you to delete selected images from your memory card, delete images from a certain date, or delete all of the images at once. To delete selected images, follow these steps:

- 1. Press the multi-selector right (▶), highlight Selected (default), and then press the multi-selector right (▶) again.** The camera displays an image selection screen.
- 2. Press the Thumbnail button (◀)** to set the image or images that you want to delete. You can also press the Zoom in button (Q) to review an image close up before deleting it. When you select the image for deletion, the trash can symbol (trash icon) appears in the upper-right corner of the thumbnail.
- 3. Press the OK button (OK) to erase the selected images.** The camera asks you for confirmation before deleting the images.
- 4. Select Yes, and then press the OK button (OK) to delete.** To cancel the deletion, highlight No (default), and then press the OK button (OK).



3.2 Selecting images to delete.

To delete images from a specific date, use the multi-selector to highlight Select date, and then press the multi-selector right (►) or the OK button (OK). A list of dates (or a single date if you've only shot for one day on a card) appears; use the multi-selector to highlight a date, and then press the multi-selector right (►) to select the date of the images for deletion. A check mark appears in the box next to the date of the images that will be deleted. You can press the Thumbnail button (Thumbnail) to view the images taken on that date to confirm that you want to delete them. Press the OK button (OK) to set the date range for deletion. When you're ready to delete the images, press the OK button (OK) again; a dialog box appears, asking for confirmation. Select Yes to delete or No to cancel, and then press the OK button (OK).

To delete all images, use the multi-selector to highlight All, and then press the OK button (OK). Select Yes when asked to confirm the deletion, and then press the OK button (OK) to delete. To cancel the deletion, highlight No (default), and then press the OK button (OK).

Playback folder

The Nikon D5200 automatically creates folders in which to store your images. The main folder that the camera creates is called DCIM, and within this folder the camera creates a subfolder to store the images; the first subfolder the camera creates is labeled 100ND5200. After shooting 999 images, the camera automatically creates another folder, 101ND5200, and so on. If you have used the memory card in another camera and have not formatted it, there will be additional folders on the card (ND600, ND3S, and so on).

You can change the current folder using the Storage folder option in the Shooting Menu. You have the following two folder choices:

- ▶ **Current.** This option displays images only from the folder to which the camera is currently saving. This feature is useful when you have multiple folders from different sessions. Using this setting allows you to preview only the most current images.
- ▶ **All.** This option plays back images from all folders that are on the memory card.

Playback display options

A lot of information is available when you review images, and the Playback display options allow you to customize that information. By default, if you don't select any of these options, playback displays the photo with some basic information (storage folder, file number, date and time, image quality, and size) in a letterbox below.

You can select one, all, or any combination of the following options:

- ▶ **None (image only).** As indicated, this shows the full size image only, with no information at all.
- ▶ **Highlights.** When you activate this option, any highlights that are blown out will blink. If this happens, you may want to apply some exposure compensation or adjust your exposure to be sure to capture highlight detail.
- ▶ **RGB Histogram.** When you activate this option, you can view the separate histograms for the Red, Green, and Blue channels along with a standard luminance histogram.
- ▶ **Shooting Data.** This option allows you to review the shooting data (metering, exposure, lens focal length, and so on).
- ▶ **Overview.** This option shows a thumbnail version of the image with the luminance histogram, as well as general shooting data: shutter speed, aperture, ISO, and so on.

When you select any of these options, you can toggle through them by pressing the multi-selector up (▲) and/or down (▼).

NOTE If an optional GPS unit, such as the Nikon GP-1, is used and GPS data is attained, the camera displays an additional GPS data screen, which shows the Latitude, Longitude, Altitude, and Time.

Image review

The Image review option (see Figure 3.1) allows you to choose whether the image is shown on the LCD monitor immediately after you shoot it. When you turn this option off, you can view the image by pressing the Playback button (▶). Keeping this option off conserves battery power because the LCD monitor is actually the biggest drain on your battery. When shooting events with a lot of quickly changing action, such as sporting events and concerts, you may want to keep this option off. I have found that when shooting fast subjects, leaving the review on causes the camera to scroll through the image data instead of moving the focus point. This can cause you to lose important shots.

If you're shooting portraits or other shots where you are shooting single images, you can turn this option on. This allows you a chance to immediately review the image to check the exposure, framing, and focus.

Rotate tall

The D5200 has a built-in sensor that can tell whether the camera was rotated while you took the image. The Rotate tall option rotates images that you have shot in portrait orientation to display upright on the LCD screen. I usually turn this option off because the portrait orientation image appears substantially smaller when displayed upright on the LCD screen.

The options are:

- ▶ **On.** The camera automatically rotates the image to be viewed while holding the camera in the standard upright position. When you turn this option on (and you set the Auto image rotation setting to On in the Setup Menu), the camera orientation is recorded for use in image-editing software.
- ▶ **Off (default).** When you turn the auto-rotating function off, images taken in portrait orientation display sideways on the LCD screen in landscape orientation.

Slide show

The Slide show option allows you to display a slide show of images from the current active folder. You can use this feature to review the images that you have shot without having to use the multi-selector. This is also a good way to show friends or clients your images. You can connect the camera to an HDTV to view the slide show on a big screen. The following options are available:

- ▶ **Start.** This option simply starts the slide show. It plays back both still images and movies.
- ▶ **Image type.** This option allows you to select what kinds of files are played back. You can select Still images and movies, Still images only, or Movies only.
- ▶ **Frame interval.** This option allows you to select how long the still images display. The options are 2, 3, 5, or 10 seconds.

While the slide show is in progress, you can press the multi-selector left (◀) to skip forward or right (▶) to skip back. Press the multi-selector up (▲) or down (▼) to view shooting information or histograms. You can also press the Menu button (MENU) to return to the Playback Menu, press the Playback button (■) to end the slide show, or tap the shutter-release button lightly to return to the Shooting mode.

If you press the OK button (OK) while the slide show is in progress, the slide show pauses and offers you options for restarting, changing the frame rate, or exiting the slide show. Press the multi-selector up (▲) or down (▼) to make your selection, and then press the OK button (OK).

DPOF print order

DPOF stands for Digital Print Order Format. This option allows you to select images to be printed directly from the camera. You can use this feature with DPOF-compatible printers or devices such as a photo kiosk at your local photo printing shop. This is a handy feature if you don't have a printer at home and you want to have prints made quickly, or if you do have a printer and want to print your photos without downloading them to your computer.

CAUTION DPOF can only be used with JPEG files. If there are no JPEGs on the card, this option is not available. If you shoot RAW files, you can use the RAW editing features in the Retouch menu () to create a JPEG copy.

Follow these steps to create a print set:

- 1. Use the multi-selector to choose the DPOF print order option, and then press the multi-selector right () to enter the menu.**
- 2. Use the multi-selector to highlight Select/Set, and then press the multi-selector right () to view thumbnails.** You can press the Zoom in button () to view a larger preview of the selected image.
- 3. Press the multi-selector right () or left () to highlight an image to print, and then press the Thumbnail button () and multi-selector up () to set the image and choose the number of prints.** You can choose from 1 to 99. The number of prints and a small printer icon appear on the thumbnail. Continue this procedure until you have selected all of the images that you want to print. Press the multi-selector down () to reduce the number of prints and remove the image from the print set.
- 4. Press the OK button ().** A menu appears with the following two options:
 - **Print shooting data.** Press the multi-selector right () to set. Press the multi-selector right () again to unset. A check mark appears in the box next to the menu option when the option is set. When you select this option, the shutter speed and aperture setting appear on the print.
 - **Print date.** Press the multi-selector right () to set. Press the multi-selector right () again to unset. A check mark appears in the box next to the menu option when the option is set. When you select this option, the date the image was taken appears on the print.
- 5. Press the OK button ().** This saves the Print order.

The Shooting Menu

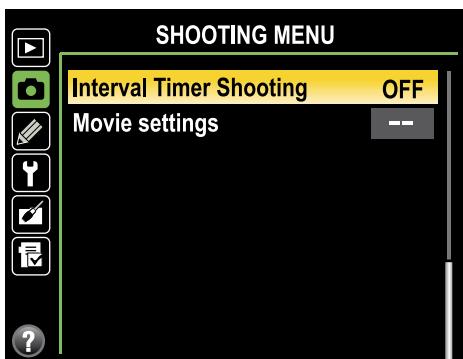
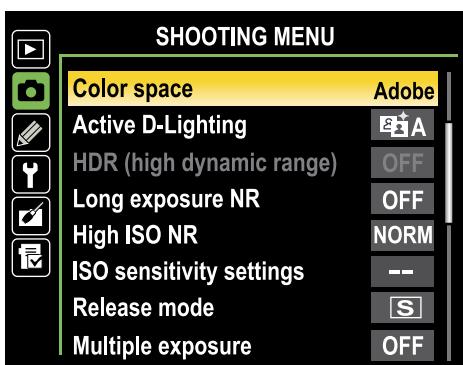
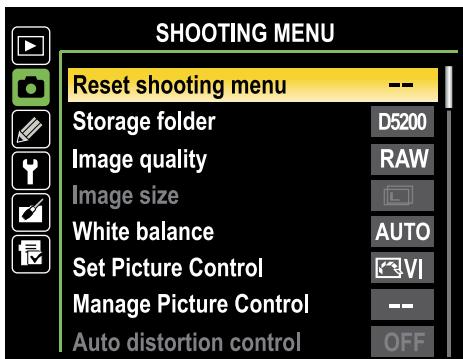
The Shooting menu (CAMERA) allows you to control how images are captured on your D5200. This includes ISO, image quality, white balance, Picture Controls, and more. In short, anything that affects the file or how the image is captured is set here. Some of the options in this menu, such as Image quality (QUAL), White balance (WB), ISO (ISO), and Picture Control (PC), can also be set using external buttons, so you don't have to enter this menu to change them.

Reset shooting menu

Simply put, the Reset shooting menu option resets all of the Shooting menu options covered in this section to their defaults. To do this, select this option, and then press the OK button (OK) or the multi-selector right (►). Two options then appear: Yes and No. Select Yes to reset or No to cancel, and then press the OK button (OK) again.

Storage folder

Use the Storage folder option to select the folder into which your images should be saved as you shoot. You can also create new folders, rename existing folders, or delete folders that you no longer need. By default, the camera creates a folder numbered 100D5200. When the folder has 999 photos in it or contains a photo with the file number 9999, the D5200 creates a new folder with a number that is one higher (101D5200, and so on).



3.3 The Shooting menu, shown in three screens.

The Storage folder options are:

- ▶ **Select folder.** The default folder is D5200, and there's another preexisting folder simply called Nikon. When you enter the Select folder submenu the current active folder appears on top and all subsequent folders follow in alphabetical order. Simply use the multi-selector to highlight the desired folder, and then press the OK button (**OK**) to select it.
- ▶ **New.** By selecting the New folder option, you can create a folder with your own designation. Simply choose a five-character, alphanumeric name for your folder, and then enter the name using the text entry menu that appears when you enter the New folder submenu. Use the multi-selector to scroll around in the keyboard text area at the top of the screen and highlight the letter or number that you want to input. When the correct character is highlighted in the keyboard area, press the OK button (**OK**). You can use the Command dial to move the cursor within the name area at the bottom to select the space where you want to place the character. To delete a character, move the cursor over the top of the letter, and then press the Delete button () to erase. After you input the text, press the Zoom in button () to create the folder. The folder then becomes the active storage folder.
- ▶ **Rename.** You can also rename an existing folder. You may want to do this instead of creating a new folder if you already have a folder that contains images, and you want to name the folder so that you can easily remember what photos you shot to help with file management.
- ▶ **Delete.** Navigating to this option and selecting Yes deletes the empty folder on the memory card. The camera asks you for confirmation so that you don't accidentally erase any folders.

Image quality

Select Image quality (see Figure 3.3) to change the image quality of a file. You can choose from the following options:

- ▶ **NEF (RAW) + JPEG fine.** This option saves two copies of the same image, one in RAW and one in JPEG with minimal compression.
- ▶ **NEF (RAW) + JPEG normal.** This option saves two copies of the same image, one in RAW and one in JPEG with standard compression.
- ▶ **NEF (RAW) + JPEG basic.** This option saves two copies of the same image, one in RAW and one in JPEG with high compression.

- ▶ **NEF (RAW).** This option saves the images in RAW format with all of the 14-bit data from the sensor. You can adjust the RAW recording settings in the NEF (RAW) recording option in the Shooting Menu.
- ▶ **JPEG fine.** This option saves the images in JPEG format with minimal compression of about 1:4.
- ▶ **JPEG normal.** This option saves the images in JPEG format with standard compression of about 1:8.
- ▶ **JPEG basic.** This option saves the images in JPEG format with high compression of about 1:16.

CROSS REF For more detailed information on image quality, compression, and file formats, see Chapter 2.

Image size

The Image size option allows you to choose the size of JPEG files. You can change the image size depending on the intended output of the file. Choose from the following sizes:

- ▶ **Large.** This setting gives you a high-resolution image of 6000×4000 pixels, or 24 megapixels.
- ▶ **Medium.** This setting gives you a resolution of 4496×3000 pixels, or 13.5 megapixels.
- ▶ **Small.** This setting gives you a resolution of 2992×2000 pixels, or 6 megapixels.

White balance

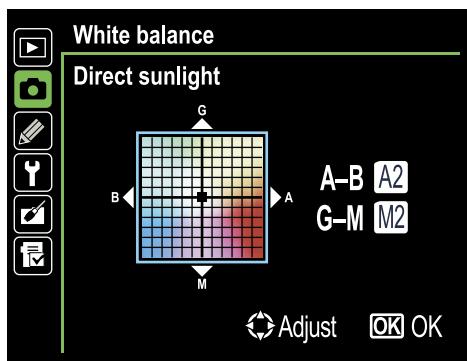
You can change the white balance settings using this menu option. Select a white balance setting from the standard settings, which are Auto (**AUTO**), Incandescent ()**,** Fluorescent ()**,** Direct Sunlight ()**,** Flash ()**,** Cloudy ()**,** and Shade ()**.** You can also set a custom white balance using the Preset manual option (**PrE**).

CROSS REF For more detailed information on white balance settings and color temperature, see Chapter 2.

Using white balance settings

To select one of the standard settings, choose the White balance option (see Figure 3.3) from the Shooting menu (CAMERA), use the multi-selector to highlight the preferred setting, and then press the multi-selector right (►) or the OK button (OK). This displays a new screen that gives you the option to fine-tune the standard setting. This screen displays a grid that allows you to adjust the color tint of the selected white balance setting.

The horizontal axis of the grid allows you to adjust the color from amber to blue, making the image warmer or cooler, while the vertical axis of the grid allows you to change the tint by adding a magenta or green cast to the image. Using the multi-selector, you can choose a setting from 1 to 6 in either direction; additionally, you can add points along the horizontal and vertical axes simultaneously. For example, you can add 4 points of amber to give it a warmer tone and also add 2 points of green, shifting the amber tone more toward yellow.



3.4 The White balance fine-tuning grid.

Choose the Fluorescent setting (FLUORESCENT) to display the following menu options:

- ▶ **Sodium-vapor.** These types of lights are often found in streetlights and parking lots. They emit a distinct, deep-yellow color.
- ▶ **Warm-white fluorescent.** These types of lamps give a white light with a slight amber cast to add some warmth to the scene. They burn at around 3000K, similar to an incandescent bulb.
- ▶ **White fluorescent.** These lights cast a very neutral, white light at around 5200K.
- ▶ **Cool white fluorescent.** As the name suggests, this type of lamp is a bit cooler than a white fluorescent lamp and has a color temperature of 4200K.
- ▶ **Day white fluorescent.** This lamp approximates sunlight at about 5500K.
- ▶ **Daylight fluorescent.** This type of lamp gives you about the same color as daylight. This lamp burns at about 6300K.
- ▶ **High temp. mercury-vapor.** These lights vary in temperature, depending on the manufacturer, and usually run between 4200 and 5200K.

This menu is handy if you know the specific type of lighting fixture that is being used. For example, most outdoor sporting arenas use mercury-vapor lights to light the field at night. If you select the Fluorescent white balance setting (⌘) from the Shooting menu (CAMERA), and then choose the last option, High temp. mercury-vapor, you get a more accurate and consistent white balance, allowing you to more accurately assess the histogram.

Preset manual white balance

The Preset manual white balance option (PRE) allows you to make your own custom white balance settings. You can use this option when shooting in mixed lighting, such as a room with an incandescent bulb and sunlight coming through a window, or when the camera's Automatic white balance (AUTO) isn't quite getting the correct color.

You can set a custom white balance in two ways: using direct measurement, where you take a reading from a neutral-colored object (a gray card works best for this) under the light source; or copying it from an existing photograph, which allows you to choose a white balance setting directly from an image stored on the memory card.

CROSS REF See Appendix C for instructions on using the included gray card to preset the white balance.

To preset the white balance manually, select Measure from the Preset manual white balance menu option (PRE), and then press the OK button (OK). The camera displays a blinking white balance preset icon (PRE). Next, aim the camera at a neutral subject and take a photo. If the preset was successful, the White balance good icon (Good PRE) flashes in the viewfinder. If the White balance no good icon (No Good PRE) flashes in the viewfinder, you need to shoot another photo. You need a good amount of light to get a proper white balance setting.

You can also copy the white balance setting from any photo that is saved on the memory card that's inserted into your camera. Once again, there are two options to select from: Measure or Use photo. Select Use photo from the Preset manual submenu. This displays two options: This image or Select image. Use the This image option to set the white balance to the image that you selected for the Preset manual (PRE). To use the Select image option, press the multi-selector right (►). The menu then displays a list of available folders. Press the multi-selector up (▲) or down (▼) to choose a folder, and then press the multi-selector right (►). This displays thumbnails of the images in the folder. Use the multi-selector to navigate through the images.

When you find a suitable image, press the OK button (**OK**) to select it. Use the Zoom in button (**Q**) if you want to take a closer look at the image. After you select an image, you again see the This image and Select image options. However, for the This image option, you now see a thumbnail of the image you selected. Make sure that This image is highlighted, and then press the OK button (**OK**).

Set Picture Control

Picture Controls allow you to choose how the images are processed, and you can also use them in the NikonView NX2 and Nikon Capture NX2 image-editing software. Picture Controls allow you to get the same results when using different cameras that are compatible with the Nikon Picture Control System.

NOTE When you save images as NEF (RAW files), Picture Controls are embedded in the metadata, and only Nikon software can use these settings. When you open RAW files in a third-party program, such as Lightroom or Adobe Camera RAW in Photoshop, Picture Controls are not applied.

Select Set Picture Control (**¶**) (see Figure 3.3) from the Shooting menu (**¶**) to adjust all of the Picture Controls to suit your specific needs or tastes. In the color modes — SD (**¶SD**), NL (**¶NL**), VI (**¶VI**), PT (**¶PT**), LS (**¶LS**) — you can adjust the sharpening, contrast, brightness, hue, and saturation. In MC mode (**¶MC**), you can adjust the filter effects and toning. After adjusting the Picture Controls (**¶**), you can save them for later use. You do this in the Manage Picture Control option described in the next section.

CROSS REF For more detailed information about customizing and saving Picture Controls (**¶**), see Chapter 2.

Manage Picture Control

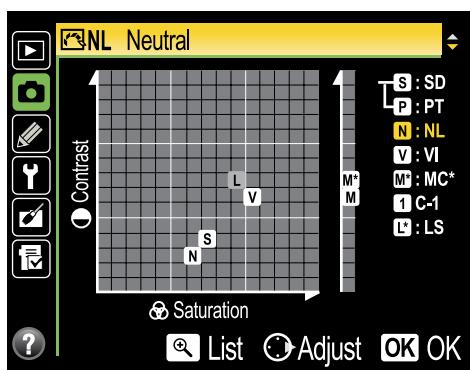
In the Manage Picture Control menu, you can edit, save, and rename your Custom Picture Controls. You can choose from the following options:

- ▶ **Save/edit.** In this menu, you choose a Picture Control, adjust, and save it. You can rename the Picture Control to help you remember what adjustments you made or to indicate what the Custom Picture Control is to be used for. For example, I have created one Picture Control named ultra-VIVID, which has the contrast, sharpening, and saturation boosted as high as it can go. I sometimes use this setting when I want crazy, oversaturated, unrealistic-looking images for abstract shots or light trails.

- ▶ **Rename.** This menu allows you to rename any of your Custom Picture Controls. You cannot, however, rename the standard Nikon Picture Controls.
- ▶ **Delete.** This menu gives you the option of erasing any Custom Picture Controls you have saved. This menu only includes controls you have saved or that you have downloaded from an outside source. You cannot delete the standard Nikon Picture Controls.
- ▶ **Load/save.** This menu allows you to upload Custom Picture Controls to your camera from your memory card; delete any Picture Controls saved to your memory; or save a Custom Picture Control to your memory card to export to Nikon View or Nikon Capture NX2 or to another camera that is compatible with Nikon Picture Controls.

CROSS REF For more detailed information about creating and managing Picture Controls (☒), see Chapter 2.

The D5200 also allows you to view a grid graph that shows you how the Picture Controls relate to each other in terms of contrast and saturation. Each Picture Control is represented on the graph by a square icon with the letter of the Picture Control to which it corresponds. Custom Picture Controls are denoted by the number of the custom slot to which they have been saved. Standard Picture Controls that you have modified display with an asterisk next to the letter. Picture Controls that have been set with one or more auto settings appear in green with lines extending from the icon to show you that the settings will change, depending on the images.



3.5 The Picture Control grid.

To view the Picture Control grid, select the Set Picture Control option from the Shooting menu (☒). Press the OK button (OK) and the Picture Control list appears. Press the Zoom in button (☒) to view the grid. Once the Picture Control grid appears, you can use the multi-selector to scroll through the different Picture Control settings. After you highlight a setting, press the multi-selector right (►) to adjust the settings or the OK button (OK) to set the Picture Control. Press the Menu button (MENU) to exit back to the Shooting menu (☒), or tap the shutter-release button to prepare the camera for shooting.

Auto distortion control

Each lens has its own specific distortion characteristics, and Nikon has built-in software that automatically corrects it on NIKKOR D- and G-type lenses only. It also only applies to JPEG or NEF files opened in Nikon software. Auto distortion control doesn't work with NIKKOR Perspective Control and fisheye lenses, or when shooting video. Nikon also does not guarantee that this feature will work with third-party lenses.

Color space

Color space (see Figure 3.3) simply describes the range of colors (also known as the *gamut*) that a device can reproduce. With the D5200, you have two choices of color spaces: sRGB and Adobe RGB. The color space you choose depends on what the final output of your images will be. The options are:

- ▶ **sRGB.** This is a narrow color space, meaning that it deals with fewer colors and also more saturated colors than the larger Adobe RGB color space. The sRGB color space is designed to mimic the colors that most low-end monitors can reproduce.
- ▶ **Adobe RGB.** This color space has a much broader color spectrum than is available with sRGB. The Adobe gamut was designed for dealing with the color spectrum that can be reproduced with most high-end printing equipment.

This leads to the question of which color space you should use. If you take pictures, download them straight to your computer, and typically only view them on your monitor or upload them for viewing on the web, then sRGB is fine. The sRGB color space is also useful when printing directly from the camera or memory card with no post-processing.

If you are going to have your photos printed professionally or you intend to do a bit of post-processing to your images, using the Adobe RGB color space is recommended. This allows you to have subtler control over the colors than is possible using a narrower color space like sRGB.

I generally capture my images using the Adobe RGB color space. I then do my post-processing and make a decision on the output. If I know that I will be posting an image to the web, I convert it to sRGB; any images destined for my printer are saved as Adobe RGB. I usually end up with two identical images saved with two different color spaces. Because most web browsers don't recognize the Adobe RGB color space, any images saved as Adobe RGB and posted on the Internet usually appear dull and flat.

NOTE Some photo printing labs also require sRGB files. Consult with the lab to see what its requirements are before sending a file.

Active D-Lighting

Active D-Lighting (**ADL**) is designed to help you retain highlight detail when shooting in a high-contrast situation — such as direct sunlight — which can cause dark shadows and bright highlight areas. The exact nature of how this works is a proprietary Nikon feature encoded into the Expeed 3 image processor.

Using Active D-Lighting (**ADL**) changes all of the Picture Control (▣) brightness and contrast settings to Auto. This setting can be thought of as a more subdued form of High Dynamic Range (HDR) — even though the processing is very different, the final goal is the same; to expand the dynamic range of the image.

Active D-Lighting has six settings: Auto, Extra high, High, Normal, Low, and Off.

CAUTION The Extra high or High settings can cause excessive noise or banding to appear in the shadow areas.

In my experience, I've found that Active D-Lighting works, but the changes it makes can be more subtle when I use the lower settings. For general shooting, I recommend setting Active D-Lighting to Auto. I prefer to shoot in RAW, and although the settings are saved to the metadata for use with Nikon software, I would rather do the adjustment myself in Adobe Photoshop, so I turn this feature off.

When using Active D-Lighting, the camera needs some extra time to process the images. Your buffer fills up faster when shooting continuously, so expect shorter burst rates.

High Dynamic Range

Although this term has become synonymous with hyper-realistic imagery, High Dynamic Range (HDR) is really just a tool to make your subjects look more as they do to the human eye. Nikon's built-in HDR option (see Figure 3.3) takes two shots — one slightly overexposed and one slightly underexposed — and combines them using in-camera processing to expand the shadow and the highlight detail. Once you select the HDR mode from the Shooting menu (▣), you have six settings: Auto, Extra high, High, Normal, Low, and Off.

CAUTION The High Dynamic Range (HDR) feature is *only* available when shooting JPEGs without RAW files. If you set the image quality to RAW or RAW + JPEG, the HDR option is *not* available.

One disappointing fact is that the HDR feature is only available as a one-time shot option. This means that after you shoot an HDR photo, the camera reverts to the normal setting; to shoot another HDR image, you must go back into the menu option and turn it back on. If you plan to make extensive use of the HDR feature, I suggest that you program it to the Function button (**Fn**) in Custom Setting menu (setFlash) f1.

When the camera is combining the images, the HDR indicator ( **Dab Hdr**) flashes in the viewfinder and the Info display. You cannot take any photos until the HDR has finished processing.

Long Exposure NR

The Long Exposure NR menu option allows you to turn on noise reduction (NR) for exposures of 1 second or longer. When this option is on, after taking a long-exposure photo, the camera runs a noise-reduction algorithm that reduces the amount of noise in your image to produce a smoother result.

The D5200 employs a technique for long exposures called *dark frame noise reduction*. It is calculated by making an exposure of the same time with the shutter closed; the camera then analyzes the noise and bases the noise reduction on this second exposure. This doubles the processing time and slows your frame rate. Again, this is a setting I leave turned off because I prefer to do my own noise reduction during post-processing.

High ISO NR

The High ISO NR menu option allows you to choose how much noise reduction (NR) is applied to images that you take at high ISO settings (Nikon doesn't specify at what setting this starts, but it's probably somewhere around ISO 800). You can select from the following settings:

- ▶ **High.** This setting applies fairly aggressive noise reduction. A rather large amount of image detail can be lost when you use this setting.
- ▶ **Normal.** This is the default setting. Some image detail may be lost when you use this setting.

- ▶ **Low.** This setting applies a small amount of noise reduction. Most of the image detail is preserved when you use this setting.
- ▶ **Off.** This setting only applies noise reduction to images at ISO 2500 or higher, but it applies less NR than the Low setting.

ISO sensitivity settings

The ISO sensitivity settings (see Figure 3.3) allow you to set the ISO sensitivity and Auto ISO. You can also change the ISO sensitivity using the Info edit menu. The options go from ISO 100 on up to ISO 25,600 (Hi2) in 1/3 steps. The base settings are ISO 100 to ISO 6400. It's recommended that you stick with the base settings rather than Hi settings. The Hi settings cause excessive noise and banding.

CROSS REF ISO settings are covered in detail in Chapter 2.

Release mode

Select Release mode (⌚) from the Shooting menu (CAMERA) to change the Release mode. There are seven options: Single-frame (s), Continuous L (ML), Continuous H (MH), Self-timer (⌚), Delayed remote (ML-L3) (ML3), Quick-response remote (ML-L3) (ML3), and Quiet shutter release (Q).

CROSS REF Release modes (⌚) are covered in-depth in Chapter 2.

3

Multiple exposure

The Multiple exposure option allows you to record multiple exposures in one image. You can record two or three shots in a single image. This is an easy way to get off-the-wall multiple images without using image-editing software like Adobe Photoshop. To use this feature, follow these steps:

1. **Press the multi-selector right (▶) to select the mode: On (series) or Off.**
When you have selected the preferred option, press the OK button (OK).
2. **Select the Number of shots menu option, and then press the multi-selector right (▶).**
3. **Press the multi-selector up (▲) or down (▼) to set the number of shots, and then press the OK button (OK).**

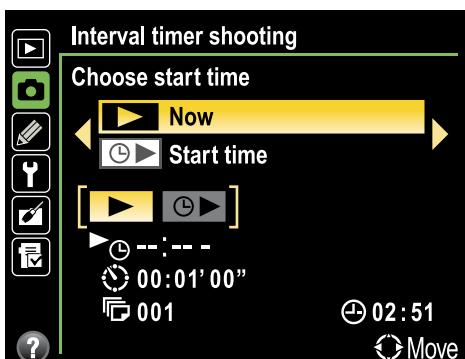
4. Select the **Auto gain option**, and then press the multi-selector right (**►**).
5. **Set the gain, and then press the OK button (OK)**. Using Auto gain enables the camera to adjust the exposure according to the number of images in the multiple exposures. This is the recommended setting for most applications. Setting the gain to Off does not adjust the exposure values and can result in an overexposed image. I only recommend using the Auto gain Off setting in low-light situations.
6. **Take your pictures.** I recommend using single burst and varying the subject matter.

Interval timer shooting

Interval timer shooting (see Figure 3.3) sets your camera to shoot a specified number of still photos at predetermined intervals during a set period of time. You can use this interesting feature to record the slow movements of plants or animals, such as a flower opening or a snail crawling. Another option is to set up your camera with a wide-angle lens and record the movement of the sun or moon across the sky. I've also set up my camera on a tripod and used the interval timer to shoot photos of my band while I was on stage.

Naturally, you need a tripod to do this type of photography, and if you plan on doing a lengthy shoot time, I suggest that you use the Nikon EH-5b AC power supply to be sure that your camera battery doesn't die in the middle of your shooting. You can then set the following options:

- ▶ **Start time.** The camera can be set to start 3 seconds after the settings have been completed (Now), or you can set it to start photographing at a predetermined time in the future.
- ▶ **Interval.** This setting determines how much time elapses between each shot. You can set Hours, Minutes, and Seconds.
- ▶ **Number of intervals.** This setting allows you to specify the number of times you want an image captured.



3.6 The Interval timer shooting menu.

- ▶ **Shots per interval.** This setting specifies how many shots are taken at each interval.
- ▶ **On or Off.** This option starts or stops the camera from shooting with the current settings.

Movie settings

The Movie settings on the D5200 allow you to adjust the size, frame rate, and quality of the videos you record. You can choose from the following options:

- ▶ **Frame size/frame rate.** This option allows you to set the size of the HD video and select the frame rate that is appropriate for your output. The following options are available:

- **1920 × 1080; 60i** ($\frac{1080i}{60}$)
- **1920 × 1080; 30p** ($\frac{1080p}{30}$)
- **1920 × 1080; 24p** ($\frac{1080p}{24}$)
- **1280 × 720; 60p** ($\frac{720p}{60}$)
- **640 × 424; 30p** ($\frac{424p}{30}$)

CROSS REF For in-depth information about recording video and bit rates, see Chapter 7.

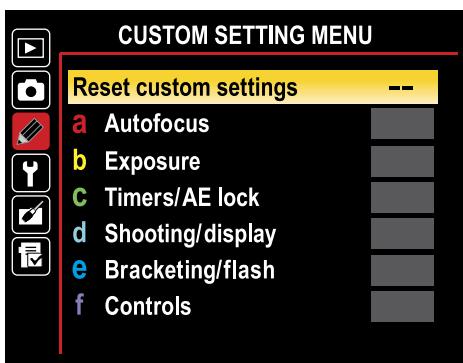
- ▶ **Movie quality.** There are two options here: High quality and Normal. These options set the maximum bit rate at which the video records.
- ▶ **Microphone.** This option allows you to adjust the volume of the recording using the built-in microphone or an external microphone. There are three easy options:
 - **Auto.** This simple option automatically adjusts the volume level so that the audio levels don't clip. This works well enough for most general video usage.
 - **Manual Sensitivity.** This option allows you to set the microphone to record at a specified volume. This option is best for recording sound in a controlled environment.
 - **Microphone off.** This turns off the audio recording. You may want to select this option if you are recording audio for your video project using an external recorder. This is what most professional videographers do.

- ▶ **Manual movie settings.** Set this option to On if you want to adjust the shutter speed and ISO sensitivity manually. This gives you more creative control over your videos. When Manual movie settings are turned Off, the camera sets the ISO and shutter speed automatically, although you can still control the aperture.

NOTE To use Manual movie settings, the camera must be in Manual mode (M).

The Custom Setting Menu

The Custom Setting menu (🔧) is where you really start customizing your D5200 to shoot to your personal preferences. This is where you make the camera yours. There are dozens of options that you can turn off or on to make shooting easier for you. This is probably the most powerful menu in the camera.



3.7 The Custom Setting menu.

Reset custom settings

Choose the Reset custom settings option, and then select Yes to restore all of the custom settings to their default values.

Custom Setting menu a: Autofocus

The Custom Setting menu (🔧) a controls how the camera performs its autofocus (AF) functions. Because focus is a very critical operation, this is a very important menu.

You can select from the following options:

- ▶ **a1: AF-C priority selection.** You can specify how the camera autofocus functions when in the Continuous Servo AF mode (AF-C) mode. Choose from the following options:
 - **Release.** Although this is not the default camera setting, it is the best option if you're shooting moving subjects. It allows the camera to take a photo whenever you press the shutter-release button, regardless of whether the

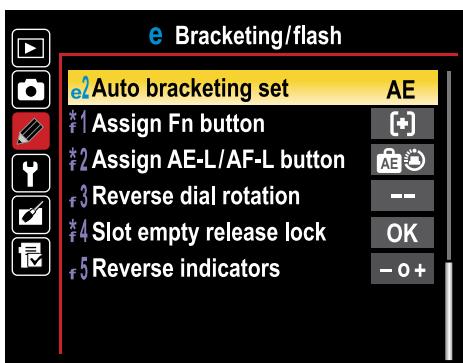
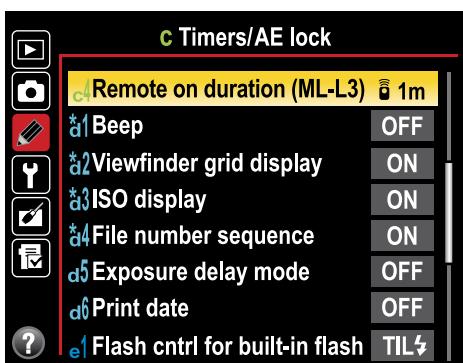
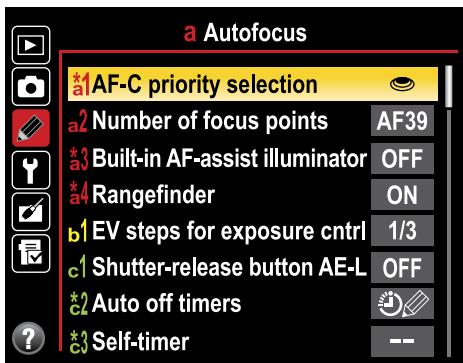
camera has achieved focus. This setting is best used for fast action shots, or when it's imperative to get the shot, regardless of whether it's in sharp focus.

- **Focus.** This is the camera default. This allows the camera to take photos only when the camera achieves focus and the focus indicator (green dot in the lower-left corner of the viewfinder) is lit. This is a good setting for slow-moving subjects where you want to be absolutely sure that your subject will be in focus.

► a2: Number of focus points.

This option allows you to choose from the number of available focus points when using autofocus. You can specify 39 points, which allows you to choose all of the D5200's available focus points. You can also set it to 11 points, which allows you to choose from only 11 focus points, similar to the D5100 and D3200 series cameras. When you choose the 11-point option, you can select your focus points much more quickly than when using 39 points. However, the 39-point option allows you to choose more accurately where in the frame the camera will focus.

- **a3: Built-in AF-assist illuminator.** The AF-assist illuminator lights up when there isn't enough light for the camera to focus properly (when using the viewfinder only). In certain instances, you may want to turn this option off, such as



3.8 The Custom Setting submenus.

when shooting faraway subjects, or in dim settings, like concerts or plays where the light may be a distraction. When set to On, the AF-assist illuminator lights up in low-light situations only if the Single Servo AF () and Auto area AF () modes were selected. When in Single-point AF mode (, or when Dynamic-area AF () is chosen, the center autofocus point must be active. When set to Off, the AF-assist illuminator does not light at all.

- ▶ **a4: Rangefinder.** Setting this option to On causes the exposure indicator in the viewfinder to act as an electronic rangefinder to help with focus when the lens or camera is set to manual focus. If the indicator is showing to the left, the focus is in front of the subject; if it shows to the right, the focus is falling behind the subject. When the camera is set to Manual exposure () the camera automatically defaults to displaying the exposure meter.

Custom Setting menu b: Exposure

Custom Setting menu (b (see Figure 3.8) is where you can change the b1 setting: EV steps for exposure cntrl, which controls exposure increments. This setting determines how the increments for shutter speed, aperture, and auto bracketing are set. The choices here are also 1/3 or 1/2 steps. Choosing 1/3-step increments gives you a much less drastic change in exposure and allows you to get a more exact exposure in critical situations.

Custom Setting menu c: Timers/AE lock

Custom Setting submenu c: Timers/AE lock (see Figure 3.8) controls the D5200's various menu timers and the auto exposure lock setting. You can choose from the following options:

- ▶ **c1: Shutter-release button AE-L.** When you set this option to the default (Off), the camera only locks exposure when you press the Auto Exposure Lock/Autofocus Lock button (). When you set it to On, the auto exposure settings lock when you press the shutter-release button halfway.
- ▶ **c2: Auto off timers.** This option controls how long the LCD monitor displays remain on when you do not push any buttons. Because the LCD monitor is the primary drain on power consumption for any digital camera, choosing a shorter delay time is usually preferable. You can choose Short, Normal, Long, or you can set each type differently in the Custom menu. The Custom options are:

- **Playback/menus – 8s, 20s, 1min, 5min, 10min**
- **Image review – 4s, 8s, 20s, 1min, 10min**

- **Live view – 5min, 10min, 15min, 20min, 30min**
- **Standby timer – 4s, 8s, 20s, 1min, 30min**

- **c3: Self-timer.** This setting puts a delay on when the shutter is released after you press the shutter-release button. This is handy when you want to take a self-portrait and you need some time to get yourself into the frame. You can also use the Self-timer release mode () to reduce camera shake caused by pressing the shutter-release button on long exposures. You can adjust the following settings:
- **Self-timer delay.** You can set the delay to 2, 5, 10, or 20 seconds.
 - **Number of shots.** You can press the multi-selector up () or down () to set the camera to take from one to nine photos.
- **c4: Remote on duration.** This setting controls how long the camera stays active while waiting for a signal from the ML-L3 wireless remote. You can set it to 1, 5, 10, or 15 minutes. After the preset amount of time has passed, the camera's exposure meter is turned off. To reactivate the camera, tap the shutter-release button.

Custom Setting menu d: Shooting/display

The Custom Setting menu () d (See Figure 3.8) is where you can change some of the minor shooting and display details. Here, you can choose from the following options:

- **d1: Beep.** When this option is on, the camera emits a beep when the self-timer is counting down or when the autofocus locks in Single Servo AF mode () . You can choose High, Low, or Off. Although the beep can be useful when in Self-timer mode () , it can also be an annoying feature, especially if you are photographing in a relatively quiet area. The beep does not sound when using Live View or when shooting in Quiet shutter release mode () . The default setting is Low.
- **d2: Viewfinder grid display.** This handy option displays a grid in the viewfinder to assist you in composing your photograph. I find this option to be very helpful, especially when composing landscape and architectural photos.
- **d3: ISO display.** Turning this option on shows the ISO setting in the viewfinder display instead of the remaining number of frames until you press the shutter-release button halfway, at which point the remaining frames are displayed.

- ▶ **d4: File number sequence.** The D5200 names files by sequentially numbering them. This option controls how the sequence is handled. When set to Off, the file numbers reset to 0001 when you format a memory card, create a new folder, or insert a new memory card. When set to On, the camera continues to count from the last number until it reaches 9999; it then returns to 0001 and counts up from there. When you set this option to Reset, the camera starts at 0001 when the current folder is empty. If the current folder contains images, the camera starts at one number higher than the last image in the folder. I always set this to On when setting up my camera. It reduces the risk of creating files with the same name, which can cause problems with file management. It also helps me keep track of how many shutter releases my camera has.
- ▶ **d5: Exposure delay mode.** Turning this option on causes the shutter to open 1 second after you press the shutter-release button and the reflex mirror has been raised. This option is for shooting long exposures with a tripod where camera shake from pressing the shutter-release button and mirror slap vibration can cause the image to be blurry.
- ▶ **d6: Print date.** This option only works with JPEGs and doesn't appear on RAW files. It allows you to add the following to your JPEG image files:
 - **Off.** No data is imprinted on the image.
 - **Date.** The month, day, and year are imprinted.
 - **Date and time.** The month, day, and year are imprinted, along with the time.
 - **Date counter.** This option displays the number of days remaining or the number of days that have passed from the selected date.

Custom Setting menu e: Bracketing/flash

The Custom Setting menu (setFlash) e (see Figure 3.8) is where you set the controls for the built-in flash. Some of these options also affect external Speedlights. This menu also contains the controls for bracketing images. You can choose from the following options:

- ▶ **e1: Flash ctrl for built-in flash.** This submenu has other submenus nested within it. Essentially, this option controls how your built-in flash operates. The two submenus are:
 - **TTL (TTL \downarrow).** This is the fully auto flash mode. You can make minor adjustments using Flash compensation (\downarrow \blacktriangleleft).
 - **Manual (M \downarrow).** You choose the power output in this mode. You can choose from full power down to 1/32 power.

- ▶ **e2: Auto bracketing set.** This option allows you to choose how the camera brackets when Auto-bracketing (**AE**) is turned on. You can choose for the camera to bracket Auto exposure (**AE**), White Balance (**WB**), or Active D-Lighting (**ADL**). White Balance bracketing (**WB**) is not available when the image quality is set to record RAW images.

CROSS REF For more information on flash photography and the Nikon Creative Lighting System, see Chapter 6.

Custom Setting menu f: Controls

Custom Setting menu (■) f (see Figure 3.8) allows you to customize some of the functions of the different buttons and dials on your D5200. There are five options, which I cover in the following sections.

f1: Assign Fn button

The Assign Fn button menu allows you to choose what the Function button (**Fn**) does when you press it. Be aware that not all options are available, depending on which setting you choose. You can also access this setting using the Info Edit menu. The options are:

- ▶ **Image quality/size.** Pressing the button and rotating the Command dial allows you to set the image quality and size.
- ▶ **ISO sensitivity.** Pressing the button and rotating the Command dial allows you to change the ISO sensitivity settings.
- ▶ **White balance.** Pressing the button and rotating the Command dial allows you to change the white balance options.
- ▶ **Active D-Lighting.** This option allows you to adjust the Active D-Lighting (**ADL**) settings quickly by pressing the Function button (**Fn**) and rotating the command dial.
- ▶ **HDR.** Assigning this option allows you to access the High Dynamic Range (HDR) feature quickly.
- ▶ **NEF (RAW).** When you activate this option, you set the camera to record JPEGs. Press the Function button (**Fn**) to set the camera to record RAW and JPEG files simultaneously. Press the button again to return to recording only JPEGs.
- ▶ **Auto bracketing.** This allows you to quickly turn on or adjust the Auto-bracketing (**AE**) as set in Custom Setting menu (■) e2.

- ▶ **AF-area mode.** Use this option to change the AF-area mode quickly by pressing the button and rotating the command dial.
- ▶ **Live view.** This option allows you to enter Live View mode (**Lv**) by pressing the Function button (**Fn**).
- ▶ **AE/AF Lock.** With this option, the focus and exposure lock when you press and hold the button.
- ▶ **AE lock only.** With this option, the exposure locks when you press and hold the button. Focus continues to function normally.
- ▶ **AE Lock (hold).** With this option, the exposure locks until you press the button a second time or the exposure meter is turned off.
- ▶ **AF Lock only.** With this option, the focus locks while you press and hold the button. The AE continues as normal.
- ▶ **AF-ON.** This option activates the camera's autofocus system.

f2: Assign AE-L/AF-L button

The Assign AE-L/AE-L button option allows you to assign a function to the AE-L/AF-L button (). Choose from the following options:

- ▶ **AE/AF Lock.** The focus and exposure lock when you press and hold the button.
- ▶ **AE lock only.** The exposure locks when you press and hold the button. Focus continues to function normally.
- ▶ **AE Lock (hold).** The exposure locks until you press the button a second time or the exposure meter is turned off.
- ▶ **AF Lock only.** The focus locks while you press and hold the button. The AE continues as normal.
- ▶ **AF-ON.** This option activates the camera's autofocus system. This works best when Custom Setting menu () a4 is set to AF-ON only.

f3: Reverse dial rotation

In the Reverse dial rotation menu, you control how the Command dial works when you rotate it. By default, rotating the command dial to the right stops down the aperture, makes a faster shutter speed (reducing exposure), and adds exposure compensation (increases exposure). You can choose to reverse the actions of the dial rotation for the exposure compensation, aperture/shutter speed, or both simultaneously.

f4: Slot empty release lock

The Slot empty release lock controls whether the shutter releases when there isn't a memory card in the camera. When you set it to Enable release, the shutter fires, and any image displayed on the monitor saves temporarily. When you set it to Release locked, the shutter does not fire. If you happen to be using Camera Control Pro 2 shooting tethered directly to your computer, the camera shutter releases regardless of what this option is set.

Many people use this feature to lock the shutter release so that if there isn't a memory card in the camera, the locked shutter instantly reminds them to insert one before they start snapping away, only to find out later that none of the images were recorded.

f5: Reverse indicators

The Reverse indicators option allows you to reverse the indicators on the electronic light meter that appears in the viewfinder and on the Info display. The default setting shows the underexposure on the left and the overexposure on the right. Nikon now offers this feature because on some of its earlier cameras, the indicators were the opposite way, and some people preferred them that way.

The Setup Menu

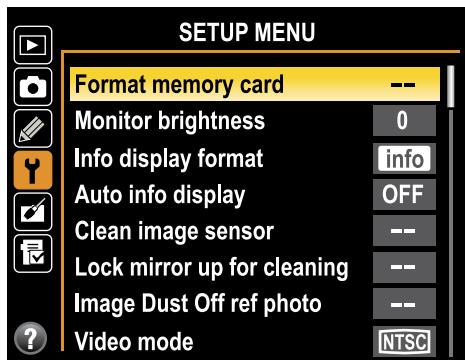
The Setup menu (F) contains a smattering of options, most of which aren't changed very frequently. Some of these settings include the time and date. A couple of other options are Clean image sensor and Battery info, which you may access from time to time.

Format memory card

If you select the Format memory card option, it erases everything on the memory card. Formatting your memory card erases all of the data on the card. It's a good idea to format your card every time you download the images to your computer (just be sure all of the files are successfully transferred before formatting). Formatting the card helps protect against corrupt data. Simply erasing the images leaves the data on the card and allows it to be overwritten; sometimes this older data can corrupt the new data as it is being written.

Monitor brightness

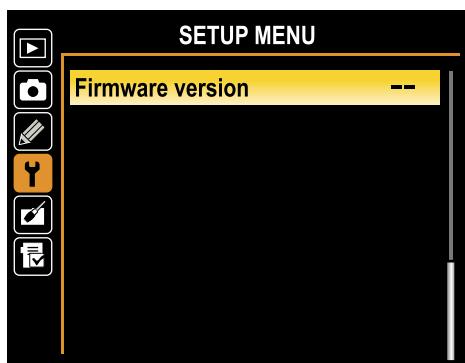
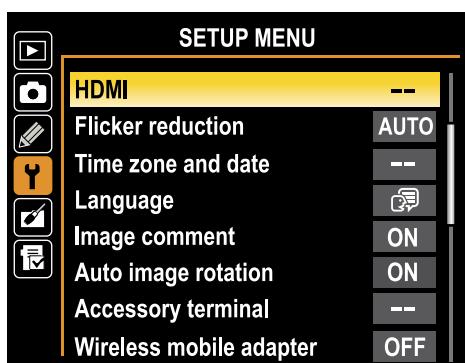
The Monitor brightness menu sets the brightness of the LCD monitor. You may want to make it brighter when viewing images in bright sunlight, or dimmer when viewing images indoors or to save battery power. You can adjust the brightness of the LCD monitor ± 3 levels. The menu shows a graph with ten bars ranging from black to gray to white. The optimal setting is where you can see a distinct change in color tone in each of the ten bars. If the last two bars on the right side blend, the LCD monitor is too bright; if the last two bars on the left side blend, the LCD monitor is too dark.



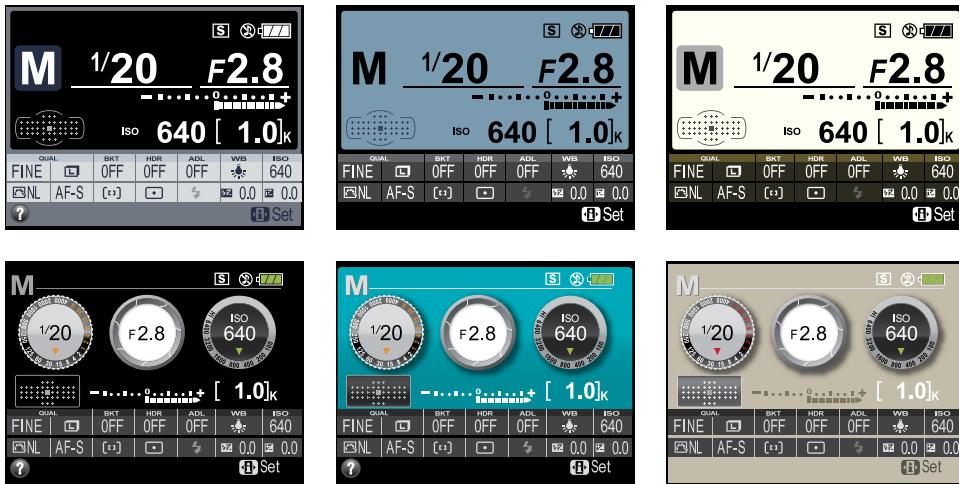
Info display format

Select the Info display format option to choose how the Info display menu appears. You can choose the classic display, which shows the exposure settings simply as numbers, or you can choose the graphic interface, which can help you visualize the exposure settings so that you can have an easier grasp of what's going on with the settings.

In addition, you can choose different display options for the Scene (**SCENE**) and Effects (**EFFECTS**) shooting modes, as well as the Programmed auto (**P**), Shutter-priority auto (**S**), Aperture-priority auto (**A**), and Manual (**M**) modes. On top of that, both the graphic and classic displays allow three choices of color and background: Light on dark, blue, and dark on light.



3.9 The Setup menu, shown in three parts.



3.10 The Classic (top) and Graphic (bottom) Info display options.

Auto info display

Set the Auto info display option to On, and you can view the Info display by simply tapping the shutter-release button. You can turn the display off again by pressing the Info button ().

Clean image sensor

The camera uses ultrasonic vibration to remove dust from the filter in front of the sensor. This helps keep most dust off the sensor, but it is not going to keep it dust-free forever. You may need to have the sensor professionally cleaned periodically.

After you select the Clean image sensor option from the Setup menu (, you can then highlight Clean now, which cleans the image sensor immediately when you press the OK button (). Selecting the Clean at startup/shutdown option brings up a submenu that includes the following options:

- ▶ **Clean at startup.** The camera goes through the cleaning process immediately after you turn the camera on. This may slightly delay your start-up time.
- ▶ **Clean at shutdown.** The camera cleans the sensor when you power the camera down. This is my preferred setting because it doesn't interfere with the start-up time.

- ▶ **Clean at startup and shutdown.** The camera cleans the image sensor when you turn the camera on and also when you power it down.
- ▶ **Cleaning off.** This option disables the dust reduction function when you turn the camera on and off. You can still use the Clean now option when this is set.

Lock mirror up for cleaning

When you select the Lock mirror up for cleaning option (see Figure 3.9), the mirror flips up and remains in that position so you can inspect or clean the image sensor. The sensor is also powered down to reduce any static charge that may attract dust.

The easiest way to clean the sensor is with a blower designed to blow puffs of air onto the sensor and remove any loose dust particles. This, combined with using the Clean image sensor feature regularly, should keep sensor dust to a minimum.

Sometimes, dust or dirt adheres to the filter that covers the sensor and it may need a wet cleaning. This involves a special swab and sensor cleaning fluid. Some people prefer to wet clean or swab the sensor themselves, but I recommend that you take your camera to an authorized Nikon service center for this during the initial factory warranty period. Any damage caused by improper cleaning is not covered by warranty and can lead to a very expensive repair bill.

That being said, learning to swab the sensor on your own is not difficult. It can also save you a lot of time and expense. You can remove the lens before or after locking up the mirror, but typically, it's easier to remove the lens beforehand. Follow these steps to lock up the mirror:

- 1. Press the Menu button (**MENU**) and use the multi-selector to enter the Setup menu (**Y**).** Use the multi-selector to navigate to the Lock mirror up for cleaning option.
- 2. Press the OK button (**OK**) or the multi-selector right (**▶**).** This brings up the Start menu option. Press the OK button (**OK**). This shows a dialog box with instructions for raising the mirror.

NOTE The mirror will not raise and lock if the battery power is too low.

- 3. Press the shutter-release button to open the shutter, and then raise and lock the mirror.** You now have access to the sensor, and can inspect or clean it.

4. **Turn off the camera.** This closes the shutter and lowers the mirror to the resting position.

CAUTION Make sure that nothing is in the way of the shutter or mirror before you turn off the camera. If a blower nozzle or swab is in the way, it will severely damage the shutter curtain, and possibly the mirror. Also, make sure that the battery has plenty of charge. If it is depleted, the shutter will close and the mirror will drop.

Image Dust Off ref photo

The Image Dust Off ref photo option takes a photo that shows any dust or debris that may be stuck to the sensor. Nikon Capture NX2 then uses the image to retouch any subsequent photos where the specks appear automatically.

To use this feature, select either *Start* or *Clean sensor and then start*. Next, you are instructed by a dialog box to take a photo of a bright, featureless white object about 4 inches (10cm) from the lens. The camera automatically sets the focus to infinity. A Dust Off reference photo can only be taken when using a CPU lens. It's recommended to use at least a 50mm lens, and when using a zoom lens, you should zoom all the way in to the longest focal length. The reference image, however, can be used for images taken at any focal length.

Video mode

Select the Video mode option (see Figure 3.9) to set the video playback mode. There are two options: NTSC and PAL. If you are in North America, use the NTSC option; if you are in Europe, set it to PAL.

HDMI

The D5200 has an HDMI (high-definition multimedia interface) output that allows you to connect your camera to a high-definition TV (HDTV) to review your images. The first option is Output resolution. There are five settings: Auto, 480p, 576p, 720p, and 1080i. The default is Auto, which selects the appropriate setting for your TV automatically. I recommend leaving the Output resolution set to Auto. See the manual for your TV to find the correct resolution if you decide to set it manually.

The second option in this menu is Device Control. This setting is important because, if it's not set right, it might disable the Live View feed for the HDMI device. After you select Device Control, you can choose from the following options:

- ▶ **On.** Select this option only when you want to use your HDTV to view image playback as you would see it on your camera's LCD screen. If your HDTV is HDMI-CEC capable, you will be able to use the TV remote control as you would the multi-selector. Be aware that if this setting is On, you will NOT be able to use Live View!
- ▶ **Off.** Use this option if you want to use the HDTV as a monitor to view Live View for shooting video or stills. This enables the camera to display what is on the LCD monitor directly to your HDTV or HDMI device.

NOTE If you want to change the HDMI settings, you must first disconnect the camera from the HD device.

Flicker reduction

Select the Flicker reduction option if a video is misbehaving. Some light sources, such as older fluorescent and mercury-vapor lights, can cause a video to flicker, depending on the local AC power grid. There are three options: Auto, 50 Hz, and 60 Hz. In the United States, the frequency is 60 Hz; in Europe, 50 Hz is the standard. The Auto option generally takes care of the problem, but if you aren't getting good results, try adjusting the shutter speed to 1/60 second or faster.

Time zone and date

Select Time zone and date (see Figure 3.9) to set the camera's internal clock. You can then choose from the following options:

- ▶ **Time zone.** Use the multi-selector to choose your time zone using the map display.
- ▶ **Date and time.** This is where you set the clock. It's pretty self-explanatory.
- ▶ **Date format.** You can set the order in which the date appears: Year/Month/Date, Month/Date/Year, or Date/Month/Year.
- ▶ **Daylight saving time.** If you turn this option on when Daylight saving time is in effect, then the time is changed by one hour.

Language

When you select the Language option, you can set the language in which the menus and dialog boxes are displayed.

Image comment

When you select Image comment, you can attach comments to the images you take with your D5200. You enter the text using the Input Comment menu. You can then view the comments in Nikon Capture NX2 or ViewNX 2 software, or you can view them in the photo information on the camera. Setting the attach comment option applies the comment to all images you take until you disable this setting.

NOTE Image comments are limited to 36 characters.

Auto image rotation

When you select the Auto image rotation option, the camera records its orientation when you shoot a photo (portrait or landscape). This allows the camera (and image-editing software) to show the photo in the proper orientation. This way, you don't have to take the time in post-processing to rotate images.

Accessory terminal

The Accessory terminal option (see Figure 3.9) allows you to adjust settings depending on what accessory you have plugged in to the terminal. You can select from the following options:

- ▶ **Remote shutter release.** This allows you to set what the camera does when a remote release is connected. You can set it to record stills or to start capturing video.
- ▶ **GPS.** You use this menu to adjust the settings of an optional GPS unit, such as the Nikon GP-1, which you can use to record longitude and latitude to the image's EXIF data. You can choose from the following options:
 - **Standby timer.** There are two options for this setting: Enable and Disable. Setting the option to Enable allows the standby timer to operate as set in Custom Setting menu (setFlash) c2. When the standby timer puts the camera to sleep, the GPS unit is disabled — it will need to reestablish GPS connections

when it awakens or is reactivated. When set to Disable, the camera does not go into standby mode in order to keep the GPS connection active. The downside of this option is that the GPS unit drains the battery.

- **Position.** Selecting this option displays the longitude and latitude of the GPS unit reading.
- **Use GPS to set camera clock.** This option uses the GPS unit to set the internal clock of your D5200.

Eye-Fi upload

The Eye-Fi upload option only appears in the Setup menu (¶) when an Eye-Fi memory card is inserted into the camera. An Eye-Fi card allows you to transfer images to your computer wirelessly. There are a number of Eye-Fi card types, so it's best to check the owner's manual that comes with your specific card for more details.

Wireless mobile adapter

Select the Wireless mobile adapter option (see Figure 3.9) to transfer files with the optional Nikon WU-1a wireless mobile adapter. If you have one of these devices, see the owner's manual for details about operating it.

Firmware version

Select Firmware version from the menu to display the firmware version your camera is using. Firmware is a computer program embedded in the camera that tells it how to function. Camera manufacturers routinely update the firmware to correct for any bugs or to make improvements on the camera's functions. Nikon posts firmware updates on its website at www.nikonusa.com.

The Retouch Menu

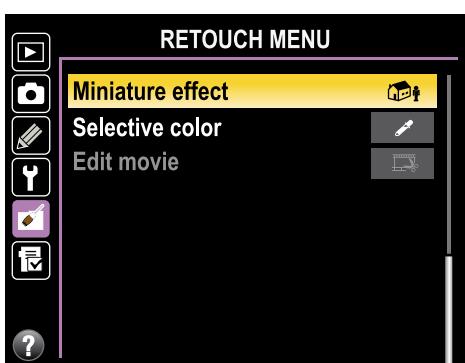
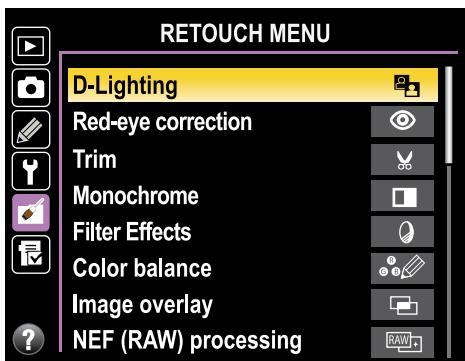
The Retouch Menu (■) allows you to make changes and corrections to your images without using imaging-editing software. As a matter of fact, you don't even need to download your images to a computer. You can make all of the changes in-camera using the LCD screen preview (or hooked up to an HDTV if you prefer). The Retouch menu (■) only makes *copies* of the images, so you don't need to worry about doing any destructive editing to your actual files.

There are two ways to access the Retouch menu (■). This first one is the quickest, but it doesn't display all of the options. Follow these steps:

- 1. Press the Playback button (■) to enter Playback mode.**
Your most recent image appears on the LCD screen.
- 2. Use the multi-selector to review your images.**
- 3. When you see an image you want to retouch, press the OK button (OK) to display the Retouch menu (■) options.**
- 4. Use the multi-selector to highlight the Retouch option you want to use.** Depending on the Retouch option you choose, you may have to select additional settings.
- 5. Make adjustments if necessary.**
- 6. Press the OK button (OK) to save.**

This is the second method for entering the Retouch menu (■). Follow these steps:

- 1. Press the Menu button (MENU) to view the menu options.**
- 2. Press the multi-selector down (▼) to move to the Retouch Menu (■).**
- 3. Press the multi-selector right (►), and then press the multi-selector up (▲) or down (▼) to highlight the Retouch option you want.** Depending on the Retouch option you select, you may have to select additional settings. Once you select your option(s), thumbnails appear.



3.11 The Retouch menu, shown in three parts.

4. Use the multi-selector to select the image to retouch, and then press the OK button (**OK**).
5. Make the necessary adjustments.
6. Press the OK button (**OK**) to save.

D-Lighting

The D-Lighting option (**DLG**) allows you to adjust the image by brightening the shadows. This is not the same as Active D-Lighting (**ADL**). D-Lighting uses a curves adjustment to help bring out details in the shadow areas of an image. This option is for use with backlit subjects or images that may be slightly underexposed.

When you select the D-Lighting option (**DLG**) from the Retouch menu (**■**), you can use the multi-selector to choose a thumbnail, and then press the Zoom in button (**Q**) to get a closer look at the image. Press the OK button (**OK**) to choose the image to retouch, and two thumbnails are displayed; one is the original image, and the other is the image with D-Lighting applied.

You can press the multi-selector up (**▲**) or down (**▼**) to select the amount of D-Lighting: Low, Normal, or High. You can view the results in real time and compare them with the original before saving. Press the OK button (**OK**) to save, the Playback button (**▶**) to cancel, or the Zoom in button (**Q**) to view the full-frame image.

Red-eye correction

Select the Red-eye correction option (see Figure 3.11) if you want the camera to automatically correct for the red-eye effect that can sometimes be caused by using the flash on pictures taken of people. This option is only available on photos taken with flash. When you choose images to retouch from the Playback menu (**▶**) by pressing the OK button (**OK**) during preview, this option is grayed out and cannot be selected if the camera detects that a flash was not used. When you attempt to choose an image directly from the Retouch Menu (**■**), a message appears, stating that this image cannot be used.

Once you select the image, press the OK button (**OK**); the camera then automatically corrects the red-eye and saves a copy of the image to the memory card. If you select an image that flash was used on but there is no red-eye present, the camera displays a message stating that red-eye is not detected in the image and no retouching will be done.

Trim

Select the Trim option to crop your image to remove distracting elements, or crop closer to the subject. Use the multi-selector to find the image to crop and press the OK button (OK) to select it. You can also use the Zoom in button (Q) and the Zoom out button (Q) to adjust the size of the crop. This allows you to crop closer in, or back it out if you find that you've zoomed in too much.

Use the multi-selector to move the crop around the image so you can center the crop on the part of the image that you think is most important. When you are happy with the crop you've selected, press the OK button (OK) to save a copy of the image, or press the Playback button (►) to return to the main menu without saving.

Rotating the Main Command dial allows you to choose different aspect ratios for your crop. You can choose the aspect ratio to conform the crop to the following sizes:

- ▶ **3:2.** This is the default crop size. It is good for prints that are 4 × 6, 8 × 12, and 12 × 18.
- ▶ **4:3.** This ratio is for 6 × 8 or 12 × 16 prints.
- ▶ **5:4.** The standard size for 8 × 10 prints.
- ▶ **1:1.** Select this ratio for a square crop.
- ▶ **16:9.** This is what's known as a *cinematic crop*. Movie screens and widescreen televisions use this ratio.

3

Monochrome

The Monochrome option (see Figure 3.11) allows you to make a copy of your color image in a monochrome format. You can select from the following three options:

- ▶ **Black-and-white.** This option changes your image to shades of black, white, and gray.
- ▶ **Sepia.** Select this option to give your image the look of a black-and-white photo that has been sepia toned. Sepia toning is a traditional photographic process that gives the photo a reddish-brown tint.
- ▶ **Cyanotype.** This option gives your photos a blue or cyan tint. Cyanotypes are a result of processing film-based photographic images.

When using the Sepia or Cyanotype options, you can press the multi-selector up (▲) or down (▼) to adjust the lightness or darkness of the effect. Press the OK button (OK) to save a copy of the image or press the Playback button (►) to cancel without saving.

TIP I recommend that you use the Monochrome Picture Control (■MC) rather than the Monochrome option in the Retouch menu (■) because it offers settings that are more flexible.

Filter effects

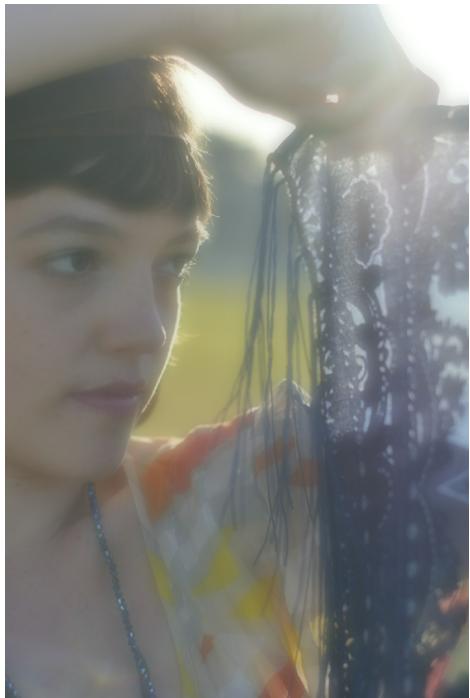
The Filter effects option allows you to simulate the effects of using certain filters over your lens to subtly modify the colors of your image. You can choose from the following seven filter effects:

- ▶ **Skylight.** A skylight filter is used to absorb some of the UV rays emitted by the sun. The UV rays can give your image a slightly bluish tint. Using the skylight filter effect causes your image to be less blue.
- ▶ **Warm filter.** A warming filter adds a little orange to your image to give it a warmer hue. This filter effect can sometimes be useful when using flash because flash can sometimes cause your images to feel a little too cool.
- ▶ **Red intensifier.** This filter boosts the saturation of reds in the image. Press the multi-selector up (▲) or down (▼) to lighten or darken the effect.
- ▶ **Green intensifier.** This filter boosts the saturation of greens in the image. Press the multi-selector up (▲) or down (▼) to lighten or darken the effect.
- ▶ **Blue intensifier.** This filter boosts the saturation of blues in the image. Press the multi-selector up (▲) or down (▼) to lighten or darken the effect.
- ▶ **Cross screen.** This effect simulates the use of a star filter, creating a star-shaped pattern on the bright highlights in your image. If your image doesn't have any bright highlights, the effect is not apparent. Once you select an image for the cross screen filter, you see a submenu with a few options that you can adjust. You can choose the number of points on the stars: 4, 6, or 8. You can also choose the amount; there are three settings that give you more or fewer stars. You can choose three angle settings that control the angle at which the star is tilted. You also have three settings that control the length of the points on the stars.
- ▶ **Soft.** This filter applies a soft glow to your images. This effect is mostly used for portraiture but can also be used effectively for landscapes.

After choosing the desired filter effect, press the OK button (OK) to save a copy of your image with the effect added.



3.12 The Cross screen filter. Exposure: ISO 100, f/2.0, 1/1600 second with a 50mm f/1.8G.



3.13 The Soft filter. Exposure: ISO 100, f/2.0, 1/1600 second with a 50mm f/1.8G.

Color balance

You can use the Color balance option (see Figure 3.11) to create a copy of an image on which you have adjusted the color balance. Using this option, you can use the multi-selector to add a color tint to your image. You can use this effect to neutralize an existing color tint or to add a color tint for artistic purposes.

Press the multi-selector up (\blacktriangle) to increase the amount of green, down (\blacktriangledown) to increase the amount of magenta, left (\blacktriangleleft) to add blue, or right (\blacktriangleright) to add amber.

A color chart and color histograms are displayed along with an image preview so you can see how the color balance affects your image. When you are satisfied with your image, press the OK button (**OK**) to save a copy.

CAUTION If you adjust the color balance using the LCD monitor as a reference, it may not yield the most accurate results.

Image overlay

The Image overlay option allows you to combine two RAW images and save them as one. You can only access this menu option by entering the Retouch menu (■), not by pressing the OK button (OK) when in Playback mode (▶).

NOTE To use this option, you must have at least two RAW images saved to the memory card. This option is not available for use with JPEGs.

Follow these steps to create an image overlay:

1. **Press the Menu button (MENU) to view the menu options.** Use the multi-selector to scroll down to the Retouch menu (■), and then press the multi-selector right (▶) to enter it.
2. **Press the multi-selector up (▲) or down (▼) to highlight Image Overlay, and then press the multi-selector right (▶).** This displays the Image Overlay menu.
3. **Press the OK button (OK) to view RAW image thumbnails.**
4. **Use the multi-selector to highlight the first RAW image to be used in the overlay, and then press the OK button (OK) to select it.**
5. **Adjust the exposure of Image 1 by pressing the multi-selector up (▲) or down (▼), and then press the OK button (OK) when the image is adjusted to your liking.**
6. **Press the multi-selector right (▶) to switch to Image 2.**
7. **Press the OK button (OK) to view RAW image thumbnails.**
8. **Use the multi-selector to highlight the second RAW image to be used in the overlay, and then press the OK button (OK) to select it.**
9. **Adjust the exposure of Image 2 by pressing the multi-selector up (▲) or down (▼), and then press the OK button (OK) when the image is adjusted to your liking.**
10. **Press the multi-selector right (▶) to highlight the Preview window.**
11. **Press the multi-selector up (▲) or down (▼) to highlight Overlay to preview the image.** Use the multi-selector to highlight Save if you want to save the image without previewing it.

NEF (RAW) processing

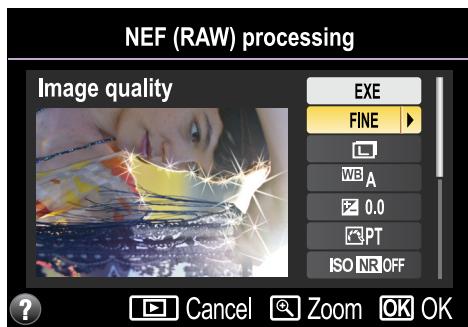
The NEF (RAW) processing option allows you to do some basic editing to images saved in the RAW format, without downloading them to a computer and using image-editing software. This option is limited in its function but allows you to fine-tune your image more precisely when printing straight from the camera or memory card.

You can save a copy of your image in JPEG format, choose the image quality and size at which to save the copy, adjust the white balance settings, fine-tune the exposure compensation, and select a Picture Control setting (■) to apply.

To apply RAW processing, follow these steps:

- 1. Enter the NEF (RAW) processing menu through the Retouch menu (■).**
- 2. Press the OK button (OK) or multi-selector right (►) to view thumbnails of the images stored on your card.** Only images saved in RAW format appear.
- 3. Use the multi-selector to scroll through the thumbnails, and then press the OK button (OK) to select the highlighted image.** This displays a screen with the image adjustment submenu located to the right of the image you selected.
- 4. Press the multi-selector up (▲) or down (▼) to highlight the adjustment you want to make.** You can set image quality, image size, white balance, exposure compensation, Picture Control, Hi ISO NR, Color space, and D-Lighting. You can also press the Zoom in button (Q) to view a full-screen preview.
- 5. After you make your adjustments, use the multi-selector to highlight EXE, and then press the OK button (OK) to save the changes.** Press the Playback button (►) to cancel without saving. EXE sets the changes, and saves a copy of the image in JPEG format at the size and quality that you select. The camera default saves the image as a Large, Fine JPEG.

3



3.14 The NEF (RAW) processing option in the Retouch menu.

CROSS REF For more information on image size, quality, white balance, and exposure compensation, see Chapter 2.

Resize

The Resize option (see Figure 3.11) is handy because it allows you to make smaller-sized copies of your images. Smaller pictures are more suitable for making small prints and web-sized images, and for e-mailing to friends and family. The first thing you need to do when creating a resized image is select the Choose size option from the submenu. You then have the following options:

- ▶ **2.5M.** 1920 × 1280 pixels.
- ▶ **1.1M.** 1280 × 856 pixels.
- ▶ **0.6M.** 960 × 640 pixels.
- ▶ **0.3M.** 640 × 424 pixels.
- ▶ **0.1M.** 320 × 216 pixels.

After you decide the size at which you want your small pictures copied, go to the Select image option. When the Select image option is chosen, the LCD screen displays thumbnails of all of the images in the current folder. To scroll through your images, press the multi-selector right (►) or left (◀). To select or deselect an image, press the multi-selector up (▲) or down (▼). You can select as many images as you have on your memory card. When all the images from which you want to make a resized copy are selected, press the OK button (OK) to make the copies.

Quick retouch

The Quick retouch option is the easiest one to use in the Retouch menu (■). The camera automatically adjusts the contrast and saturation, making your image brighter and more colorful, perfect for printing straight from the camera or memory card. In the event that your image is dark or backlit, the camera also automatically applies D-Lighting to help bring out details in the shadow areas of your picture.

Once you select an image for Quick retouch, you can choose how much of the effect to apply: High, Normal, or Low. The LCD monitor displays a side-by-side comparison between the image as shot and the retouched image to give you a better idea of what the effect looks like.

Once you decide how much of the effect you want, press the OK button (OK) to save a copy of the retouched image, or you can press the Playback button (■) to cancel without making any changes to your picture.

Straighten

The Straighten feature fixes images shot at a slight angle, which is another nice feature when printing directly from the camera. When you select an image, press the multi-selector right (►) and left (◀) to adjust the tilt amount. A grid overlay is displayed over the image. You can use it to align with the horizon or another straight object in the photo.

Distortion control

As discussed in Chapter 4, some lenses are prone to distortion. The Distortion control option (see Figure 3.11) allows you to make in-camera corrections for lens distortion. There are two options: Auto and Manual. Auto automatically applies any needed corrections, and Manual allows you to apply the effect yourself using the multi-selector. Press the multi-selector right (►) to reduce barrel distortion (wide-angle), or press the multi-selector left (◀) to reduce pincushion distortion (telephoto).

CAUTION The Distortion control Auto setting is recommended for use with NIKKOR G- and D-type lenses only.

Fisheye

The Fisheye option does the opposite of what distortion control does; it adds barrel distortion to the image to make it appear as if it were taken with a fisheye lens. Press the multi-selector right (►) to increase the effect or left (◀) to decrease it. To be honest, this effect isn't that great, so use it at your own peril.

3

Color outline

The Color outline feature takes the selected image and creates an outline copy that you can open in image-editing software, such as Adobe Photoshop or Corel Paintshop Pro, and color in manually. This option works best when used on an image with high contrast. It's a pretty cool effect, and the image can even be used straight from the camera, which gives it the look of a drawing.

Color sketch

Select Color sketch to make your image appear as if it were drawn with colored pencils. Selecting Vividness allows you to increase the color saturation of the effect. The Outlines option allows you to change the thickness of the outlines of the sketch.

Perspective control

The Perspective control option allows you to correct problems with perspective caused when you point the camera upward, or shoot at an angle instead of straight on. Think of shooting a tall building; when you tilt the camera up at the building, it causes the base to look larger than the top of the building. You can correct for this by using the Perspective control option.

Press the multi-selector up (\blacktriangle) or down (\blacktriangledown) to adjust the vertical perspective. Press the multi-selector left (\blacktriangleleft) or right (\blacktriangleright) to adjust the horizontal perspective.

Miniature effect

The Miniature effect () is modeled after a technique that some people, erroneously, call the *tilt-shift effect* because it can be achieved optically with a tilt-shift lens. Quite simply, what this effect does is simulate the shallow depth of field normally present in macro shots. This tricks the eye into seeing something large as something very tiny. The effect only works with very far-off subjects and works better when the vantage point is looking down. It's a cool effect, but it only works with limited subjects, so keep that in mind.

Once an image is selected for use with the Miniature effect (, you can use the multi-selector up (\blacktriangle) or down (\blacktriangledown) to move the sharpness zone up or down in the image. Use the multi-selector left (\blacktriangleleft) or right (\blacktriangleright) to adjust the width of the sharpness zone. Press the Zoom out/ Thumbnail button () to turn the sharpness zone from horizontal to vertical. You can then use the multi-selector up (\blacktriangle) or down (\blacktriangledown) to adjust the width of the sharpness zone in the image. Press the multi-selector left (\blacktriangleleft) or right (\blacktriangleright) to move the sharpness zone left or right.

Press the Zoom in button () to preview the effect. Press the OK button () to save a copy of the image with the effect added, or press the Playback button () to cancel.

Selective color

Use the Selective color option (see Figure 3.11) to turn your image black and white, while retaining up to three colors. After selecting the image, use the multi-selector to maneuver the cursor over an object of a particular color. Once the cursor is over the color, press the AE-L/AF-L button () to select the color. Press the multi-selector up (\blacktriangle) or down (\blacktriangledown) to adjust the purity of the color. Lower numbers are more specific with the color; higher numbers select a broader range of the color selection.

Rotate the Main Command dial right to select the other color options and follow the same procedures. For more precise color selection, use the Zoom in button (Q) to magnify the image. To reset the image, press the Delete button (D). Press the OK button (OK) to save the image.

Edit movie

The Edit movie option allows you to make basic edits to videos that you shoot with the D5200. You have three options: choose the Start frame, choose the End frame, and grab a still image from the video. Each edit you make is saved as a new file so there's no need to worry about making any permanent changes to your original file. To edit your video, follow these steps:

- 1. Press the Menu button (MENU), and then use the multi-selector to select the Retouch menu (R).**
- 2. Select Edit Movie.** Press the OK button (OK) or the multi-selector right (►) to view menu options.
- 3. Choose the edit you want to make.** The options are Choose start point, Choose end point, or Save selected frame. Press the OK button (OK) or the multi-selector right (►). This displays a menu with all videos saved to the current card.
- 4. Select the video.** Use the multi-selector to scroll through the available videos. The selected video is highlighted in yellow. Press the OK button (OK) when your video is selected.
- 5. Play the video.** Press the OK button (OK) to begin playback. Press the multi-selector up (▲) at the point in the video where you want to make the edit. You can press the multi-selector down (▼) to stop playback. Press the multi-selector left (◀) and right (►) to go backward or forward in the video clip.
- 6. Make the edit.** Press the multi-selector up (▲) to make the cut. I prefer to press the multi-selector down (▼) to pause the movie first, and make sure that's where I want to make the cut. I then make the edit and the movie saves automatically.

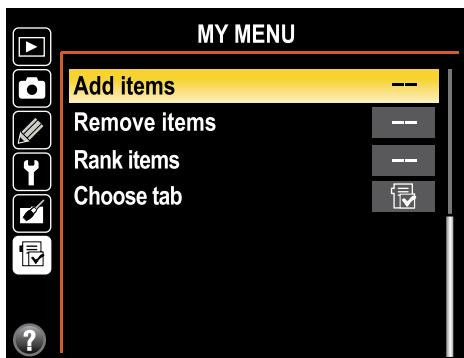
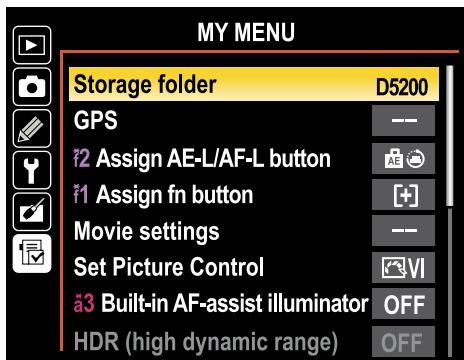
My Menu

The My Menu option (M) allows you to create your own customized menu by choosing the options that it contains. You can also set the different menu options to whatever order you want. This allows you to have all of the settings you change most often right at your fingertips without having to go searching through all the menus and sub-menus. For example, I have the My Menu option set to display all of the menu options

I frequently use, including Storage Folder, GPS, Custom Settings menu (MENU) f1 and f2, Picture Control (REC), and a few others. This saves me an untold amount of time because I don't have to go through a lot of different menus.

Follow these steps to set up your custom My Menu (REC):

- 1. Select My Menu (REC), and then press the OK button (OK).**
- 2. Select Add items, and then press the OK button (OK).**
- 3. Use the multi-selector to navigate through the menus and add specific menu options, and then press the OK button (OK).**
- 4. Use the multi-selector to position where you want the menu item to appear. Press the OK button (OK) to save the order.**
- 5. Repeat steps 2 through 4 until you have added all of the menu items you want.**



3.15 My Menu with my personal settings.

To reorder the items in My Menu (REC), follow these steps:

- 1. Select My Menu (REC), and then press the OK button (OK).**
- 2. Select Rank items, and then press the OK button (OK).** A list of all menu options saved to My Menu (REC) appears.
- 3. Use the multi-selector to highlight the menu option you want to move, and then press the OK button (OK).**
- 4. Use the multi-selector to move the yellow line where you want to move the selected item.** Press the OK button (OK) to set. Repeat this step until you have moved all of the menu options that you want.
- 5. Press the Menu button (MENU) or tap the shutter-release button to exit.**

To delete options from My Menu (✉), simply highlight the one that you want to delete, and then press the Delete button (>Delete). The camera asks for confirmation that you indeed want to delete the setting. Press the Delete button (>Delete) again to confirm, or press the Menu button (MENU) to exit without deleting the menu option.

As I mentioned earlier, you can replace the My Menu option (✉) with the Recent settings tab. The Recent settings menu (✉) stores the last 20 settings you have adjusted. Follow these steps to switch from My Menu (✉) to Recent settings (✉):

- 1. Select My Menu (✉) from the Menu tab, and then press the OK button (OK) to view My Menu.**
- 2. Use the multi-selector to scroll down to the Choose tab menu option.** Press the OK button (OK).
- 3. Select Recent settings (✉).** Press the OK button (OK) or the multi-selector right (▶) to change the setting.
- 4. Press the Menu button (MENU) or tap the shutter-release button to exit.**



Selecting and Using Lenses with the Nikon D5200

Probably the most important accessory that you can buy for your D5200 is a good lens. Your lenses have a tremendous effect on image quality, especially with the high-resolution sensors of dSLRs. The D5200 sensor resolves a high amount of detail, and therefore it's important to put high-quality glass in front of it. The lens not only affects image sharpness, but also contrast and color. A quality lens is a valuable investment as it will likely be in your kit through a number of camera bodies.

A key feature of the D5200 is that the lenses are interchangeable. You can use lenses to achieve visual effects. You can use a wide-angle lens to distort spatial relations and lines, a telephoto to make far-off objects appear closer, or a macro lens to get close up and show detail that can't be perceived unaided by the human eye.



A high-quality lens is an investment that should outlast many dSLR camera bodies.

Deciphering Nikon Lens Codes

One of the first things that is apparent when shopping for lenses is that there are a lot of letters in the names, such as AF-S DX NIKKOR 18-55mm f/3.5-5.6G VR. That's a big name for the simple kit lens that comes with the D5200. So, what do all of these letters mean? Here's a simple list to help you decipher them:

- ▶ **AI/AI-S.** These are Auto Indexing lenses. They automatically adjust the aperture diaphragm down to the selected setting when you press the shutter-release button. All lenses, including autofocus (AF) lenses made after 1977, are Auto Indexing, but when referring to AI lenses, most people generally mean the older, manual-focus (MF) lenses.
- ▶ **E.** These are Nikon's budget series lenses. They were made to be used with lower-end film cameras, such as the EM, FG, and FG-20. Although these lenses are compact and often constructed with plastic parts, some of them — especially the 50mm f/1.8 — are of good quality. These lenses are also manual focus only. E lenses are not to be confused with Nikon's Perspective Control (PC-E) lenses.

CAUTION AI/AI-S and Series E lenses do not allow for auto-exposure or metering because they don't have a CPU to communicate data with the camera body.

- ▶ **D.** Lenses with this designation convey distance information to the camera to aid in metering for exposure and flash.
- ▶ **G.** These newer lenses lack a manually adjustable aperture ring, so you must set the aperture on the camera body. Like D lenses, G lenses also convey distance information to the camera.
- ▶ **AF, AF-D, AF-I, and AF-S.** All of these codes denote that the lens is an autofocus (AF) lens. The AF-D code represents a distance encoder for distance information; AF-I indicates an internal focusing motor; and AF-S represents an internal Silent Wave Motor.
- ▶ **DX.** This code lets you know that the lens is optimized for use with the Nikon DX-format sensor.

NOTE Full-frame lenses do not carry an FX designation, and you can use them effectively on DX cameras without limitation.

- ▶ **VR.** This code tells you that the lens is equipped with Nikon's Vibration Reduction (VR) image-stabilization system. Nikon's latest lenses employ technology known as VR-II and VR-III, which are capable of detecting side-to-side as well as up-and-down motion. All of these lenses are designated as VR.
- ▶ **ED.** This code indicates that some of the glass in the lens is Nikon's Extra-Low Dispersion glass, which is less prone to lens flare and chromatic aberrations.
- ▶ **Micro-NIKKOR.** This is Nikon's designation for its line of macro lenses.
- ▶ **IF.** This stands for *internal focus*. The focusing mechanism is inside the lens, so the front of the lens doesn't rotate when focusing. This feature is useful when you don't want the front of the lens element to move, such as when using a polarizing filter. The internal focus mechanism also allows for faster focusing.
- ▶ **DC.** This stands for *Defocus Control*. Nikon offers only a couple of lenses with this designation. They make the out-of-focus areas in the image appear softer by using special lens elements to add spherical aberration. The parts of the image that are in focus aren't affected. Currently, the only Nikon lenses with this feature are the 135mm and the 105mm f/2. Both of these are considered portrait lenses.
- ▶ **N.** On some of Nikon's higher-end lenses, you may see a large golden N. This means the lens has Nikon's Nano-Crystal Coating, which is designed to reduce flare and ghosting.
- ▶ **PC-E.** This is the designation for Nikon's Perspective Control lenses. The E means that it has an electromagnetic Auto Indexing (AI) aperture control instead of the typical mechanical one found in all other AI lenses.

Lens Compatibility

Nikon has been manufacturing lenses since about 1937 and is well known for making some of the highest-quality lenses in the industry. You can use almost every Nikon lens made since about 1977 on your D5200, although some lenses will have limited functionality. In 1977, Nikon introduced the Auto Indexing (AI) lens. Auto Indexing allows the aperture diaphragm on the lens to stay wide open until the shutter is released; the diaphragm then closes down to the desired f-stop.

This allows maximum light to enter the camera, which makes focusing easier. You can also use some of the earlier lenses, now referred to as *pre-AI*, but the camera's auto-exposure functions and metering will not work. All exposure settings must be calculated and set manually.

TIP There are a number of apps that allow you to take exposure readings with your phone. I use a free one called LightMeter.

In the 1980s, Nikon started manufacturing autofocus (AF) lenses. Many of these lenses are very high quality and can be found at a much lower cost than their 1990s counterparts, the AF-D lenses. The main difference between AF lenses and AF-D lenses is that the AF-D lenses provide the camera with distance information based on how far away the subject is when focused on. Both types of lenses are focused with a screw-type drive motor that's found inside the camera body. Unfortunately, to reduce the size and weight of the D5200, the camera body isn't equipped with a built-in focus motor. You can only use AF/AF-D lenses for manual focusing, although metering and auto-exposure work perfectly.

Nikon's current line is the AF-S lens. AF-S lenses have a Silent Wave Motor built in to the lens. The AF-S is an ultrasonic motor that allows lenses to focus much more quickly than the traditional, screw-type lenses. It also makes focusing very quiet. Most of these lenses are also known as G-type lenses. These lenses lack a manual aperture ring; you control the aperture by using the Sub-command dial on the camera body. Nikon offers a full complement of AF-S lenses for the D5200, ranging from the ultra-wide 10-24mm f/3.5-5.6G to the super-telephoto 600mm f/4G.

NOTE Nikon's first incarnation of the Silent Wave Motor was called AF-I. These are long, expensive telephoto lenses, but they work perfectly with the D5200.

The DX Crop Factor

You may often hear or read about something called the *crop factor*. This concept is often confusing to newer photographers, especially those who are unfamiliar with 35mm film photography. The crop factor is a ratio that describes the size of a camera's

imaging area as compared to another format; in the case of SLR cameras, the reference format is 35mm film.

SLR camera lenses were initially designed around the 35mm film format. Photographers use lenses of a certain focal length to provide a specific field of view. The field of view, also called the angle of view, is the amount of the scene that's captured in an image. This is usually described in degrees. For example, when you use a 16mm lens on a 35mm camera, it captures almost 180 degrees of the scene, which is quite a bit. Conversely, when you use a 300mm focal length, the field of view is reduced to a mere 6.5 degrees, which is a very small part of the scene. The field of view is consistent from camera to camera because all SLRs use 35mm film, which has an image area of 24mm x 36mm.

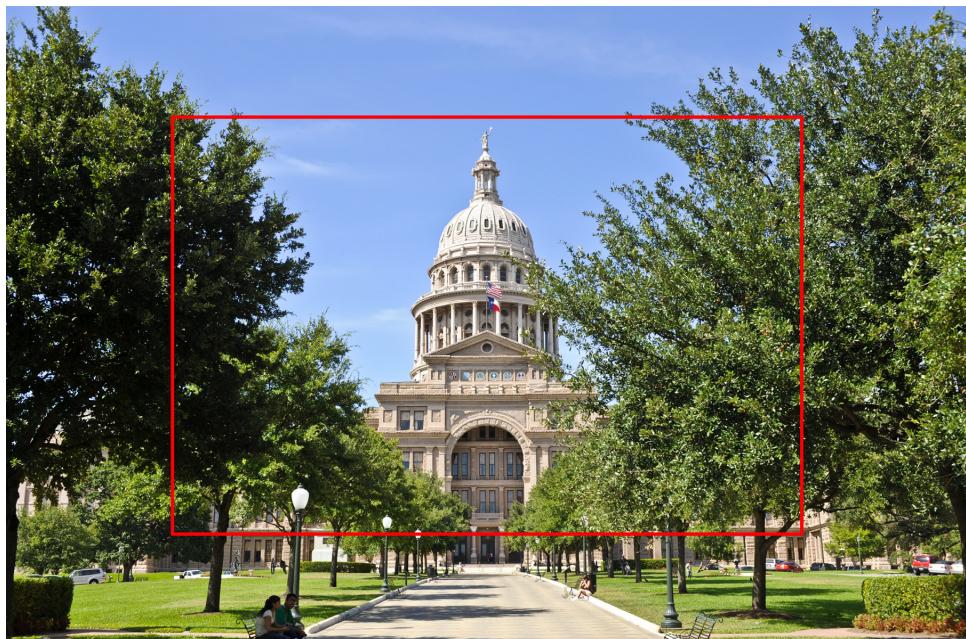
With the advent of digital SLRs, the sensor was made smaller (15.6mm x 23.5mm) than a frame of 35mm film to keep costs down because full-frame sensors are more expensive to manufacture. This smaller sensor size was called APS-C or, in Nikon terms, the DX-format. When these same lenses are used with DX-format dSLRs, they have the same focal length they've always had, but because the sensor doesn't have the same amount of area as film, the field of view is effectively decreased. This causes the lens to provide the field of view of a longer focal lens when compared to 35mm film images.

Fortunately, the DX sensors are a uniform size, thereby supplying consumers with a standard to determine how much the field of view is reduced on a DX-format dSLR with any lens. The digital sensors in Nikon DX cameras have a 1.5X crop factor, which means that to determine the equivalent focal length of a 35mm or FX camera, you simply have to multiply the focal length of the lens by 1.5. Therefore, a 28mm lens provides an angle of coverage similar to a 42mm lens, a 50mm is equivalent to a 75mm, and so on.

TIP An easy way to figure out the DX equivalent focal length is to divide the focal length by 2, and then add the quotient to the original focal length. For example, 10 divided by 2 is 5, and 10 plus 5 equals 15. The equivalent focal length in 35mm (or FX) is 15mm.

Nikon has created specific lenses for dSLRs with digital sensors. These lenses are known as DX-format lenses. The focal length of these lenses was shortened to fill the gap to allow true super-wide-angle lenses. These DX-format lenses were also

redesigned to cast a smaller image inside the camera so that the lenses could actually be made smaller and use less glass than conventional lenses. The by-product of designing a lens to project an image circle to a smaller sensor is that these same lenses can't effectively be used with FX-format, and can't be used at all with 35mm film cameras (without severe vignetting) because the image won't completely fill an area the size of the film or FX sensor.



4.1 This image was shot with a 28mm lens on a D600 FX camera. The area inside the red square is what would be captured with the same lens on a DX camera, like the D5200.

There are some upsides to this crop factor. Lenses with longer focal lengths now provide a bit of extra reach. A lens set at 200mm now provides the same amount of coverage as a 300mm lens, which can offer a great advantage for sports and wildlife photography, or when you can't get close enough to your subject. Also, when using a lens designed for FX cameras, the sensor only records image information from the center of the lens, where the image is generally sharper.

Another advantage of DX lenses is that, because of their relatively small size, they are less expensive to manufacture and, therefore, less expensive than their full-frame counterparts.

Autofocus Concerns

The D5200 has no autofocus motor built in to the camera body, so therefore only lenses that have an integrated focus motor can perform autofocus functions with the D5200. This can lead to some confusion as to which lenses can be used with the D5200 with full functionality including autofocus.

As pointed out earlier, there are many letter designations on lenses. Nikon has its own specific designations, and third-party companies use their own. This can make shopping for lenses online a daunting task. You don't want to order a lens and have it shipped to you only to find that the lens isn't equipped with an autofocus motor so you're reduced to manual focusing only.

Every company has its own letter designation for lenses with motors built in to the lens for autofocus, and some companies have more than one designation for different types of built-in motors that are included on different lenses.

Here's a list of the acronyms and keywords to look for when shopping for autofocus lenses for your D5200:

- ▶ **AF-S/AF-I (Nikon).** Nikon uses AF-S to designate that the lens has the ability to autofocus with the D5200. In Nikon literature, you also sometimes see the term *Silent Wave Motor* or SWM. An older, rarer version is AF-I.
- ▶ **HSM (Sigma).** Sigma Corporation uses this acronym for its Hyper Sonic (integrated focus) motor.
- ▶ **BIM/USD/PZD (Tamron).** BIM stands for Built-In Motor, USD for Ultra Sonic Drive, and PZD for PieZo Drive.
- ▶ **SD-M (Tokina).** This company's lens designation system is a bit tricky, so close scrutiny is required. I've seen Tokina's integrated motors listed as SD-M (Silent Drive Motor), not to be confused with the SD designation, which is for Super-low Distortion glass. In Tokina literature, you also see *Silent DC Motor* listed as the name of the integrated motor. For DX-format lenses, all Tokina lenses with the DX II designation have integrated motors, while those with a simple DX designation do not.

Third-party Lenses

Other companies also make lenses for Nikon cameras. These lenses are referred to as *third-party* lenses or sometimes, albeit less frequently, *non-manufacturer* lenses. What this means is that the company that makes the lenses isn't affiliated with the manufacturer (first party) or the purchaser (second party), but is its own entity (third party).

Variable-aperture Lenses

One of the issues with kit lenses, such as the 18-55mm VR, is that it has a *variable aperture*. This means that as you zoom in on something when shooting wide open or closed down to the minimum aperture, the aperture opening effectively gets smaller and allows less light to reach the sensor, causing the need for a slower shutter speed or higher ISO setting.

More high-end lenses have a constant aperture all the way through the zoom range. In daylight or brightly lit situations, this may not be a factor, but when shooting in low light, this can be a drawback. Although the VR feature helps when shooting relatively still subjects, moving subjects in low light are blurred.

Previously, third-party lenses were considered inferior substitutes to OEM (Original Equipment Manufacturer) lenses and, in the past, that was true. However, in the last 10 years, the digital revolution has brought about a huge resurgence in photography, and third-party lens manufacturers have stepped up their game to provide very high quality lenses at lower prices than those sold by Nikon. While most third-party lenses don't stand up to Nikon's professional grade lenses as far as build quality, third-party lenses are great alternatives to Nikon's high-end to lower-level consumer lenses. If you're looking for a relatively inexpensive, fast, constant-aperture zoom with good image quality that won't break the bank, a third-party lens is likely the answer.

There are three major players in the third-party lens game, Sigma, Tokina, and Tamron. You may see other brands such as Vivitar and Promaster, but these lenses are usually made by one of the three and rebranded.

Sigma has been making lenses for more than 50 years and was the first lens manufacturer to make a wide-angle zoom lens. Sigma makes excellent, high-quality lenses. Almost all current Sigma lenses are available with what Sigma calls an HSM, or Hyper-Sonic Motor. This is an AF motor built inside the lens. It operates in a similar fashion to the Nikon AF-S or Silent Wave Motor. This enables almost all current Sigma lenses to autofocus perfectly with the D5200.

Sigma has recently announced some new high-end lenses: the 30mm f/1.4 DC HSM, the 35mm f/1.4 DG HSM, a redesigned 17-70mm f/2.8-4 Macro OS, and the 120-300mm f/2.8 OS. These are the first lenses that you can plug in to your computer via a USB dock and use Sigma's proprietary software to update firmware and make micro-adjustments for focusing. This is an amazing new feature. Sigma is blazing new trails

in lens technology. Sigma lenses are a viable and affordable alternative to Nikon's professional offerings.

Tokina only offers a few lenses that are fully compatible with cameras that don't have a built-in focus motor, like the D5200. The wide-angle lenses are the 11-16mm f/2.8 Pro DXII, the 12-24mm f/4 Pro DXII, and the 16-28mm f/2.8 Pro FX (this lens also works with full-frame cameras, such as the Nikon D600). Most other current Tokina lenses can be used with the D5200 as manual focus only.

Tamron is another major player in the third-party lens market. The company currently offers about a half-dozen lenses that are equipped with a built-in motor to focus with the D5200, with the 17-50mm f/2.8 being the most popular inexpensive fast zoom. Tamron has been working through some problems with its built-in focus motor technology, so there are a few different iterations of its most popular lenses. It has a standard screw-type focus technology; a technology referred to as *Built-in-Motor* (BIM), which focuses very slowly and loudly with an internal focus motor; and the Piezo Drive (PZD) and the Ultrasonic Drive (USD), which are recent additions that are comparable to Nikon's Silent Wave or AF-S lenses. Only lenses with the PZD or USD designations will autofocus with the D5200.

Types of Lenses

As I mentioned at the beginning of this chapter, one of the key features of SLR cameras is the ability to use different types of lenses. This allows you to control the aspect in which the image is displayed. Different types of lenses are designed to provide certain effects. The lenses you choose allow you to control the artistic direction of your photography.

Wide-angle lenses

The focal-length range of wide-angle lenses starts at about 10mm (ultrawide) and extends to about 24mm (wide angle). Many of the most common wide-angle lenses on the market today are zoom lenses, although a few prime lenses are available. Wide-angle lenses are generally *rectilinear*, meaning that the lens has molded glass elements to correct the distortion that's common with wide-angle lenses; this keeps the lines near the edges of the frame straight rather than curved. Fisheye lenses, which are also a type of wide-angle lens, are *curvilinear*; the lens elements aren't corrected, resulting in severe optical distortion (which is desirable in a fisheye lens).

Wide-angle lenses have a short focal length, which projects an image onto the sensor that has a wider field of view; this allows you to fit more of the scene into your image. In the past, ultrawide-angle lenses were rare, prohibitively expensive, and out of reach for most nonprofessional photographers. These days, it's easy to find a relatively inexpensive ultrawide-angle lens. The following list includes some of the ultrawide-angle lenses that work best with the D5200:

► **AF-S NIKKOR 10-24mm f/3.5-**

4.5G. This is a great compact, ultrawide-angle lens. It's nice and sharp, and balances well on the D5200. The only downside is that it is a little pricey compared to third-party lenses of the same caliber.

► **Sigma 10-20mm f/3.5 and f/4-**

5.6 DC HSM. Sigma offers two lenses in this range: The f/3.5 constant-aperture version and the variable-aperture f/4-5.6 version. If you do a lot of low-light, handheld shooting, the f/3.5 version is the better option. If you shoot mostly in daylight or photograph landscapes at smaller apertures with a tripod, the cheaper f/4-5.6 lens is a good option.

► **Tokina 11-16mm f/2.8 Pro DXII.** This is one of the only ultrawide lenses available with a fast, constant, built-in focus motor that allows the D5200 to autofocus. The zoom range is rather small, but when using an ultrawide lens, most photographers tend to stay at the wide end of the range anyway.



Image courtesy of Nikon, Inc.

4.2 The NIKKOR 10-24mm f/2.8G lens.

Zoom Lenses versus Prime Lenses

Some photographers prefer primes, and some prefer zooms. It's largely a personal choice, and each type has its advantages. One of the main advantages of the zoom lens is its versatility. You can attach one lens to your camera and use it in a wide variety of situations, which reduces how often you need to change your lenses. This is a very good feature because every time you take the lens off your camera, the sensor is vulnerable to dust and debris. In addition, in the time it takes to change from one lens to another, you may miss the shot.

Although today's zoom lenses can be just as sharp as a prime lens, you do have to pay for this quality. A \$150 zoom lens isn't going to give you nearly the quality of a \$1,500 zoom lens. These days, you can easily find an affordable, fast zoom lens — one with an aperture of at least f/2.8. However, because you can easily change the ISO on a digital camera and the noise created from using a high ISO is decreasing, a fast zoom lens isn't always completely necessary. Some photographers prefer a zoom lens with a wider aperture — not so much for the speed of the lens as for the option of being able to achieve a shallower depth of field, which is very important for isolating subjects.

One of the most important features of prime lenses is that they can have a faster maximum aperture than zoom lenses due to the smaller size. Primes also require fewer lens elements and moving parts, so the weight is considerably reduced as compared to a fast zoom. Fast DX primes like the Nikon 35mm f/1.8 are also relatively inexpensive and are some of Nikon's best lenses.

Wide-angle lenses are perfect for a variety of subjects. The perspective you get from a wide-angle lens isn't like anything that can be seen with the human eye. You can use this to create some very bold and interesting images. Once you get used to seeing the world through a wide-angle lens, you may find that you look at your subjects and the world in general in a different way. I always try to find interesting lines and angles for use with my wide-angle lenses. There are many factors to consider when you use a wide-angle lens. Here are a few examples:

- ▶ **Deeper depth of field.** Wide-angle lenses allow you to get more of the scene in focus than you can with a midrange or telephoto lens at the same aperture and distance from the subject.
- ▶ **Wider field of view.** Wide-angle lenses allow you to fit more of your subject into your images. The shorter the focal length is, the more of the subject you can fit into a shot. This can be especially beneficial when you shoot landscape photos and want to fit an immense scene into your photo, or when photographing a large group of people.
- ▶ **Perspective distortion.** Using wide-angle lenses causes things that are closer to the lens to look disproportionately larger than things that are farther away. You can use perspective distortion to your advantage to emphasize objects in the foreground if you want the subject to stand out in the frame.

- ▶ **Handholding.** At shorter focal lengths, it's possible to hold the camera steadier than you can at longer focal lengths. At 14mm, it's entirely possible to handhold your camera at 1/15 second without worrying about camera shake.
- ▶ **Environmental portraits.** Although using a wide-angle lens isn't the best choice for standard close-up portraits, wide-angle lenses work great for environmental portraits where you want to show a person in his or her surroundings.

Wide-angle lenses can also help pull you into a subject. With most wide-angle lenses, you can focus very close to a subject while creating the perspective distortion for which wide-angle lenses are known. Don't be afraid to get close to your subject to make a more dynamic image. The worst wide-angle images are the ones that have a tiny subject in the middle of an empty area.



4.3 A wide-angle shot taken with a Nikon 10-24mm f/3.5-4.5G wide-angle lens at 12mm.
Exposure: ISO 200, f/8.0, 0.4 second.

Wide-angle lenses are very distinctive in the way they portray your subjects, but they also have some limitations that you may not find in lenses with longer focal lengths. Here are some pitfalls that you need to be aware of when using wide-angle lenses:

- ▶ **Soft corners.** The most common problem with wide-angle lenses, especially zooms, is that they soften the images in the corners. This is most prevalent at wide apertures, such as f/2.8 and f/4.0; the corners usually sharpen up by f/8.0.

(depending on the lens). This problem is most noticeable in lower-priced lenses. The high resolution of the D5200 can really magnify these flaws.

- ▶ **Vignetting.** This is the darkening of the corners in an image. Vignetting occurs because the light necessary to capture such a wide angle of view must come in at a very sharp angle. When the light comes in at such an angle, the aperture is effectively smaller. The aperture opening no longer appears as a circle, but more like a cat's eye (you can see this effect in the bokeh at the edges of very fast lenses). Stopping down the aperture reduces this effect, and reducing the aperture by 3 stops usually eliminates any vignetting.
- ▶ **Perspective distortion.** Perspective distortion is a double-edged sword: it can make your images look either very interesting or very terrible. One of the reasons that a wide-angle lens isn't recommended for close-up portraits is that it distorts faces, making the nose look too big and the ears too small. This can make for a very unflattering portrait.
- ▶ **Barrel distortion.** Wide-angle, and even rectilinear lenses, are often plagued with this specific type of distortion, which causes straight lines outside the image center to appear to bend outward (similar to a barrel). This can be undesirable when doing architectural photography. Fortunately, Photoshop and other image-editing software enable you to fix this problem relatively easily.

Focal Length and Depth of Field

Although focal length seems to be a factor in depth of field, technically speaking, this isn't true. Telephoto lenses appear to have a shallower depth of field due to a higher magnification factor, but if the subject stays the same size in the frame, the depth of field is consistent at any given aperture, regardless of the focal length.

What *does* change is the distribution of the zone of acceptable sharpness. At shorter focal lengths, most of the zone is behind the focal point or subject. At longer focal lengths, the zone of acceptable sharpness falls more in front of the focal point. This means that, although mathematically the depth of field is consistent at all focal lengths, the distribution of the zone of sharpness is different.

Wide-angle lenses have a more gradual fall-off of sharpness, which makes the depth of field appear deeper. Telephoto lenses appear to have a shallower depth of field because the zone of sharpness falls off more quickly behind the focal point, and the background is magnified due to compression distortion. This causes the background to appear much larger in relation to the subject than when using a short focal length.

Standard zoom lenses

Standard (or midrange) zoom lenses fall in the middle of the focal-length scale. Zoom lenses of this type usually start at a moderately wide angle of around 16mm to 18mm and zoom in to a short telephoto range between 50mm and 85mm. The 18-55mm kit lens that comes bundled with the D5200 falls under this lens category. These lenses are perfect for most general photography applications. In fact, they can be used successfully for everything from architectural to portrait photography. This type of lens covers the most useful focal lengths and will probably spend the most time on your camera. For this reason, I recommend buying the best quality lens you can afford. Some of the options for midrange lenses include:

- ▶ **NIKKOR 17-55mm f/2.8G.** This is Nikon's top-of-the-line standard zoom lens. It is a professional lens and has a fast aperture of f/2.8 over the whole zoom range. It is extremely sharp at all focal lengths and apertures. As with most Nikon pro lenses, the build quality on this lens is excellent. The 17-55mm f/2.8G features the super-quiet and fast-focusing Silent Wave Motor, as well as ED glass elements to reduce chromatic aberration. This is a top-notch lens, worth every penny of its price tag.
- ▶ **NIKKOR 16-85mm f/3.5-5.6G VR.** This lens is Nikon's upgrade to the standard DX kit lens (the 18-55mm f/3.5-5.6G VR). This lens offers a bit better build quality. It's also a bit wider at the short end, with a good amount of extra reach at the telephoto end.
- ▶ **Tamron 17-50mm f/2.8 Di II.** This is a very popular alternative to the Nikon lens for a fast aperture zoom. There are two versions of the Di II lens: VC (Vibration Compensation) and non-VC. However, you should be aware that the regular Di version doesn't have a built-in focus motor and won't autofocus with the D5200.
- ▶ **Sigma 17-70mm f/2.8-4 HSM OS Macro.** This is one of my favorite lenses for DX cameras, and it's easily the most versatile lens I've ever owned. It's relatively fast and good for low-light shooting with Optical Stabilization. It's also very sharp and, although not a true macro lens, it gets you close enough. The best part is that it's not overly expensive. I recommend this lens over all other standard lenses in its class.



Image courtesy of Nikon, Inc.

4.4 The NIKKOR 16-85mm f/3.5-5.6G lens.

In the standard range for primes, the most popular are the 30-35mm normal lenses. They are referred to as *normal* because they approximate about the same field of view as the human eye. The Nikon 35mm f/1.8 is a competent, inexpensive, fast normal lens, as is the even faster Sigma 30mm f/1.4. I recommend that every photographer carry a fast prime lens in his camera bag.



Image courtesy of Nikon, Inc.

4.5 The Nikon 35mm f/1.8G is a favorite of many photographers.

Using Vibration Reduction Lenses

Nikon has an impressive list of lenses that offer Vibration Reduction (VR). This technology is used to combat image blur caused by camera shake, especially when handholding the camera at long focal lengths. The VR function works by detecting the motion of the lens and shifting the internal lens elements. This allows you to shoot at slower shutter speeds than you normally use while still getting sharp images.

An old rule of thumb of photography is that to get a reasonably sharp photo when handholding the camera, you should use a shutter speed that corresponds to the reciprocal of the lens's focal length. In simpler terms, when shooting at a 200mm zoom setting, your shutter speed should be at least 1/200 second. When shooting with a wider setting, such as 28mm, you can safely handhold at around 1/30 second. Nikon has updated the VR mechanism a few times and refers to it as VR-II and VR-III. The original VR claims you can shoot up to 3 stops slower, while the newer VR-II boasts that you can shoot 4 stops slower. The brand-new VR-III ups that claim to 5 stops of reduction. This means that, according to Nikon's claims, you should be able to handhold the camera with a 200mm lens and get an image relatively free of vibration blur at 1/6 second.

Although the VR feature provides some extra latitude when shooting with low light, it's not made to replace a fast shutter speed. To get a good, sharp photo when shooting action, you need a fast shutter speed to freeze the action. No matter how good the VR is, nothing can freeze a moving subject but a fast shutter speed.

Some third-party lens manufacturers offer their own version of VR as well; for example, Sigma has Optical Stabilization (OS) and Tamron has Vibration Control (VC). Tokina doesn't currently include image stabilization on any of its lenses.

Telephoto lenses

Telephoto lenses have very long focal lengths that are used to get closer to distant subjects. They provide a very narrow field of view and are handy when you're trying to focus on the details of a far-off subject. Telephoto lenses have a much shallower depth of field than wide-angle and midrange lenses, and you can use them to blur out background details to isolate a subject. Telephoto lenses are commonly used for sports and wildlife photography. The shallow depth of field also makes them one of the top choices for photographing portraits.

Like wide-angle lenses, telephoto lenses also have their quirks, such as perspective distortion. As you may have guessed, telephoto perspective distortion is the opposite of wide-angle distortion. Because everything in the photo is so far away with a telephoto lens, the lens tends to *compress* the image. Compression causes the background to look closer to the subject than it actually is. Of course, you can use this effect creatively. For example, compression can flatten out the features of a model, resulting in a pleasing effect. Compression is one of the main reasons photographers often use a telephoto lens for portrait photography.

A standard telephoto zoom lens usually has a range of about 70 to 200mm. If you want to zoom in close to a subject that's very far away, you may need an even longer lens. These super-telephoto lenses can act like telescopes, really bringing the subject in close. They range from about 300mm up to about 800mm. Almost all super-telephoto lenses are prime lenses, and they're very heavy, bulky, and expensive. To keep costs lower, some super-telephoto lenses have a slower aperture of f/4.0.

There are quite a few telephoto prime lenses available. Most of them, especially the longer ones (105mm and longer), are expensive, although you can sometimes find older Nikon primes that are discontinued or used — and at decent prices — such as the NIKKOR 300mm f/4.0.

The following list covers some of the most common telephoto lenses:

- ▶ **NIKKOR 70-200mm f/2.8G VR II.** Nikon's top-of-the-line standard telephoto lens features Vibration Reduction (VR), which is useful when photographing far-off subjects handheld. This is a great lens for shooting sports or portraits, as well as wildlife photography.

- ▶ **NIKKOR 70-200mm f/4G VR III.** Nikon's latest affordable alternative to the 70-200mm f/2.8G VR lens. It is sharp and has a constant f/4.0 aperture. This makes for a smaller, lighter lens when speed isn't a necessity.
- ▶ **NIKKOR 80-200mm f/2.8D.** A great, affordable alternative to the 70-200mm VR lens, the 80-200mm is sharp and has a fast, constant f/2.8 aperture. There are a few versions of this lens, the most desirable of which has an AF-S motor.
- ▶ **NIKKOR 80-400mm f/4.5-5.6G VR.** This high-power, VR image-stabilization zoom lens gives you a lot of reach. Its versatile zoom range makes it especially useful for wildlife photography when the subject is far away. As with most lenses with a very broad focal-length range, you make concessions with fast apertures and a moderately lower image quality when compared to the 70-200mm or 80-200mm f/2.8 lenses.



Image courtesy of Nikon, Inc.

4.6 The NIKKOR 70-200mm f/4G VR III lens.

Super-zoom Lenses

Most lens manufacturers, Nikon included, offer what's commonly called a *super-zoom*, or sometimes a *hyper-zoom*. Super-zooms are lenses that encompass a very broad focal length, from wide angle to telephoto. The most popular of the super-zooms is the Nikon 18-200mm f/3.5-5.6 VR.

These lenses have a large focal-length range that you can use in a wide variety of shooting situations without having to switch out lenses. This would come in handy if, for example, you were photographing a nice landscape at Loch Ness using a wide-angle setting, and suddenly the Loch Ness monster pokes her head up out of the deep. You could quickly zoom in with the super-telephoto setting and get a good close-up shot without having to fumble around in your camera bag to grab a telephoto and switch out lenses, possibly causing you to miss the shot of a lifetime.

Super-zooms come with a price (figuratively and literally). To achieve the great ranges in focal length, concessions must be made with regard to image quality. These lenses are usually less sharp than lenses with a shorter zoom range and are more often plagued with optical distortions and chromatic aberration. Super-zooms often show pronounced barrel distortion at the wide end and can have moderate to severe pincushion distortion at the long end of the range. Luckily, these distortions can be fixed in Photoshop or other image-editing software.

Another caveat to using these lenses is that they usually have appreciably smaller maximum apertures than zoom lenses with shorter ranges. This can be a problem, especially because larger apertures are generally needed at the long end to keep a high enough shutter speed to avoid blurring that results from camera shake when handholding. Of course, some manufacturers include some sort of stabilization technology to help control this problem.

Close-up/Macro lenses

A macro lens is a special-purpose lens used in macro and close-up photography. It allows you to have a closer focusing distance than regular lenses, which in turn allows you to get more magnification of your subject, revealing small details that would otherwise be lost. True macro lenses offer a magnification ratio of 1:1; that is, the image projected onto the sensor through the lens is the exact size as the object being photographed. Some lower-priced macro lenses offer a 1:2 or even a 1:4 magnification ratio, which is one-half to one-quarter of the size of the original object. Although lens manufacturers refer to these lenses as macro, strictly speaking they are not.

NOTE Nikon macro lenses are branded Micro-NIKKOR.

One major concern with a macro lens is the depth of field; when you focus at such a close distance, the depth of field becomes very shallow. As a result, it's often advisable to use a small aperture to maximize your depth of field and ensure everything is in focus. Of course, as with any downside, there's also an upside: you can also use the shallow depth of field creatively. For example, you can use it to isolate a detail in a subject.

Macro lenses come in a variety of focal lengths, and the most common is 60mm. Some macro lenses have substantially longer focal lengths that allow more distance between the lens and the subject. This comes in handy when the subject needs to be lit with an additional light source. A lens that's very close to the subject while focusing can get in the way of the light source, casting a shadow.

When buying a macro lens, you should consider a few things: How often are you going to use the lens? Can you use it for other purposes? Do you need AF? Because newer dedicated macro lenses can be pricey, you may want to consider some less expensive alternatives.

It's not absolutely necessary to have an autofocus lens. When shooting very close up, the depth of focus is very small, so all you need to do is move slightly closer or farther away to achieve focus. This makes an autofocus lens a bit unnecessary. You can find plenty of older manual focus (MF) macro lenses that are very inexpensive, but have superb quality and sharpness.

Nikon has a very strong lineup of macro lenses that offer full functionality with the D5200. They range from normal to telephoto in both VR and non-VR versions and at all price points. The choices range from the 40mm f/2.8G, 60mm f/2.8G, 85mm f/3.5G VR, and the 105mm f/2.8G VR when you need some extra reach.



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Image courtesy of Nikon, Inc.

4.7 The Micro-NIKKOR 40mm f/2.8G macro lens.



4.8 A macro shot taken with a Pentax Macro-Takumar 50mm f/4.0 at 3:1 magnification. I used an M42 to Nikon adapter to mount the lens. Exposure: ISO 1600, f/11, 1/100 second.

Fisheye lenses

Fisheye lenses are ultrawide-angle lenses that aren't corrected for distortion like standard rectilinear wide-angle lenses. These lenses are known as *curvilinear*, meaning that straight lines in your image, especially near the edge of the frame, are curved. Fisheye lenses have extreme barrel distortion. What makes fisheye lenses appealing is the very thing we try to get rid of in other wide-angle lenses.

Fisheye lenses cover a full 180-degree area, allowing you to see everything that's immediately to the left and right of you in the frame. You need to take special care so that you don't get your feet in the frame, which often happens when you use a lens with a field of view this extreme.

Fisheye lenses aren't made for everyday shooting, but with their extreme perspective distortion you can achieve interesting and, sometimes, wacky results. You can also *de-fish* or correct for the extreme fisheye by using image-editing software, such as Photoshop, Capture NX or NX 2, and DxO Optics. The result of de-fishing your image is that you get a reduced field of view. This is akin to using a rectilinear wide-angle lens, but it often yields a slightly wider field of view than a standard wide-angle lens.

Two types of fisheye lenses are available: Circular and full frame. Circular fisheye lenses project a complete 180-degree spherical image onto the frame, resulting in a circular image surrounded by black in the rest of the frame. A full-frame fisheye completely covers the frame with an image. The 16mm NIKKOR fisheye is a full-frame fisheye on an FX-format dSLR. Sigma also makes a few fisheye lenses in both the circular and full-frame variety. A couple of Russian companies (Zenitar and Peleng) also manufacture high-quality, but affordable manual-focus, fisheye lenses. Autofocus is not truly a necessity on fisheye lenses, given their extreme depth of field and short focusing distance.



4.9 An image taken with a Nikon 10.5mm fisheye lens. Exposure: ISO 100, f/5.6, 1/200 second.

Lens Accessories

A number of lens accessories are designed to work with your existing lenses to make them more useful for different applications. These accessories allow you to save room and weight in your camera bag by essentially allowing you to use one lens for numerous purposes.

Teleconverters

A *teleconverter* (TC) is a small lens element situated between the camera and the lens. A teleconverter magnifies the incoming image to increase the effective focal length. Teleconverters are quite small, which is why some photographers prefer to use them rather than buy a longer lens. They are generally used to extend telephoto lenses, rather than wide-angle or standard lenses; in fact, they aren't generally recommended for use with those types of lenses.

Teleconverters come in three standard magnifications — 1.4X, 1.7X, and 2X — which magnify your images by 40 percent, 70 percent, and 100 percent. So when using a teleconverter with a 70-200mm f/2.8G, you get effective focal lengths of 98-280mm, 199-340mm, and 140-400mm, respectively. The 1.5X crop factor still applies, which makes the apparent reach of the lens ever longer, giving you the final equivalent of 147-420mm, 299-510mm, and 210-600mm.

CAUTION Not all lenses are designed to work with teleconverters. I recommend that you try out any teleconverter you are considering purchasing with your lens. On some lenses, the rear elements may protrude out far enough to damage the lens or teleconverter, so caution is recommended when attempting to couple them.

The upside of using a teleconverter is that you can get more reach out of the lens. This is obvious, of course, but it can get you in closer to unapproachable subjects to capture more detail. You can get more reach without a lot of extra weight (a 600mm telephoto lens is very sizeable). You maintain the lens's minimum focus distance, which allows you to get near-macro shots. Another upside is that when coupled with a macro lens, the teleconverter increases your magnification ratio. With a 2X converter you can increase the ratio to 2:1, or double life size.

Of course, there's no free lunch. The main drawback is that you lose light when using a teleconverter. A 1.4X TC costs you 1 stop of light, a 1.7X about 1.5 stops, and a 2X, 2 stops. Therefore, your 200mm f/2.8 becomes a 400mm f/5.6 with a 2X extender. This may not be bad in daylight, but it can become a liability in low light. A lens with a maximum aperture of f/4, such as a 300mm f/4, would be reduced to an effective aperture of f/8, which is the threshold of the D5200's ability to AF. Previous Nikon cameras only allowed AF on lenses that were f/5.6 or faster, so the D5200 outshines earlier models when it comes to using teleconverters.

Another drawback to using teleconverters is that the extra glass elements have a detrimental effect on image quality. Images shot with a teleconverter can often appear hazy and lack sharpness. This is why you should purchase the best teleconverters you can get. Unfortunately, the Nikon TCs are quite expensive, but they are the best. I've used third-party teleconverters that cost much less and, much to my chagrin, none of them holds a candle to the Nikon offerings.

In a nutshell, using teleconverters is an exercise of give and take. If you need the extra length, you need to ponder whether the advantages are worth the drawbacks.

Extension tubes

Extension tubes are often mistaken for teleconverters. The placement is the same, but their purpose is much different. Extension tubes are placed between the camera body and the lens, but there are no optical elements involved. An *extension tube* is an empty tube, the sole purpose of which is to move the lens farther away from the focal plane, allowing it to focus closer on the subject. This allows a standard lens to focus at macro ratios of 1:1 or better.

Extension tubes are an inexpensive add-on to make any lens a macro lens. The upside to extension tubes is that there are no optical elements involved, so there is no degradation in image quality at all, aside from a shallower depth of field. As with teleconverters, there are different sizes that allow different magnifications, and increasing magnification brings a loss of light.

NOTE Extension tubes are more effective with wide to standard lenses than telephotos.

There are two kinds of extension tubes: CPU and non-CPU (the cheapest). Similar to Nikon's older MF lenses, these tubes have no electrical contacts to relay data to the camera. For extension tubes, you need to use lenses with manual aperture control. If you don't, the aperture stops down automatically to the minimum aperture. Manual focus and manual exposure are also necessary.

Stepping up a bit, you can get extension tubes with electrical contacts that allow you to autofocus and control your aperture and other settings from the camera as you normally would. Extension tubes are a great alternative to buying a dedicated macro lens, and they also provide excellent image quality because there's no additional glass between the lens and sensor to interfere.

Close-up filters

On the bottom tier of lens accessories are close-up filters. They screw right into the filter ring on the front of the camera lens. Similar to extension tubes, close-up filters allow you to focus closer on your subject for getting macro shots. They essentially act as a magnifying glass for your lens. These filters come in a variety of magnifications and can be stacked or screwed together to increase magnification exponentially.

The upside to using close-up filters is that you don't lose any light. The effectiveness of the lens aperture is not reduced at all. The downside is that close-up filters reduce image quality and can produce soft images. The image quality degrades further as the lenses are stacked.

As with teleconverters, you are better off purchasing high-quality filters. The glass in the more expensive filters is manufactured more precisely and gives much sharper results than those with low-quality glass. Quality brands include B+W and Heliopan.

Ultraviolet filters

Current dSLR cameras, such as the D5200, have a built-in ultraviolet (UV) filter in front of the sensor; therefore, the usefulness of a UV filter is negated when it comes to the purpose for which it was originally designed. However, many photographers (myself included) still use them. Why would someone decide to use a seemingly useless filter on a lens? To protect the front element of the lens.

This is one of those hot-button issues that you find photographers arguing vehemently about — both for and against — on Internet forums. The bottom line is that there are good reasons why you should use UV filters and good reasons why you shouldn't.

The main pro for using a UV filter is the protection you get against scratches on the front element of the lens. Dust, dirt, and debris can get on the lens, causing abrasions when you clean the glass using a lens cloth. The UV filter provides a barrier against the debris. This is especially important when shooting near the ocean, as the salty sea spray is extremely abrasive to glass. If, as I do, you shoot in bad conditions frequently, you will appreciate the protection of a UV filter. Look at your UV filter after about six months of constant use and you will see the kind of damage it prevents.

There are, however, some cons to using UV filters. For one thing, any extra glass in front of the lens degrades image quality. For this reason, I only use the best quality, multicoated filters. My personal choice is the Rodenstock HR Digital. B+W also makes some top-rated filters.

Another con to using a UV filter is that adding another piece of glass to the mix also gives light another surface to reflect from, which can lead to increased flare and ghosting. This is another reason why I recommend using a high-quality, multicoated filter — the coating helps quell this problem.

It is really up to the photographer to decide whether a UV filter is a necessity. If you find yourself shooting outside in the elements a lot and you need to clean your lens frequently, you may benefit from a UV filter. However, if you're an indoor shooter mainly working in a clean environment such as a studio you may never need the protection of a UV filter.

Neutral density filters

A *Neutral density (ND)* filter reduces the amount of light that enters the lens, without coloring or altering it in any way. These filters are used in bright sunlight to allow slower than normal shutter speeds to be used to create special effects, such as motion blur. ND filters are also used to reduce light so that a wide aperture can be used in bright sunlight; this is used quite a bit in filmmaking.

ND filters come in different densities, called filter factors. These are measured in 1-stop increments and, just as when reducing the aperture or shutter speed by 1 stop, the light is halved. An ND2 filter reduces the light by 1/2 or 1 stop, ND4 allows only 1/4 of the light to reach the sensor, which is 2 stops, an ND8 permits only 1/8 of the ambient light (3 stops), and so on.



4

4.10 This photo was taken using a standard Neutral density, ND8 filter to achieve a slow shutter speed in daylight. Exposure: ISO 100, f/10, 0.6 second, using a Sigma 17-35mm lens.

NOTE Some Neutral density filter manufacturers (mostly the high-end ones) use the following scale to measure density: 0.01 for 1/3 stop, 0.02 for 2/3 stop, and 0.03 for 1 stop.

There is also a type of filter called a *Gradual neutral density filter (GND)*. This type of filter has a gradient that goes from clear to dark. It is mostly used in landscape photography to balance the exposure from a bright sky with darker land, although High Dynamic Range (HDR) photography is supplanting this technique.

A third type of filter that is becoming increasingly more common is the Variable neutral density filter. It allows you to adjust darkness from about 2 to 8 stops by rotating it. This allows a lot more flexibility for different light intensities, and you only have to carry around one filter.

Controlling Exposure

Learning the fundamentals of exposure is one of the most important aspects of the art of photography. Taking each element and understanding where each one fits and how is the key to mastering the skill of producing photographs exactly as you envision them. If you don't have a firm knowledge of exposure settings and what each setting does, you will never be able to achieve reproducible results.

Exposure isn't an exceedingly difficult concept to master, but at first, it can seem a bit technical and confusing, especially if you're new to the world of dSLR cameras. While the D5200 has a plethora of scene modes that can get reasonably good results, if you want to make photographs instead of merely take pictures, you have to learn what goes into making an exposure.



Knowing which modes and features to use in any given situation allows you to get a good exposure, no matter what you're shooting.

Defining Exposure

Exposure is the amount of light that reaches the camera sensor during a single *shutter cycle*. A shutter cycle occurs when the shutter-release button is fully depressed, the reflex mirror flips up, the shutter opens and closes, the mirror flips back down into place, and the shutter resets. While that sounds like a mouthful, it all happens in a split second.

There are three things that determine how much light reaches the sensor of your D5200 during each shutter cycle. Each of these three elements must be set to a specific value to achieve a proper exposure for the amount of light that exists in the scene that you are photographing. If one of the three elements is changed, one or both of the remaining elements must be adjusted accordingly to get an equivalent exposure.

The three elements of exposure are:

- ▶ **Shutter speed.** The *shutter speed* simply determines the length of time the shutter is open, exposing the sensor to light.
- ▶ **ISO sensitivity.** The *ISO setting* you choose influences the camera sensor's sensitivity to light — or, more correctly — how much the signal from the sensor is amplified.
- ▶ **Aperture.** The *aperture* (also known as the *f-stop*) is the opening inside the lens that controls the amount of light that reaches the sensor of your camera. Each lens has an adjustable opening. As you change the size of the aperture, you allow more or less light to reach the sensor.

If you've spent any time around photographers or photography forums, you may have heard the word *stop*. All three of the aforementioned elements are measured in stops. The term *stop* is relative to each of these three elements because they represent the same amount of light. Closing the aperture by 1 stop is the same as shortening your shutter speed by 1 stop or decreasing the ISO sensitivity by 1 stop.

NOTE In current photography lingo, the fine adjustments that you can apply to the ISO, shutter speed, and aperture settings are referred to as *steps*. A step represents each of the settings between 1 stop. All Nikon dSLRs allow you to change these settings in 1/3 to 1/2 increments. For practical purposes, you can think of a step as a stop and vice versa.

To clarify, a stop isn't a quantity of light. A stop is the doubling or halving of the amount of light in any given scene. In short, each whole setting of these three elements of exposure is equivalent to 1 stop of light, and you can use these settings to double or halve the amount of light to which you expose the sensor.

NOTE The D5200 exposure settings are adjusted in 1/3 stops by default.

As covered in Chapter 2, the D5200 has a number of exposure modes that can give you a correct exposure. However, keep in mind that there actually is no one correct exposure setting for any one scene. Depending on the situation, the camera can choose any number of settings that add up to a correct exposure.

As mentioned previously, changing one aspect of the exposure setting requires changing one of the other elements to allow the same amount of light to reach the sensor. This is referred to as *equivalent exposure*, meaning that although some of the settings have been altered, the quantity of light reaching the sensor remains the same. This means that for any given scene, there can be seven or more correct exposures at a specific ISO setting. If you add in ISO sensitivity, you can have more than 14 separate exposure settings that give you the same exposure. If you consider that the D5200 is set by default to work in 1/3-stop settings, that number triples.

Now, when I say there isn't any one correct exposure setting that works for any given scene, this statement comes with a caveat. There is *one* exposure setting that is correct and that is the one that *you* choose. You can look at the exposure meter in the camera and adjust the settings until the meter shows that you have the right settings to get the right amount of light to make a nice, even exposure, but that doesn't mean that the image will come out exactly as you envision it. You may want the photo slightly overexposed to brighten it, or underexposed to get deeper shadows. This means that you select the appropriate settings to create an artistic image, an *expressive* exposure setting, if you will.

In the following sections, I discuss the basics of the different elements in the exposure trio and how you can use them to express yourself creatively not only to make good exposures but also to use them to create effects that add interest to your images.

ISO

The ISO sensitivity number indicates how sensitive to light the medium is — in the case of the D5200, that medium is the CMOS sensor. The higher the ISO number, the more sensitive it is and the less light you need to take a photograph. For example, you might choose an ISO setting of 100 on a bright, sunny day when you are photographing outside because you have plenty of light. However, on a cloudy day you may want to consider an ISO of 400 or higher to make sure your camera captures enough available light.

NOTE Technically, in digital photography, the ISO sensitivity setting controls how much amplification the signal from the sensor receives.

ISO sensitivity settings on the D5200 in 1-stop increments are 100, 200, 400, 800, 1600, 3200, and 6400. Each ISO setting is twice as sensitive to light as the previous setting. For example, at ISO 400, your camera is twice as sensitive to light as it is at ISO 200. This means it needs only half the light at ISO 400 that it needs at ISO 200 to achieve the same exposure.

The D5200 allows you to adjust the ISO in 1/3-stop increments (100, 125, 160, 200, and so on), which enables you to fine-tune your ISO to reduce the noise that is inherent in higher ISO settings. Keep in mind, however, that when using Auto ISO, the camera uses 1/3-step ISO settings at all times.

NOTE In Custom Setting menu (setFlash) b1, you can set the ISO sensitivity to be controlled in 1/3- or 1/2-stop increments.

In an artistic context, you can use the ISO to control either the aperture or the shutter speed; for example, if you need a faster shutter speed and smaller aperture to get a desired effect, then you can raise the ISO sensitivity setting.

Shutter speed

Shutter speed is the amount of time that the shutter exposes the sensor to light. Shutter speeds are indicated in seconds, with long shutter speeds in whole seconds and short shutter speeds in fractions of a second. Common shutter speeds (from slow to fast) in 1-stop increments include 1 second, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000, and so on. Increasing or decreasing shutter speed by one setting halves or doubles the exposure, respectively.

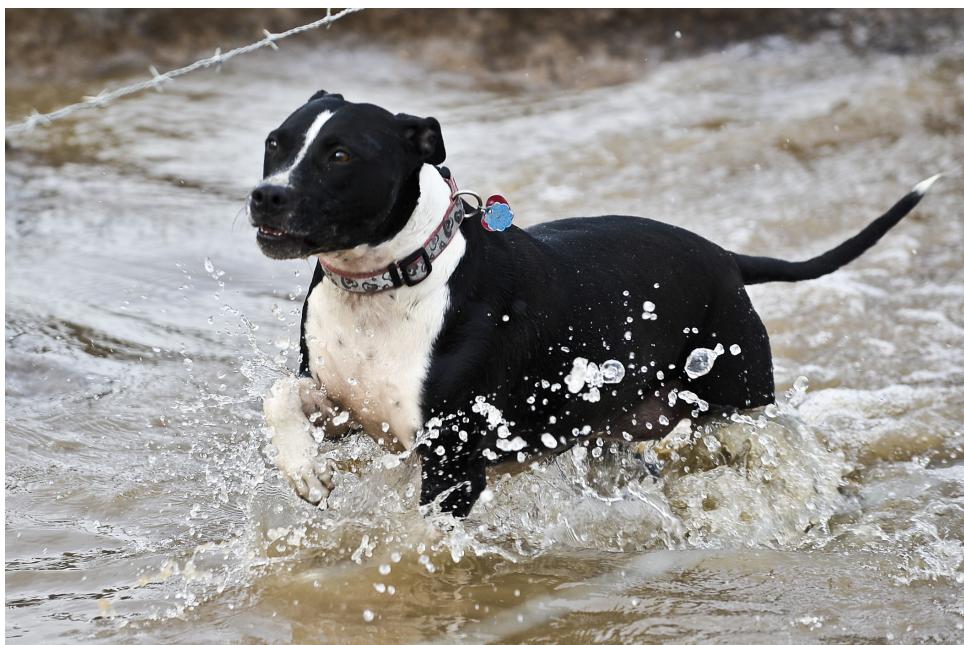
NOTE The numerator of the shutter speed isn't featured on any of the camera displays, so you end up with what seems to be a whole number. For example, 1/250 second simply appears as 250. To delineate the fractions from the whole numbers, a number sign is used. For example, a 2-second exposure appears as 2#.

The D5200 shutter speed is controlled in 1/3 steps, so it uses the following numbers: 1 second, 1/1.3, 1/1.6, 1/2, 1/2.5, 1/3, 1/4, 1/5, 1/6, 1/8, and so on. Shutter speeds play various roles in creating expressive exposures. They allow the photographer to portray motion in a still photograph in different ways. Although you can use various techniques to portray motion creatively, there are ultimately two types of exposures: fast (or short) exposures and slow (or long) exposures.

For general daytime photography with a still or moderately moving subject, 1/30 second or slower is considered a slow shutter speed, while 1/60 second or faster is considered a fast shutter speed. That being said, there are no hard and fast rules about what a fast or slow exposure is; that depends solely on the subject. For example, for most general photography, 1/250 second is a fast exposure, but if you're photographing speeding cars, 1/250 second is a slow exposure. On the opposite end, if you're photographing the night sky, 1/8 second is a relatively fast exposure, whereas in the daytime, 1/8 second would be very slow. Ultimately, the speed of the shutter is relative to the speed of the subject.

Fast shutter speeds

Fast shutter speeds are used to freeze motion. This stops the movement of the subject and captures the moment with every minute detail intact for that tiny slice of time when the shutter is open. This allows you and your viewers to examine a moment frozen in time forever. This is one of the reasons photography is such an enduring form of art; it allows us to examine, in detail, something that occurred for only a fraction of a second. Fast shutter speeds portray movement by stopping the movement, as counterintuitive as that may seem.



5.1 A fast shutter speed allowed me to freeze the motion of the water splashing as this dog frolicked in the pond. Exposure: ISO 140 (Auto-ISO), f/4.0, 1/640 second, with a Nikon 70-200mm f/2.8G VR.

Slow shutter speeds

Photographing an image using a slow shutter speed adds another dimension to the image, almost like time travel. You capture the subject moving through time and space.

Slow shutter speeds are used to create motion blur so you can see that the subject is actually moving. Motion blur can be applied only to the background by panning along with the subject (which keeps the subject sharp), or the subject can contain blur. When using a slow shutter speed, you often need to use a tripod to keep some elements of the image sharp. Although blur can be a great way to show motion, you usually don't want the whole image to be a blurry mess.



5.2 Using a slow shutter speed allowed me to capture the motion of this Ferris wheel as a blur, creating the illusion of movement.

Exposure: ISO 100, f/8.0, 1.3 second, with a Nikon 14-24mm f/2.8G.



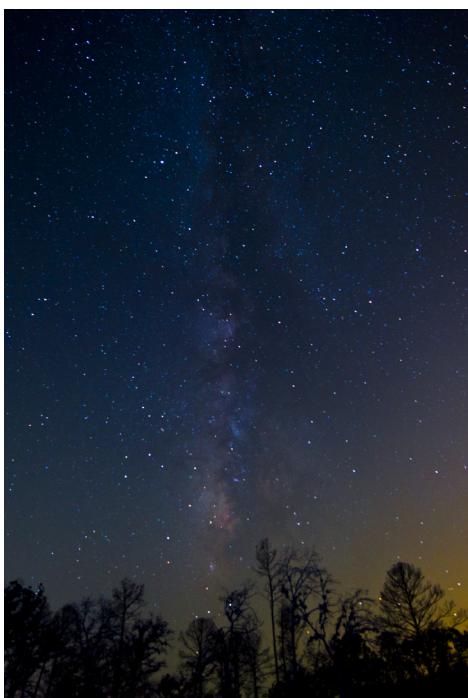
5.3 I used a slow shutter speed while panning when shooting this image, which blurred the background, but kept the formula car relatively sharp to portray extreme speed. Note that the wheels are also blurred, which indicates that the car is moving. Exposure: ISO 100, f/10, 1/160 second, with a Nikon 70-200mm f/2.8G VR.

Long exposures are not only for portraying motion; they can also allow us to see things that are normally too dim for human eyes to perceive, as shown in the photograph of the light from the Milky Way I captured in Figure 5.4.

Aperture or f-stop

In my opinion, the aperture is the most important aspect of creative and expressive photography. With the aperture, you can control how much and what part of an image is in focus, which controls the area to which the

5.4 A very long exposure allowed me to record the faint light from the Milky Way during the Gemenid meteor showers. Exposure: ISO 800, f/2.8, 30 seconds, with a Nikon 14-24mm f/2.8G.



viewer's attention is drawn. The aperture is the size of the opening in the lens that determines the amount of light that reaches the image sensor. The aperture is controlled by a metal diaphragm that operates in a similar fashion to the iris of your eye. Aperture is expressed as an f-stop number. Common f-stops in 1-stop increments are f/1.4, f/2.0, f/2.8, f/4.0, f/5.6, f/8.0, f/11, f/16, and f/22. Here are two important things to know about aperture:

- ▶ **Smaller f-numbers equal wider apertures.** A small f-number, such as f/2.8, means the lens aperture is open wide so that more light reaches the sensor. If you have a wide aperture (opening), the amount of time the shutter needs to stay open to let light into the camera decreases.
- ▶ **Larger f-numbers equal narrower apertures.** A large f-number, such as f/16, means the lens opening is smaller so that less light reaches the sensor. If you have a narrow aperture (opening), the amount of time the shutter needs to stay open to let light into the camera increases.

NOTE The terms *aperture* and *f-stop* are interchangeable.

One commonly asked question is why the numbers of the aperture seem counterintuitive. The answer is relatively simple: The numbers are actually derived from ratios, which translate into fractions. The f-number is defined by the focal length of the lens divided by the actual diameter of the aperture opening. The simplest way to look at it is to put a 1 on top of the f-number as the numerator. For the easiest example, take a 50mm f/2 lens (okay, Nikon doesn't actually make a 50mm f/2, but pretend for a minute). Take the aperture number, f/2. If you add the 1 as the numerator, you get 1/2. This indicates that the aperture opening is half the diameter of the focal length, which equals 25mm. Therefore, at f/4, the effective diameter of the aperture is 12.5mm. It's a pretty simple concept once you break it down.

As with ISO and shutter speed, there are standard settings for aperture, each of which has a 1-stop difference from the next. The standard f-numbers (f/1.4, f/2.0, f/2.8, f/4.0, f/5.6, f/8.0, f/11, f/16, and f/22) may appear to be random, but they aren't. Upon closer inspection, you notice that every other number is a multiple of 2. Broken down even further, each stop is a multiple of 1.4 (which is the $\sqrt{2}$). If you start with f/1.0 and multiply by 1.4, you get f/1.4; multiply this by 1.4 again and you get 2 (rounded up from 1.96); multiply 2 by 1.4 and you get 2.8, and so on. As it does with the ISO and shutter speed settings, the Nikon D5200 allows you to set the aperture in 1/3-stop increments.

NOTE In photographic vernacular, *opening up* refers to going from a smaller to larger aperture. *Stopping down* refers to going from a larger to smaller aperture.

Now that you know a little more about apertures, you begin to see why different aperture settings are used, and the effect that they have on your images. The most common reason why a certain aperture is selected is to control the depth of field, or how much of the image is in focus. Quite simply, using a wider aperture (f/1.4 through f/4.0) gives you a shallow depth of field. This allows you to exercise *selective focus* — that is focusing on a certain subject and allowing the rest of the image to fall out of focus.



5.5 A shallow depth of field draws your eye directly to the subject. Exposure: ISO 220 (Auto-ISO), f/4.0, 1/500 second, with a Nikon 85mm f/3.5G VR macro.

Conversely, using a small aperture (f/11-32) maximizes your depth of field, allowing you to get more of the scene in focus. Using a wider aperture is generally preferable when shooting portraits because it blurs out the background and draws attention to the subject; a smaller aperture is generally used when photographing landscapes to ensure that a larger range of the scene is in focus.

Another way that the aperture setting is used is to control the shutter speed. You can use a wide aperture to allow a lot of light in so that you can use a faster shutter speed to freeze action. Conversely, you can use a smaller aperture if you want to be sure that your shutter speed is slow.



5.6 As you can see in these images, the deep depth of field (f/32) of the shot on the left allows the background to show and distract from the main subject. The image on the right was shot at f/2.8 and allows the spires to become the prominent feature of the image.

Fine-Tuning Your Exposure

You can't always rely on your camera's meter to give you the most accurate reading. It is, after all, a computer and doesn't know what your intentions are for your image, and it can be tricked into under- or overexposing your images by areas of extreme brightness or darkness in the scene. A common scenario in which this occurs is shooting at the beach or in a snowy area. The camera meter senses all of this brightness

and tries to control the highlights; however, it ends up underexposing the image, causing the sand or snow to appear a dirty gray instead of a brilliant white, as it should be. The quick fix here is to add a stop or two of exposure compensation, which I talk about in the next section.

Exposure compensation

Exposure compensation is a D5200 feature that allows you to fine-tune the automatic exposure setting supplied by the camera's exposure meter. Although you can adjust the exposure of the image in your image-editing software (especially if you shoot RAW), it's best to get the exposure right in the camera to be sure that you have the highest image quality. If, after taking the photograph, you review it and it's too dark or too light, you can adjust the exposure compensation and retake the picture to get a better exposure.

Exposure compensation is adjusted in increments called *exposure value* (EV); 1 EV is equal to 1 stop of light. You adjust exposure compensation by pressing the Exposure Compensation button (Z), next to the shutter-release button, and rotating the Main Command dial to the left for more exposure (+EV) or to the right for less exposure (-EV). Depending on your settings, the exposure compensation is adjusted in either 1/3 or 1/2 stops of light. You can change this setting in Custom Setting menu (C) b1.

You can adjust the exposure compensation up to +5 EV and down to -5 EV, which is a large range of 10 stops. To remind you that exposure compensation has been set, the Exposure Compensation indicator (Z) appears in the viewfinder display. It also appears on the LCD screen when the shooting info displays.

CAUTION Be sure to reset the Exposure compensation (Z) to 0 after you finish shooting to avoid unwanted over- or underexposed images later.

Using histograms

The easiest way to determine if you need to adjust the exposure compensation is to preview your image. If it looks too dark, adjust the exposure compensation up; if it's too bright, adjust the exposure compensation down. This, however, is not the most accurate method of determining how much exposure compensation to use. One of the most important tools you have to evaluate exposure is the histogram. To determine accurately how much exposure compensation to add or subtract, look at the histogram. The histogram is a visual representation of the tonal values in your image. Think of it as a bar graph that charts the lights, darks, and midtones in your picture.

The histogram's range is broken down into 256 brightness levels from 0 (absolute black) to 255 (absolute white). The black (or shadows) are represented on the left side of the histogram, and the white (or highlights) are represented on the right. The more pixels there are at any given brightness value, the higher the bar. If there are no bars, then the image has no pixels in that brightness range. A typical histogram for an overexposed image is shown in Figure 5.7, and a typical histogram for an underexposed image is shown in Figure 5.8. The histogram of a properly exposed image is shown in Figure 5.9.

NOTE The histogram displayed on the LCD screen is based on an 8-bit image. When you're working with 12- or 14-bit files using editing software, the histogram may be displayed with 4,096 brightness levels for 12-bit or 16,384 brightness levels for 14-bit.

The D5200 offers four histogram views: Luminance, which shows the brightness levels of the entire image, and separate histograms for the Red, Green, and Blue color channels.

The most useful histogram for determining if your exposure needs adjusting is the luminance histogram. To display the luminance histogram without the color channel histograms, simply press the multi-selector up (\blacktriangle) while viewing the image on the LCD screen. This displays a thumbnail of the current image, the shooting information, and a small luminance histogram.



5.7 An example of a histogram from an overexposed image (no highlight detail). Notice that the histogram information is spiking and completely touching the far-right side of the graph.



5.8 An example of a histogram from an underexposed image (no shadow detail). Notice the spikes at the far-left side of the graph.



5.9 The histogram of a properly exposed image. Notice that the graph does not spike against the left or right edges, but tapers off.

Theoretically, you want to expose your subject so that it falls approximately in the middle of the tonal range. If your histogram graph has most of the information on the left side, then your image is probably underexposed; if it's mostly on the right side, then your image is probably overexposed. Ideally, with most average subjects that aren't bright white or extremely dark, you want to try to get your histogram to have most of the tones in the middle range, tapering off as they get to the dark and light ends of the graph.

However, this is only for most average types of images that would not be too light or too dark, with little contrast. As with almost everything in photography, there are exceptions to the rule. If you take a photo of a dark subject on a dark background (that is, a *low-key* image), then naturally your histogram will have most of the tones on the left side of the graph, as shown in Figure 5.10. Conversely, when you take a photograph of a light subject on a light background (that is, a *high-key* image), the histogram will have most of the tones skewing to the right, as shown in Figure 5.11.



5.10 An example of a histogram from a low-key image. Notice that although most of the tones are to the left, the histogram tapers off down to the highlight side, indicating that there is detail in the highlight area.

The most important thing to remember is that the histogram is just a factual representation of the tones in the image and there is no such thing as a perfect histogram. Also remember that although it's okay for the graph to be near one side or the other, you usually don't want your histogram to have spikes bumping up against the edge of the graph; this indicates that your image has blown-out highlights (completely white, with no detail) or blocked-up shadow areas (completely black, with no detail).



5.11 An example of a histogram from a high-key image. Although most of the tones are to the right, the histogram tapers off down to the shadow side, indicating that there is detail in the shadow area.

Now that you know a little bit about histograms, you can use them to adjust exposure compensation. Follow these steps when using a histogram as a tool to evaluate your photos:

- 1. After taking your picture, review its histogram on the LCD screen.** To view the histogram in the image preview, press the Playback button (▶) to view the image. Press the multi-selector up (▲), and the histogram appears directly to the right of the image preview.
- 2. Look at the histogram.** Note if it indicates that the image is properly exposed (see Figure 5.9).
- 3. Adjust the exposure compensation.** To move the tones to the right, add a little exposure compensation by pressing the Exposure compensation button (◀), and then rotating the Command dial to the right. To move the tones to the left, press the Exposure compensation button (▶), and then rotate the Command dial to the left.
- 4. Retake the photograph if necessary.** After taking another picture, review the histogram again. If needed, adjust the exposure compensation more until you achieve the desired exposure.

When you photograph brightly colored subjects, it may sometimes be necessary to refer to the RGB histograms. Sometimes it's possible to overexpose an image in only one color channel, even though the rest of the image looks like it is properly exposed. To view the separate RGB histograms, you need to set the display mode in the Playback menu (▶).

To view RGB histograms, follow these steps:

- 1. Press the Menu button (MENU).**
- 2. Use the multi-selector to select the Playback menu (▶).** Press the multi-selector right (▶).
- 3. Use the multi-selector to highlight Playback display options.** Press the OK button (OK) or multi-selector right (▶) to view the menu options.
- 4. Press the multi-selector down (▼) to scroll down to the menu option RGB histogram.** Press multi-selector right (▶) to set the option to On; this is confirmed by a small check mark in a box next to the option.
- 5. When the option is set, press the OK button (OK).**

It's possible for any one of the color channels to become overexposed — or blown out, as most photographers call it — although the most commonly blown-out channel is the Red channel. Digital camera sensors are more prone to overexposing the Red channel because they are generally more sensitive to red colors. When one of these color channels is overexposed, the histogram for that particular color channel looks similar to the luminance histogram of a typical overexposed image.

Typically, the best way to deal with an image that has an overexposed color channel is to reduce exposure by using exposure compensation. Although this a quick fix, reducing the exposure can also introduce blocked-up shadows; you can deal with this by shooting RAW or, to a lesser extent when shooting JPEGs, by using Active D-Lighting, which is a proprietary Nikon camera feature that preserves shadow and highlight detail.

Working with Light

The word *photography* is derived from two Greek words: *photos* (light) and *graphos* (writing or painting). Without a doubt, light is the most essential ingredient that goes into making a photograph. Light is also the most variable part of the photographic equation because it can change instantly, either by the hand of the photographer or the force of nature. Ultimately, the way that light interacts with a subject is the defining factor of the tone and mood of an image.

Working with light, and learning to control and manipulate it, is one of the fundamental keys to becoming a successful photographer. If you allow light to control your photography, you will forever be at its mercy and never truly grasp the art of photography.



Controlling light is the key to setting the tone of your images.

Lighting Essentials

The way light interacts with a subject has an enormous effect on the way the camera records the image. The angle and direction from which the light is coming, as well as the color of the light source and the quality of the light, all play a part in the way the image appears. All of these things combined affect the mood, tone, and feeling of an image, so it's important to grasp the basic tenets behind using light for photography. This section covers the two main types of lighting used by photographers and filmmakers today: Soft and hard light.

The quality of light

Photographers and filmmakers use the term *quality of light* to describe the way that light interacts with a scene. *Quality* doesn't necessarily describe whether the light is good or bad, but rather, how it looks within the scene.

The first thing a photographer should consider when planning an image concept or assessing an existing light scene is the quality of light. For example, if you're planning to shoot a portrait, you need to decide how you want to portray the person. If you're shooting a landscape, think about what time of day the lighting is best for that particular terrain.

Soft lighting

Soft light is distributed evenly across the scene and appears to wrap around the subject. It comes from a large light source, and the shadows fade gradually from dark to light, which results in a subtle shadow edge transfer. This is a very desirable type of light to use in most types of photography, especially in portraiture. You can also create soft light by placing a light source close to the subject or by diffusing the light source, thereby mimicking a larger light source.

NOTE The term *shadow edge transfer* is used to describe how abruptly the shadows in images go from light to dark. This is the determining factor in whether light is soft or hard. Soft light has a smooth transition and hard light has a well-defined shadow edge transfer.

Soft light is very flattering to most subjects. It is used to soften hard edges and smooth out the features of a subject. Soft lighting can be advantageous for almost any type of photography, although in some instances it can lack the depth that you get from using a more direct light source.

To achieve soft lighting naturally, you can place the subject in an area that isn't receiving direct sunlight, such as under a porch, overhang, or tree. Cloudy (especially partly cloudy) days are also ideal for soft, diffused lighting.

When artificial light is the source of your subject's illumination, you usually need to modify the light in some way to make it soft. Redirecting or bouncing the light off a wall or some other reflective material softens the light; aiming the light source through diffusion material is also a good way to soften the light.

Hard lighting

The opposite of soft light is hard light. With hard light, the shadow edge transfer is more defined. It is directional, and you can pinpoint where the light source is located very easily. Moving the light source farther from the subject results in harder light because the light source becomes smaller relative to the subject.

Hard light isn't used as extensively as soft light, but it is very effective in highlighting details and textures in almost any subject. Hard light is often used in landscape shots to bring attention to details in natural formations. Hard light is also effective for creating gritty or realistic portraits.



6.1 This photo was taken on a cloudy day, giving the scene a shadowless, soft light appearance. Exposure: ISO 100, f/1.8, 1/4000 second with a Sigma 35mm f/1.4 DG HSM.

Artificial hard light is easily achieved with a bare light source. You can also use accessories, such as grids or snoots, to make the light more directional. The bright, midday sun is an excellent example of a natural, hard light source as shown in Figure 6.2.



6.2 This hard-light portrait was taken in direct sunlight. Exposure: ISO 100, f/1.8, 1/4000 second with a 28mm f/1.8G.

Lighting direction

The direction from which light strikes your subject has a major impact on how your images appear. When using an artificial light source, you can easily control the direction of the lighting by moving the light source relative to the subject. When using natural lighting, moving the subject relative to the light source is the key to controlling the lighting direction. I cover the three major types of lighting direction in the following sections.

Frontlighting

Frontlighting comes from directly in front of the subject, following the old photographer's adage: keep the sun at your back. This is a good general rule; however, sometimes frontlighting can produce flat results lacking in depth and dimension. In Figures 6.3 and 6.4, you can see the difference that changing the direction of the light can have on a subject. When the light is aimed straight ahead, as shown in Figure 6.3, more of it reflects from the background, which brightens the background significantly, as well.

Frontlighting works pretty well for portraits, and many fashion photographers swear by it, especially for highlighting hair and makeup. Frontlighting flattens out facial features and also hides blemishes and wrinkles very well. Be aware that using frontlighting with a continuous light source, like the sun, can cause your subject to squint.



6.3 This vintage radio was lit from the front with an on-camera, SB-900 Speedlight. Notice that the lighting is flat and even.
Exposure: ISO 400, f/4.0, 1/200 second with a 300mm f/4.0.

Sidelighting

Although sidelighting comes in from the side, it doesn't necessarily have to come in from a 90-degree angle. It usually comes in from a shallower angle, such as 45 to 60 degrees.

Lighting the subject from the side increases the shadow contrast and causes the details to become more pronounced. This is what gives two-dimensional photographs a three-dimensional feel. Sidelighting is equally effective when using either hard or soft light, and it works for just about any subject.



6.4 The light was moved to the side for this shot. Notice that the radio has more texture, depth, and form, giving it more dimensionality and lending the image a somewhat moodier quality.
Exposure: ISO 100, f/4.0, 1/200 second with a 300mm f/4.0.

Backlighting

Backlighting involves placing the light source behind the subject. Although it's not as common as front- and sidelighting, it does have its uses. Backlighting is often used in conjunction with other types of lighting to add highlights to the subject.

TIP Using backlighting and lens flare creates a classic, cinematic effect.

Backlighting has often received a bad rap in photography, but more photographers are now using it to add artistic flair to their images. Backlight introduces effects that were once perceived as undesirable in classical photography, such as lens flare and decreased contrast. Photographers today are discovering that, when used correctly, backlighting can create interesting images.

TIP The key to making backlighting work is to use the Spot metering mode (□). When shooting portraits, meter on the subject; for silhouettes, meter on the brightest area in the scene.

Backlighting can make portraits more dynamic, incorporate silhouettes into landscape photos, or make translucent subjects, like the flowers shown in Figure 6.5, seem to glow.

Natural Light

Natural light is probably the easiest light source to find simply because it's all around you, as the sun is the source of all natural light. Some people confuse available light with natural light. To make it clear, all natural light is available light, but not all available light is natural light. Available light is light that exists in a scene and that isn't augmented by the photographer. For example, when you walk into a room that is solely lit with an overhead lamp, the overhead lamp provides the available light, but it is not natural light.



6.5 Backlighting can add lens flare to your image, giving it a cinematic effect.
Exposure: ISO 400, f/8.0, 1/2000 second, using an 80-200mm f/2.8D at 80mm.

NOTE Early in the morning and late in the evening when the sun is rising or setting are the best times to take photographs. These times are known as the *Golden Hour*.

That being said, natural light can be the most difficult to work with. It can be too harsh on a bright, sunny day, too unpredictable on a partly cloudy day, and although an overcast day can provide beautiful soft lighting, it can sometimes lack definition, which leads to flat images.

Natural light often benefits from some sort of modification to make it softer and less directional. Here are a few examples of natural lighting techniques:

- ▶ **Use fill flash.** As contrary as it sounds, using flash to augment natural light can really help. You can use the flash as a secondary light source (not as your main light) to fill in the shadows and reduce contrast.
- ▶ **Try to use window lighting.** Like fill flash, this technique is one of the best ways to use natural light, even though it seems contrary. Go indoors and place your model next to a window. This provides a beautiful soft light that is very flattering. Many professional portrait and food photographers use window light. It can be used to light almost any subject softly and evenly, yet it still provides directionality. This is definitely the quickest, and often the nicest, light source you can find.
- ▶ **Find some shade.** The shade of a tree or the overhang of an awning or porch can block the bright sunlight while still providing plenty of diffuse light with which to light your subject.
- ▶ **Take advantage of clouds.** A cloudy day softens the light, allowing you to take portraits outside without worrying about harsh shadows and too much contrast. If it's only partly cloudy, you can wait for a cloud to pass over the sun before taking your shot.
- ▶ **Use a modifier.** Use a reflector to reduce the shadows, or a diffusion panel to block the direct sunlight from your subject.



6.6 Window lighting was all that was necessary for this food shot. Exposure: ISO 640, f/4.5, 1/50 second, using a Sigma 17-70mm f/2.8-4 DC HSM OS at 28mm.

Continuous Light

Continuous lighting is a constant light source. It has a *what you see is what you get* effect, therefore, it's the easiest type of lighting to use. You can set up the lights and see what effect they have on your subject before you even pick up your D5200. Continuous lights are an affordable option for a beginners, and the learning curve isn't too steep.

As with other lighting systems, you have many continuous lighting options. Here are a few of the most common:

- ▶ **Incandescent.** Incandescent, or tungsten, lights are the most common type of lights (a standard light bulb is a tungsten lamp). With tungsten lamps, an electrical current runs through a tungsten filament, heating it and causing it to emit light. This type of continuous lighting is the origin of the term *hot lights*.
- ▶ **Halogen.** Halogen lights, which are much brighter than typical tungsten lights, are another type of hot light. Considered a type of incandescent light, halogen lights employ a tungsten filament, but they also include halogen vapor in the gas inside the lamp. The color temperature of halogen lamps is higher than the color temperature of standard tungsten lamps. Halogen lights are also more expensive and the lamps burn much hotter than standard light bulbs.
- ▶ **Fluorescent.** Fluorescent lighting is used in most office buildings and retail stores. In a fluorescent lamp, electrical energy changes a small amount of mercury into a gas. The electrons collide with the mercury gas atoms, causing them to release photons, which in turn cause the phosphor coating inside the lamp to glow. Because this reaction doesn't create much heat, fluorescent lamps are much cooler and more energy efficient than tungsten and halogen lamps. In the past, fluorescent lighting wasn't commonly used because of the ghastly green cast the lamps caused. These days, with color-balanced fluorescent lamps and the ability to adjust white balance, fluorescent light kits for photography and especially video are becoming more common and are very affordable.

Here are some disadvantages of using incandescent lights:

- ▶ **Color temperature inconsistency.** The color temperature of lamps change the more they are used and as the current varies. The color temperature may be inconsistent from manufacturer to manufacturer and may even vary within the same types of bulbs.

Continuous Lighting versus Flash

Incandescent lights appear to be very bright to you and your subject, but they actually produce less light than a standard flash unit. For example, a 200-watt tungsten light and a 200-watt-second strobe use the same amount of electricity per second, so they should be equally bright, right? Wrong. Because the flash discharges all 200 watts of energy in a fraction of a second, the flash is actually much, much brighter.

Why does this matter? Because when you need a fast shutter speed or a small aperture, the strobe can give you more light in a shorter time. An SB-600 Speedlight gives you about 30-watt-seconds of light at full power. To get an equivalent amount of light at the maximum sync speed of 1/250 second from a tungsten light, you would need a 7,500-watt lamp! Of course, if your subject is static, you don't need to use a fast shutter speed; in this case, you can use one 30-watt light bulb for a 1-second exposure or a 60-watt light bulb for a 1/2-second exposure.

- ▶ **Light modifiers are more expensive.** Because most continuous lights are hot, modifiers such as softboxes need to be made to withstand the heat; this makes them more expensive than the standard equipment intended to be used for strobes.
- ▶ **Short lamp life.** Incandescent lights tend to have a shorter life than flash tubes, so you must replace them more often.

If you're serious about continuous lighting, you may want to invest in a photographic light kit. These kits are widely available from any photography or video store. They usually include both the lights and light stands. Some kits also include light modifiers (such as umbrellas or softboxes) to diffuse the light and create a softer look. The kits can be relatively inexpensive, with two lights, two stands, and two umbrellas costing around \$100. You can buy much more elaborate setups that cost all the way up to \$2,000.

The D5200 Built-in Flash

The Nikon D5200 has a built-in flash that pops up for quick use in low-light situations. Although this little flash is fine for snapshots, it's not always the best option for portraying your subject in a flattering light.

TIP Even when you're using the pop-up flash for snapshots, I recommend using a pop-up flash diffuser. There are a number of brands and types, but I use a LumiQuest Soft Screen. It folds up flat to fit in your pocket and costs a little over \$10.

Built-in flash exposure modes

The built-in flash of the D5200 has a few different exposure modes that control the way the flash calculates exposure, flash output, and brightness, and a couple of modes for using some advanced flash techniques.

i-TTL and i-TTL BL

The D5200 determines the proper flash exposure automatically using Nikon's proprietary *i-TTL* (Intelligent-Through-the-Lens) flash metering system. The theory behind i-TTL is the same as standard exposure metering, except that, with i-TTL, the camera gets most of the metering information from monitor preflashes emitted from the flash. These preflashes emit almost simultaneously with the main flash, so it almost appears as if the flash only fires once. The camera also uses data from the lens, such as distance information and f-stop values, to help determine the proper flash exposure.

Additionally, the D5200 employs two types of i-TTL flash metering: Standard i-TTL flash and i-TTL Balanced Fill-Flash. With Standard i-TTL flash mode, the camera determines the exposure for the subject only and doesn't consider the background lighting. With i-TTL Balanced Fill-Flash mode, the camera attempts to balance the light from the flash with the ambient light to produce a more natural-looking image.

When you use the built-in flash on the D5200, the default mode is i-TTL Balanced Fill-Flash when using the Matrix (), or Center-weighted () metering modes. When the D5200 is set to Spot metering () , the flash defaults to i-TTL automatically.

Manual

The built-in flash power is set by fractions in Manual mode (, with 1/1 being full power. The output is halved for each setting (which is equal to 1 stop of light). The settings are 1/1, 1/2, 1/4, 1/8, 1/16, and 1/32.

Guide Number/Distance = Aperture

The equation that photographers use to calculate flash exposure manually is GN/Distance = A. The Guide Number (GN) is the power of the flash. Distance (D) is the range between the subject and the flash. Aperture (A) is the lens opening which determines how much light comes into the lens. You can change this equation in the following ways to find the information you need to know:

- ▶ **GN/D = A.** If you know the GN of the flash and the distance of the flash from the subject, you can determine the aperture you need to use to achieve the proper exposure.
- ▶ **A/GN = D.** If you know the aperture you want to use and the GN of the flash, you can determine the distance to place your flash from the subject.
- ▶ **A × D = GN.** If you already have the right exposure, you can take your aperture setting and multiply it by the distance of the flash from the subject to determine the approximate GN of the flash.

The Guide Number (GN) for the built-in flash is 39 when measuring distance in feet, or 12 when using meters at full power (1/1) set to ISO 100. To determine the GN at higher ISO settings, multiply the GN by 1.4 for each stop that the ISO increases. For example, doubling the ISO setting to 200 increases the GN by a factor of 1.4, so $39 \times 1.4 = \text{GN } 54.6$.

Similarly, when reducing the flash power by 1 stop, you divide the GN by a factor of 1.4, so at 1/2 power, the GN is about 28 ($\text{GN } 39 \div 1.4 = \text{GN } 27.8$).

Flash sync modes

Flash sync modes control how the flash operates in conjunction with your D5200. These modes work with both the built-in Speedlight and accessory Speedlights, such as the SB-910, SB-700, SB-600, and so on. These modes allow you to choose when the flash fires, either at the beginning of the exposure or at the end, and they also allow you to keep the shutter open for longer periods, enabling you to capture more ambient light in low-light situations. However, before covering the Sync modes, I need to explain sync speeds.

Sync speed

The *sync speed* is the fastest shutter speed that you can use while achieving a full flash exposure. This means that if you set the shutter speed faster than the rated sync speed of the camera, you end up with a partially exposed image (the image will appear with a black bar at the bottom). The D5200 won't let you set the shutter speed above the rated sync speed of 1/200 second when using the built-in flash or a dedicated Speedlight. This means you don't need to worry about having partially black images when using a Speedlight, but it may be something to consider if you use studio-type flash units.

Limited sync speeds exist because of the way shutters work in modern cameras. All DSLR cameras have a *focal plane shutter*. This shutter is located directly in front of the focal plane, which is the surface of the sensor. The focal plane shutter has two shutter curtains that travel vertically in front of the sensor to control the time the light can enter through the lens. At slower shutter speeds, the front curtain covering the sensor moves away, exposing the sensor to light for a set amount of time. When you have made the exposure, the second curtain moves in to block the light, thus ending the exposure.

To achieve shutter speeds faster than 1/200 second, the second curtain of the shutter starts closing before the first curtain has exposed the sensor completely. This means the sensor is actually exposed by a slit that travels along the height of the sensor. This allows your camera to have extremely fast shutter speeds, but it limits the flash sync speed because the entire sensor must be exposed to the flash at once to achieve a full exposure.

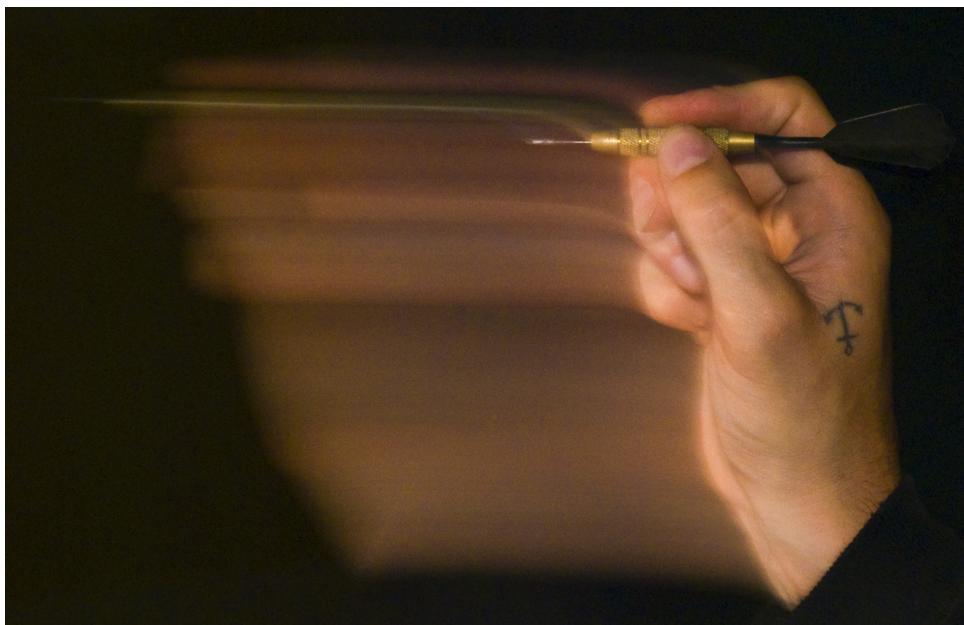
Front-curtain sync

Front-curtain sync flash mode (Flash icon) is the default for your camera when you use the built-in flash or one of Nikon's dedicated Speedlights. In Front-curtain sync flash mode (Flash icon), the flash fires as soon as the shutter's front curtain fully opens. This mode works well with most general flash applications.

When you set the Shooting mode to Programmed auto (P) or Aperture-priority auto (A), the shutter speed is set to 1/60 second automatically.

Front-curtain sync flash mode (**Flash**) works well when you use relatively fast shutter speeds. However, if you use Shutter-priority auto mode (**S**) and the shutter speed is slowed down to 1/30 or slower (also known as *dragging the shutter* in flash photography), Front-curtain sync flash mode (**Flash**) causes your images to have an unnatural-looking blur in front of them. This occurs especially when photographing a moving subject because the ambient light reflects off of it.

When doing flash photography, your camera actually records two exposures concurrently: The flash exposure and the ambient light. When you use a faster shutter speed in lower light, the ambient light usually isn't bright enough to have an effect on the image. When you slow down the shutter speed substantially, it allows the ambient light to be recorded to the sensor, causing *ghosting*. Ghosting is a partial exposure that usually appears transparent on the image.



6.7 Front-curtain sync flash mode creates an unnatural looking blur when dragging the shutter during flash exposures. Exposure: ISO 800, f/5.0, 1 second with a 50mm f/1.8G.

Ghosting causes a trail to appear in front of the subject because the flash freezes the initial movement of the subject. Because the subject is still moving, the ambient light records it as a blur that appears in front of the subject, creating the illusion that it's moving backward. To counteract this problem, you can use Rear-curtain sync flash mode (flash REAR), which I explain later.

Slow sync

When doing flash photography at night, your subject is often lit well, but the background appears completely dark. Slow sync flash mode (flash SLOW) helps take care of this problem because it allows you to set a longer shutter speed (up to 30 seconds) to capture some of the ambient light of the background. This allows the subject and the background to be more evenly lit, and you can achieve a more natural-looking photograph.

TIP To avoid ghosting in Slow sync flash mode (flash SLOW), be sure that the subject remains still for the whole exposure. With longer exposures, you can use ghosting creatively.

Red-Eye Reduction

When using on-camera flash, such as the built-in flash, you often get the red-eye effect. This occurs because the pupils are wide open in the dark, and the light from the flash is reflected off the retina and back to the camera lens. Fortunately, the D5200 offers a Red-Eye Reduction mode ($\text{flash} \odot$). When you activate this mode, the camera either turns on the AF-assist illuminator (when using the built-in flash) or fires some preflashes (when using an accessory Speedlight), which causes the pupils of the subject's eyes to contract. This reduces the amount of light from the flash that reflects off the retina, thus reducing or eliminating the red-eye effect.

Rear-curtain sync

When using Rear-curtain sync flash mode (flash REAR), the camera fires the flash at the end of the exposure just before the rear curtain of the shutter starts moving. This is useful when you're taking flash photographs of moving subjects. Rear-curtain sync flash mode (flash REAR) allows you to portray the motion of the subject more accurately by

causing a motion blur trail behind the subject rather than in front of it, as is the case with the Front-curtain sync flash mode (⚡). You can also use Rear-curtain sync flash mode (⚡_{REAR}) in conjunction with the Slow sync flash mode (⚡_{SLOW}) to achieve Slow Rear-curtain sync flash mode (⚡_{REAR}_{SLOW}).



6.8 Rear-curtain sync flash mode gives the image a more natural sense of movement with the blur following behind the subject. Exposure: ISO 800, f/5.0, 1 second with a 50mm f/1.8G.

NOTE Rear-curtain sync flash mode (⚡_{REAR}) is available in all of the exposure modes: Programmed auto (P), Shutter-priority auto (S), Aperture-priority auto (A), and Manual (M). Slow Rear-curtain sync flash mode (⚡_{REAR}_{SLOW}) is available only in the Programmed auto (P), Auto (A^{AUTO}), or Auto Flash off (Y) modes.

Flash Compensation

When you photograph subjects using flash, whether you're using the built-in flash on your D5200 or an external Speedlight, there may be times when the flash causes your principal subject to appear too light or too dark. This usually occurs in difficult lighting

situations, especially when you use i-TTL metering. Your camera's meter can be fooled into thinking the subject needs more or less light than it actually does. This can happen when the background is very bright or very dark, or when the subject is off in the distance or very small in the frame.

Flash compensation allows you to adjust the flash output manually, while retaining the i-TTL readings so your flash exposure is at least in the ballpark. With the D5200, you can vary the output of your built-in flash's TTL setting (or your own manual setting) from -3 Exposure Value (EV) to +1 EV. This means that if your flash exposure is too bright, you can adjust it down 3 full stops under the original setting. If the image seems underexposed or too dark, you can adjust it to be brighter by 1 full stop.

Press the Flash compensation ( ) and Exposure compensation () buttons simultaneously, and rotate the Command dial to apply flash compensation.

Creative Lighting System Basics

The *Creative Lighting System* (CLS) is what Nikon calls its proprietary system of Speedlights and the technology that goes into them. The best part of CLS is the ability to control Speedlights wirelessly, which Nikon refers to as *Advanced Wireless Lighting* (AWL). AWL allows you to get your Speedlights off-camera so that you can control light placement like a professional photographer would with studio-type strobes.

To take advantage of AWL, all you need is your D5200, a Speedlight that can be used as a Commander (such as the current SB-910, SB-700, or SU-800, or the discontinued SB-800 or SB-900), and at least one remote Speedlight (such as the current SB-910, SB-700, SB-600, or SBR-200, or the discontinued SB-800 or SB-900).

Communications between the commander flash and the remote units are accomplished by using pulse modulation. *Pulse modulation* means that the commanding Speedlight fires rapid bursts of light in a specific order. The pulses of light are used to convey information to the remote group, which interprets the bursts of light as coded information. The commander tells the other Speedlights in the system when and at what power to fire. You can also use an SB-700, SB-800, SB-900, or SB-910 Speedlight or an SU-800 Commander as a master. This allows you to control three separate groups of remote flashes and gives you an extended range.

CAUTION The Nikon SB-400 cannot be used as a remote unit.

In a nutshell, this is how the Creative Lighting System works:

- 1. The commander unit sends instructions to the remote groups to fire a series of monitor preflashes to determine the exposure level.** The camera's i-TTL metering sensor reads the preflashes from all the remote groups and takes a reading of the ambient light.
- 2. The camera tells the commander unit the proper exposure readings for each group of remote Speedlights.** When the shutter is released, the commander, via pulse modulation, relays the information to each group of remote Speedlights.
- 3. The remote units fire at the output specified by the camera's i-TTL meter, and the shutter closes.**

All of these calculations happen in a fraction of a second, as soon as you press the shutter-release button. It almost appears to the naked eye as if the flash just fires once. There is little lag-time waiting for the camera and the Speedlights to do the calculations.

Light Modifiers

When you set up a photographic shot, you are building a scene using light. For some images, you may want a hard light that is very directional; for others, a soft, diffused light works well. Light modifiers allow you to control the light so you can direct it where you need it, give it the quality the image calls for, and even add color or texture to the image. There are many kinds of diffusers, but the following are the most common:

- ▶ **Umbrella.** The photographic umbrella is used to soften the light. You can either aim the light source through the umbrella or bounce the light from the inside of the umbrella, depending



6.9 A Nikon Speedlight with an umbrella.

on the type of umbrella you have. Umbrellas are very portable and make a great addition to any Speedlight setup.

- ▶ **Softbox.** These also soften the light and come in a variety of sizes, from huge 8-foot softboxes to small 6-inch versions that fit right over your Speedlight mounted on the camera.



6.10 A medium-sized softbox.

► **Reflector.** These are probably the handiest modifiers you can have. You can use them to reflect natural light onto your subject or to bounce light from your Speedlight onto the subject, making it softer. Some can act as diffusion material to soften direct sunlight. They come in a variety of sizes from 2 to 6 feet and fold up into a small, portable size. I recommend that every photographer have a small reflector in his or her camera bag.



6.11 A small reflector being used to bounce light from a Speedlight.

Working with the Live View and Video Modes

Live View and high-definition (HD) video are standard on all of Nikon's current dSLRs. When the D5000 was introduced, the video settings were pretty much fully automatic, except for the autofocus, which was fully manual and video was only 720p. When the D5100 was released, its video capabilities were upgraded to a full 1080p HD, and it also gained autofocus, but the most important part was still missing — manual settings to control video recording.

Enter the D5200. Finally, Nikon has added a Manual video mode (M), which previously was only available on higher-end cameras. Nikon has also added a built-in stereo microphone (something even the flagship D4 doesn't have), which is a first for all of its dSLRs. As a result, the D5200 is much more viable for use as a dedicated HD video camera than any of its predecessors.



Using Live View mode, especially with the D5200 Vari-angle LCD monitor, you can get creative when composing angles.

Live View Mode

Live View mode (**Lv**) is simply a live feed of what is being projected through the lens and onto the sensor. This live feed can also be used to produce a video. To enter Live View mode (**Lv**), flip the Live View switch (**Lv**) to activate it. The Live View switch (**Lv**) is located next to the Mode dial. To shoot still photos simply half-press the shutter-release button as you normally would to focus when using the viewfinder and fully press the button to take the picture. To record video, press the movie-record button, which is located just behind and to the left of the shutter-release button.

When you use Live View mode (**Lv**), shooting stills and videos is very similar. Although each feature has some options that the other doesn't, I'm first going to cover the options they have in common.

Automatic Scene Selection

When Live View mode (**Lv**) is activated and you are using one of the two fully automatic exposure modes, Auto (**AUTO**) or Auto Flash off (**④**), the D5200 image processor is able to read the scene and automatically select the appropriate scene mode for you. The camera displays the automatically selected scene mode in the display with a small icon next to it to indicate that it's an auto scene selection. I admit, when I first read about this feature I was skeptical, but it works remarkably well. The following are the six auto scenes:

- ▶ **Portrait (PORTRAIT)**. This is selected when the camera detects a face in the scene. It's partial to human faces, but I've noticed it will pick out my dog's once in a while.
- ▶ **Landscape (LANDSCAPE)**. This is selected when the camera detects a far focus point, and an area that is bright across the top half of the frame (sky) and darker across the bottom half (land).
- ▶ **Close up (CLOSE UP)**. This mode is activated when the camera detects the focus distance is at about 12 inches or less.
- ▶ **Night Portrait (NIGHT PORTRAIT)**. This mode is activated when the camera detects a face in the scene and a dark background.
- ▶ **Auto (AUTO)**. This is the active mode when the camera detects a scene other than those listed, or if it cannot determine a scene setting.
- ▶ **Auto flash off (FLASH OFF)**. This mode is the same as the above except the flash is off.

Focus modes

The D5200 offers three focus modes when using Live View mode (**Lv**). These modes are a bit different, although similar in some ways to those you find when using the traditional, through-the-viewfinder shooting method. When in Live View mode (**Lv**), you change the focus mode by pressing the Info Edit button (**I**) to enter the Info edit menu. If the camera is on, but asleep, press the Info Edit button (**I**) twice to get to the Info edit menu. Use the multi-selector to navigate to the Focus mode option, and then press the OK button (**OK**). There are three modes: Single Servo AF (**AF-S**), Full-time Servo AF (**AF-F**), and Manual focus (**MF**). You can also slide the focus mode switch on the lens to Manual (if the lens features one).



7.1 The focus modes in the Info edit menu.

Single Servo AF

This mode is the same as using Single Servo AF (**AF-S**) when shooting stills traditionally with the viewfinder method. Press the multi-selector up (**▲**), down (**▼**), right (**►**), or left (**◀**) to move the focus point to your subject, and then press the shutter-release button halfway to focus. Fully press the shutter-release button when the scene is in focus and ready to shoot. Note that the D5200 takes a still photo in Single Servo AF mode (**AF-S**) even if the scene is out of focus when the shutter-release button is fully pressed.

You follow the same procedure for video, except that you press the movie-record button located just behind and to the left of the shutter-release button to start recording video. You can focus first, and then start recording; or you can start recording out of focus, and then press the shutter-release button halfway to focus in for a cinematic *pull focus* effect (this technique works a lot better in manual focus, however). Once the camera locks focus, it stays focused at that distance unless you press the shutter-release button again.

For still photography, I recommend using Single Servo AF mode (**AF-S**) for stationary subjects like portraits, still life, products, and landscapes. For video, you need to be sure that your subject isn't moving backward or forward by a large margin, especially if you're using a wide aperture for shallow depth of field. Even the slightest change in distance can cause the subject to go out of focus. This setting is good for doing interviews or shooting scenes where there is not much subject movement.

Full-time Servo AF

Full-time Servo AF mode (**AFF**) allows the camera to focus continuously, similar to when the shutter-release button is pressed halfway in Continuous Servo AF mode (**AFC**).

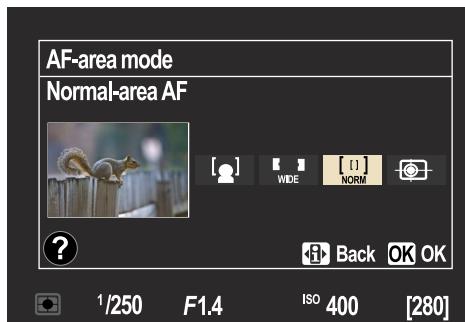
When using Full-time Servo AF mode (**AFF**) while recording video, you should be aware that the camera often hunts for focus, especially if you are moving or panning the camera. This can cause the video to go in and out of focus during your filming, which can cause your videos to look unprofessional (although some mockumentary videos use this for effect).

The Autofocus modes, and the Single Servo AF (**AF-S**) and Full-time Servo AF (**AF-F**) modes, operate in conjunction with the AF-area modes, which are covered in the next section.

AF-area modes

To make the Live View mode (**Lv**) focusing quicker and easier, Nikon gives you different options for AF-area modes. The AF-area modes are different from the traditional through-the-viewfinder shooting AF-area modes. When in Live View mode (**Lv**), you change the focus modes by pressing the Info Edit button (**Fn**) to enter the Info edit menu. If the camera is on, but asleep, press the Info Edit button again to enter the Info Edit menu. Use the multi-selector to navigate to the AF-area mode option, and then press the OK button (**OK**).

The following options are found here:



7.2 The AF-area modes in the Info edit menu.

- ▶ **Face-priority AF mode (▣).** Use this mode for shooting portraits or snapshots of the family. You can choose the focus point, but the camera uses face recognition to focus on the face rather than something in the foreground or background. This can really be an asset when shooting in a busy environment, such as when a lot of distracting elements are in the background. When the camera detects a face in the frame, a double yellow border is displayed around the autofocus area. If the D5200 detects more than one face (the camera can read up to 35 faces),

then it chooses the closest face as the focus point. You can use the multi-selector to choose a different face if you desire. When you use Face-priority AF mode (■) to shoot group shots, I suggest using an aperture of f/5.6 or smaller to ensure greater depth of field to get all the faces in focus.

- ▶ **Wide-area AF mode (□)**. This mode makes the area where the camera determines focus from about four times the size of the Normal-area AF mode (□). This is good when you don't need to be very critical about the point of focus in your image. For example, when shooting a far-off landscape, you really only need to focus on the horizon line. This is a good general mode for everyday use. You can move the autofocus area anywhere within the image frame.

TIP When using the Face-priority AF (■), Normal-area AF (□), or Wide-area AF (□) modes in Live View mode (Lv), press the OK button (OK) to quickly return the autofocus area to the center of the frame.

- ▶ **Normal-area AF mode (□)**. This mode has a smaller autofocus point than Wide-area AF mode (□), and you use it when you need to achieve focus on a very specific or precise area within the frame. This is the preferred mode when shooting with a tripod, or when shooting macros, still life, or portraits that require a more precise focus than Face-priority AF mode (■) provides (generally, portraits are focused on the eye closest to the camera).
- ▶ **Subject-tracking AF (⊕)**. This is an interesting feature, especially when used in conjunction with video. Use the multi-selector to position the autofocus area over the top of the main subject in the image. Focus on the subject, and then press the OK button (OK) to start tracking the subject. The autofocus area follows the subject as it moves around within the frame. Be aware, however, that this feature works best with slow to moderately paced subjects that stand out from the background. When using Subject-tracking AF mode (⊕) with very fast-moving subjects, the camera tends to lose the subject and lock onto something of a similar color and brightness within the frame. This mode also becomes less effective as the amount of light decreases. To disable subject tracking, simply press the OK button (OK). This resets the autofocus area to the center. To reactivate Subject-tracking AF mode (⊕), press the OK button (OK) again.

NOTE All AF-area modes are disabled when you set the camera or lens to Manual focus (MF), or when you attach a manual focus or non AF-S lens to the D5200.

Using Live View mode

As you may already know, the image from the lens is projected to the viewfinder via a mirror that is in front of the sensor. There's a semitransparent area in the mirror that acts as a beam splitter, which the camera uses for its normal phase-detection autofocus. For Live View mode (**Lv**) to work, the mirror must be flipped up, which makes phase-detection autofocus unusable, so the camera uses contrast detection directly from the sensor to determine focus. This makes focusing in Live View mode (**Lv**) a bit slower than focusing normally. In addition, when you're shooting stills, the mirror must flip down and back up, which takes some extra time. This makes Live View mode (**Lv**) a more challenging option to use when shooting moving subjects or events such as sports, where timing is the key element in capturing an image successfully.

That being said, Live View mode (**Lv**) is ideal when shooting in a controlled environment or studio setting, especially when using a tripod. You can move the focus area anywhere within the frame; you're not limited to the tightly packed 39-point autofocus array. Using Live View mode (**Lv**) also allows you to achieve sharper images when doing long exposures because the mirror is already raised, eliminating any chance of mirror slap, which can sometimes cause images to blur slightly when shooting exposures longer than 1/2 second.

TIP Keep in mind that if you hold the camera at arm's length when it's in Live View mode (**Lv**), you increase the risk of blurry images due to added camera shake. Keep your elbows close to your sides for added stability.

Shooting still photographs in Live View mode (**Lv**) is very simple. Simply pull the Live View Selector switch to activate Live View mode (**Lv**) and you're ready to shoot. Use the multi-selector up (**▲**), down (**▼**), right (**►**), or left (**◀**) to position the focus point. When in Single Servo AF mode (**AF-S**), press the shutter-release button halfway to focus; in Full-time Servo AF mode (**AF-F**), wait until the camera achieves focus, and then fully press the shutter-release button to take the picture. To shoot video, follow the same procedure, except when you want to start filming, press the Movie record button.

NOTE When using Full-time Servo AF mode (**AF-F**), pressing the shutter-release button causes the camera to refocus before actually taking the photo.

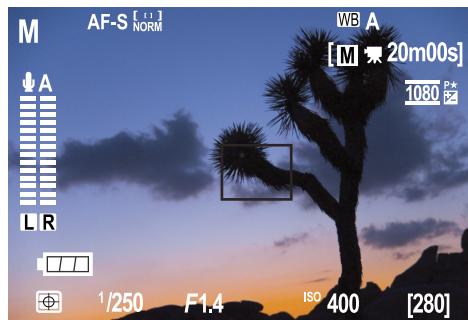
CAUTION When filming video, fully depressing the shutter-release button ends video recording and causes the D5200 to shoot a still frame.

When in Live View mode (**Lv**), the following buttons on top of the camera behave a little differently than they do when in the default viewfinder shooting mode:

- ▶ **Live View mode switch (**Lv**)**. A quick pull of this switch, located next to the mode dial, flips up the mirror and activates Live View mode (**Lv**).
- ▶ **Exposure compensation (**Z**)/Aperture (**⊕**) button**. Press this button and rotate the Command dial to adjust the aperture setting when in Manual mode (**M**). It adjusts the exposure compensation when in the Programmed auto (**P**), Shutter-priority auto (**S**), or Aperture-priority auto (**A**) modes.
- ▶ **Movie record button**. This button's only function is to start recording video when it's pressed and to stop when it's pressed a second time. Simple. It's located just behind and to the left of the shutter-release button.
- ▶ **Info button (**Info**)**. Pressing this button cycles through a number of options for viewing the information laid over the Live View feed on the LCD monitor. These are the Live View/Movie Recording Display options, and they are:
 - **Show photo indicators**. As the name suggests, this is the information you need to see when using Live View mode (**Lv**) to shoot still photos (see Figure 7.3).
 - **Show movie indicators**. This information display, shown in Figure 7.4, shows settings relevant to filming video. This viewing option also has the 16:9 aspect ratio in clear view with the rest of the frame grayed out so you can accurately frame your videos to the correct aspect before you press the Movie record button.



7.3 The Show photo indicators option.



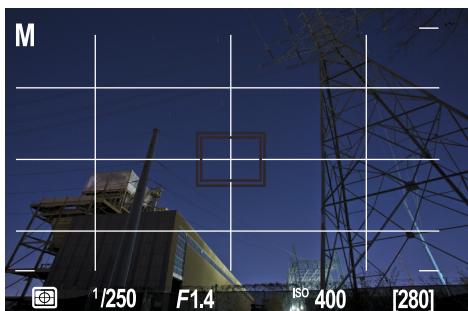
7.4 The Show movie indicators option.

NOTE When the camera is set to record video at 640×424 , the grayed-out crop area isn't shown as the aspect ratio is 3:2 like a standard photo.

NOTE When the camera is set to record at 60 fps, it uses a smaller central crop area of the sensor.

- **Hide indicators.** This option hides all of the extraneous settings indicators in the frame and gives you a clear view so you can frame your shot without distractions. The shooting info is still displayed on the bottom. There are small brackets visible for use in lining up the shot to a 16:9 aspect ratio.
- **Framing grid.** This is similar to the Hide indicators option with the addition of a grid, which is helpful for keeping lines or horizons straight in your compositions, or helping to compose with the Rule of Thirds.

Although you can shoot stills or video when the camera is in any of the Live View/Movie Recording Display options, I recommend setting the display option for your intended recording. For example, set it to Show photo indicators for shooting stills and set it to Show movie indicators for filming video. This may seem like a no-brainer, but it's definitely a good habit to get into.



7.5 The Framing grid option displays the same information found in the Hide indicators option with the addition of a grid to aid in composition.

The buttons on the back of the camera also have some features when using Live View mode (**Lv**). Here are the options:

- ▶ **Playback button (■).** Press this button to review your images or videos. Press it again to return to Live View mode (**Lv**).
- ▶ **Menu button (MENU).** Press this button to access the menu system. Not all options are available. Press the Menu button (**MENU**) again to return to Live View mode (**Lv**).
- ▶ **Zoom in button (Q).** Press this button to zoom in on your focus point to check focus.

- ▶ **Thumbnail/Zoom out button (Q).** Press this button to zoom out when you're back to the standard framing; the shooting info bar reappears at the bottom of the screen.
- ▶ **Info edit button (I).** A single press of this button brings up the Info edit menu. Press the Info edit button ($\text{Fn} + \text{credit2}$) again to return to Live View mode (Lv).
- ▶ **AE-L/AF-L button (AE-L).** This button functions as assigned in Custom Setting menu (C) f2 when you press it.

Why Shoot Video with a dSLR?

A short time ago, video in dSLRs was considered by many photographers to be a gimmick — a marketing tactic to get people to buy dSLRs, not only to take pictures, but also to shoot home videos just like a compact camera. However, as the technology has advanced, dSLR videography has become a viable form of filming, not only for family events but also for television shows and even feature-length films meant for the big screen. This is because smaller dSLR cameras have features that outweigh some advantages of a dedicated video camera. Here are some of the major advantages:

- ▶ **Price.** dSLR cameras are much cheaper than a mid- to pro-level HD video camera.
- ▶ **Image quality.** The larger CMOS sensors also allow the camera to record video with less noise at high sensitivities than most consumer video cameras can.
- ▶ **Interchangeable lenses.** You can use almost every Nikon lens on the D5200. Additionally, while some HD video cameras take Nikon lenses, you need an expensive adapter, and you lose some resolution and the ability to get a very shallow depth of field.
- ▶ **Depth of field.** You can get a much shallower depth of field with dSLRs than you can with standard video cameras when using a lens with a fast aperture, such as a 50mm f/1.4. Most video cameras have sensors that are much smaller than the sensor of the D5200, which gives them a much deeper depth of field. A shallow depth of field gives videos a more professional, cinematic look.

Shooting and Editing Video

Using the video feature on the D5200 is quite simple: pull the Live View mode switch (**LV**), focus, and then press the Movie record button. Okay, hold your horses there, Scorsese. Before you hit that Record button, you need to set up the camera.

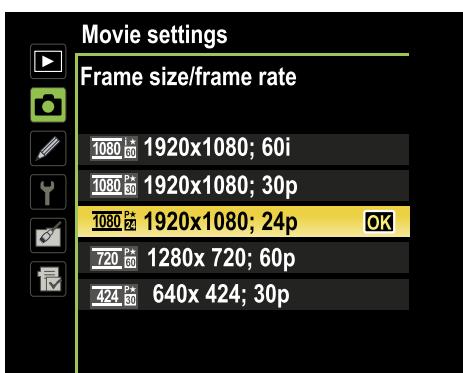
First, press the Menu button (**MENU**) to enter the menu system. Use the multi-selector to navigate to the Shooting menu (**CAMERA**), press the OK button (**OK**), and then navigate down to the Movie settings option. This is the very last menu item. Press the OK button (**OK**) and you're faced with the following options:

► **Frame size/frame rate.** Choose the image size based on your intended output and preferred frame rate (covered later in this chapter). You have the following choices:

- 1920 × 1080; 60i ($\frac{1080}{60}^i/\frac{1080}{60}$)
- 1920 × 1080; 30p ($\frac{1080}{60}^{**}/\frac{1080}{60}^p$)
- 1920 × 1080; 24p ($\frac{1080}{60}^{**}/\frac{1080}{60}^p$)
- 1280 × 720; 60p ($\frac{720}{60}^{**}/\frac{720}{60}^p$)
- 640 × 424; 30p ($\frac{424}{60}^{**}/\frac{424}{60}^p$)



7.6 The Live View mode switch and Movie record button.



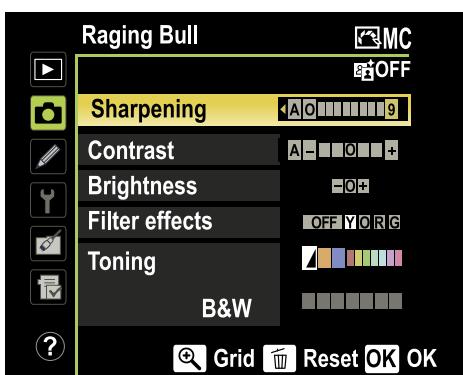
7.7 The Frame size/frame rate screen.

- ▶ **Movie quality.** You have two choices: High and Normal. The difference comes down to bit rate. At higher bit rates, more information is being recorded, resulting in better color rendition and dynamic range; of course, higher bit rates also mean more data and larger file sizes. Keep in mind that High-quality movie clips are limited to 20 minutes and Normal quality clips can be up to 29 minutes and 59 seconds. Again, your choice comes down to your intended output. For the web, Normal quality is fine; for viewing on HDTVs, stick with High-quality. Notice that when the quality is set to High, a small star appears in the Frame size/frame rate icon.
- ▶ **Microphone.** The three microphone settings are Auto sensitivity, Manual sensitivity, and Microphone off. Auto works for most general filming, but for a more consistent sound in a controlled environment, you can set the microphone sensitivity manually. You can monitor the levels when filming. When recording sound to an external source, you may want to turn the microphone off. Most professional filmmakers prefer to record the audio to a separate file using a dedicated sound recording system for higher audio quality. The video and sound files are later synced up in postproduction.
- ▶ **Manual movie settings.** When this option is set to the default (which is Off) the camera completely controls the shutter speed and ISO setting, no matter what the settings say in the info display. Set this to On if you want to set the shutter speed and ISO manually when in Manual exposure mode (M).

CAUTION When you set the Manual movie settings to On, it disables Auto ISO (**AUTO**) for video.

Now that the Movie settings are taken care of, you should set the following options:

- ▶ **Picture Control.** As it does with your still images, the D5200 applies Picture Control settings to your movie. You can also create and use Custom Picture Controls that fit your specific application.



7.8 My Raging Bull Picture Control settings.

One of my favorites is a Custom Picture Control that I created called Raging Bull; it uses the Monochrome Picture Control (MC) with added contrast and the yellow filter option. This gives me a black-and-white scene that's reminiscent of the Martin Scorsese film of the same name. Before you start recording your video, decide which Picture Control you want to use for your movie.

► **Exposure mode.** If you set the Manual movie settings to On, this is a very important setting. The exposure mode you select determines whether you or the camera will be choosing the settings. Select one of the following options:

- **Programmed auto (P) and Shutter-priority auto (S) modes.** These modes let the camera make all the exposure choices for you. When you press the Live View button (LV), the camera sets the shutter speed, aperture, and ISO sensitivity. While you're filming, if the lighting changes, the camera adjusts the exposure by adjusting the ISO sensitivity. If the scene becomes too bright, the shutter speed is raised to keep a good exposure unless you lock the exposure by pressing the AE-L/AF-L button (AE-L). The only control you have over the exposure is that you can adjust the Exposure compensation (EV).
- **Aperture-priority auto mode (A).** This mode allows you a little more control. You can set the aperture to control the depth of field, but the camera automatically controls the shutter speed and the ISO sensitivity. You can also use Exposure compensation (EV) to brighten or darken the image.
- **Manual mode (M).** If you're serious about video, you should be using this exposure mode. This mode lets you control the exposure by adjusting the aperture, shutter speed, and ISO setting yourself. It takes a little more time to set up, but this allows you to control not only the depth of field but also the amount of noise and the shutter speed effect if you want.



7.9 Still photo taken using the Raging Bull Picture Control settings. Exposure: ISO 3200, f/1.4, 1/60 second with a 500mm f/1.4.

Shutter Speed

In filmmaking, there's a concept called the 180-degree shutter rule. Without getting into why it has this name, the 180-degree shutter rule states that your shutter speed should be about twice your frame rate for natural-looking images. So, for 1080p at 24 fps ($\frac{1080\text{P}}{24}$ / $\frac{1080\text{P}}{24}$), you should use a shutter speed of 1/50 second; for 1080p at 30 fps ($\frac{1080\text{P}}{30}$ / $\frac{1080\text{P}}{30}$), use a speed of 1/60 second; and at 1080i at 60 fps ($\frac{1080\text{i}}{60}$ / $\frac{1080\text{i}}{60}$) and 720p at 60 fps ($\frac{720\text{P}}{60}$ / $\frac{720\text{P}}{60}$), shoot at 1/125 second. This gives the video just enough blur to make it look natural to human eyes.

Slower shutter speeds give the video a smeared appearance, although the D5200 avoids this by not allowing you to set the shutter speed slower than the frame rate.

On the opposite end of the spectrum, faster shutter speeds can cause the video to appear slightly jerky. This is because just as when shooting a still image the action is frozen (remember, videos are just stills played in succession), and as the subject moves through the frame, there is no motion blur to make it look more natural to the eyes. Of course, you can use the jerky, fast shutter speed as an effect as well. Movies such as *Saving Private Ryan*, *300*, and *Gladiator* used this effect in the action scenes.

CAUTION When shooting using Manual exposure (**M**), the aperture must be set before Live View mode (**Lv**) is activated.

TIP When shooting in Manual exposure mode (**M**), set the Function button (**Fn**) to ISO so you can adjust the ISO settings quickly.

Frame size and frame rate

The D5200 offers a few different options for recording video. There are two size settings for HD video with three frame rate options, and one option for shooting smaller videos that are destined directly for the web or e-mail. The high definition (HD) video sizes are 1920 × 1080 and 1280 × 720. The small size is 640 × 424. When discussing video frame size, it is usually referred to by the height number (1080 or 720) because of the way the image is progressively recorded (from top to bottom), but more on that later.

The 1080 video size has more resolution and therefore holds more detail and has less noise in low light. Most professionals prefer to shoot in 1080 and downsize later if necessary. There are, however, some reasons for shooting in 720. For example, the file sizes are smaller and, if you're only shooting videos to post to YouTube or Vimeo or some other online source, you don't really need the higher resolution. If you plan to make DVDs to show on an HDTV, then the extra resolution of 1080p is going to make quite a difference in quality. So, it boils down to your intended output. If you're just planning on e-mailing to friends or just want to shoot a small-size file to be viewed on a laptop or mobile phone you can use the smallest option of 640 × 424.

An important part of video capture is *frame rate*. This is the rate at which the still images are recorded, and it is expressed in terms of frames per second (fps). At the end of the resolution number (1080 or 720), there is another number in subscript (24, 25, 30, 50, or 60). This subscript number is the frame rate. Video capture involves recording still images, linking them together, and then playing them back one after another in sequence. This allows the still images to appear as if they're moving. Most video cameras capture video at 30 or 60 fps. A rate of 30 fps is generally considered the best for smooth-looking video. Shooting at 24 fps is the minimum rate required to fool the human eye into seeing seamless motion. This is the frame rate that film-based motion pictures use, so 24 fps gives HD video a cinema-like quality.

The frame rate you select is dependent on a few different factors. Most seasoned videographers prefer 30 fps for the smooth video look and the way that it portrays motion more naturally. Some videographers like to use 60 fps as well. This frame rate is generally used when shooting fast action or doing many quick pans as the faster minimum shutter speed allows the camera to eliminate artifacts, such as *skew*, which can occur when doing a fast pan. When shooting fast action, such as sports, most videographers recommend 60 fps. Shooting at 60 fps is also a way in which videographers can create smooth slow motion by slowing the 60 fps footage down to 30 fps and using it with the regular footage that was shot at 30 fps.

Some filmmakers who started out using film and have recently transitioned to HDSLR video prefer the 24 fps film look. This is also the preferred frame rate if the footage is going to be intercut with footage that was digitized from actual film stock.

You may also have noticed a little subscript *p* or *i* near the icon. If you're familiar with HD, you've probably heard the terms *progressive* and *interlaced*. Your D5200 has an HDMI (High-Definition Multimedia Interface) output setting, which you can find in the Setup menu (¶). Here, you can choose between progressive and interlaced resolutions. *Interlaced* video scans every other line that makes up the picture, although the

picture appears as if it is being displayed all at once. *Progressive scanning* displays single lines of the image from top to bottom. As with interlaced technology, all of this happens too fast for the human eye to detect the separate changes, and so everything appears to happen all at once.

You may be wondering why all of the options are 1080p, 720p, or 424p except for one — the 1080i at 60 fps. This option creates manageable file sizes that are roughly the same as 1080p. Because the camera records every other line, it only records a real 30 fps.

In-camera video editing

You can make simple edits to your videos in-camera. However, for more serious edits, you should consider third-party software, such as iMovie for Mac, or Adobe Premiere Elements for Mac or PC. These are affordable, entry-level editing programs. As you progress, though, you may need to step up to more powerful programs, such as Final Cut Pro from Apple or Adobe Premiere Pro. In-camera, you have three options: choose the Start frame, choose the End frame, and grab a still image from the video. Each edit you make is saved as a new file, so there's no need to worry about making any permanent changes to your original file. To edit a video, follow these steps:

- 1. Press the Menu button (**MENU**) and use the multi-selector to select the Retouch menu (**[■]**). You can also press the Playback button (**[■]**), select the video, and then press the Retouch button (**[■]**).**
- 2. Select Edit Movie, and then press the OK button (**OK**) or the multi-selector right (**▶**) to view the menu options. You can also press the Retouch button (**[■]**) from the Playback screen to display the options.**
- 3. Choose the type of edit that you want to make, and then press the OK button (**OK**) or the multi-selector right (**▶**). The options are Choose start point, Choose end point, or Save selected frame. A menu appears with all videos that are saved to the current memory card (when the movie is selected directly from the Playback screen, this option doesn't appear).**
- 4. Use the multi-selector to scroll through the available videos until the one you want is highlighted in yellow, and then press the OK button (**OK**).**
- 5. Press the OK button (**OK**) to begin playback, and then press the multi-selector up (**▲**) at the point in the video where you want to make the edit. You can press the multi-selector down (**▼**) to stop playback, and multi-selector left (**◀**) or right (**▶**) to go back or forward in the video clip.**

6. **Press the multi-selector up (▲) to make the edit.** I prefer to pause the movie by pressing the multi-selector down (▼) so I can be absolutely sure it is where I want the edit to be. I then make the edit and the movie saves automatically.

TIP When playing back a movie file, you can use the Command dial to jump ahead in 10-second increments. If the clip is less than 10 seconds long, it jumps to the end of the clip.

Real-world Applications

The key to capturing great images is to know which settings to use to achieve the desired results, although having a good eye doesn't hurt, either. The D5200 has scene modes to capture most subjects you will likely encounter. However, this chapter is intended to guide you away from relying too much on the camera.

In this chapter, I cover how you can make decisions based on the how and why of the settings, as well as some new techniques that allow *you* to take the photograph — not the camera. Yes, there are times when it may be convenient to let the camera take over one, or even all of the settings. However, understanding what the camera is doing, even though you are setting it to Automatic, is the key to becoming a photographer rather than a picture-taker.



Exposure, composition, camera setting, and equipment choice are all factors in creating an image. The key is to know how to put it all together and make it work in any situation.

Abstract Photography

Many people, especially nonphotographers, assume that digital photography is an art form that presents subjects as they are because the camera can capture a perfect likeness of just about anything. While this can be true, photography is also one of the *most* abstract forms of art. Photography is about taking a three-dimensional object and portraying it effectively using only two dimensions.

If the concept alone isn't abstract enough, there are many tools a photographer can use to portray a subject in an even more abstract way. Using things like ultrawide-angle lenses, shallow depth of field, and long exposures, a photographer can stretch the limits of reality visually.

There are two distinct types of abstract photography: *Objective* and *nonobjective*. Objective abstract photography takes a subject and depicts it in an unorthodox way. The subject is generally recognizable, but takes on a strange or unique look to it, perhaps warping it in space by using perspective distortion or stretching it out in time by using a long exposure. Nonobjective abstract photography takes a subject and renders it unrecognizable. Breaking the subject down to its base elements, such as lines, forms, colors, or textures, can make photographic abstractions.

Equipment

The great thing about abstract photography is that you can do it with just about any type of gear. You don't need any special lenses, lighting equipment, or accessories; your kit lens works great if that's all you have.

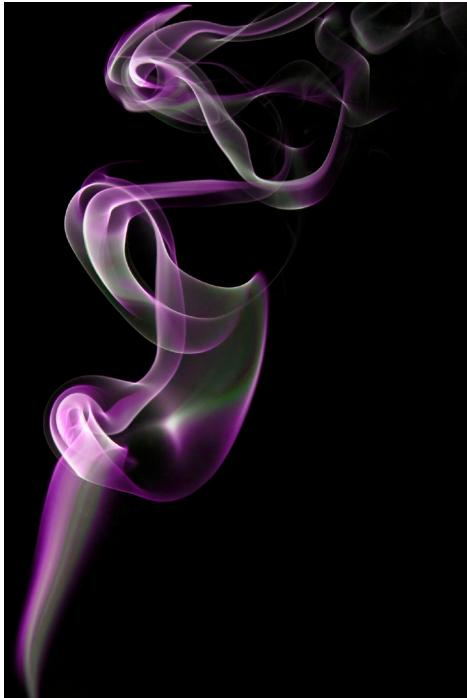
Lensbaby

If there ever was a lens designed specifically for abstract photography, I'd have to say the Lensbaby is it. Originally, the Lensbaby was a simple, flexible tube with a single glass element and round, drop-in discs with different-sized openings that acted as apertures. It was a *selective focus* lens that created a soft, dreamlike effect with a small area that was usually *almost* in focus (the focus was controlled by tilting, pushing, and pulling the tube with your fingers).

Since its early (and very simple) beginnings, Lensbaby has evolved to include many types of lenses, but they're all designed to add an interesting (if not abstract) effect to any images you shoot with them.



8.1 Here, I focused on shattered glass and used an extremely shallow depth of field. This allowed the background lights to go completely out of focus, creating great patterns and textures. Exposure: ISO 200, f/1.4, 1/125 second using a 50mm f/1.4G.



8.2 For this photo, I used a Speedlight to illuminate the smoke from a burning stick of incense. The colors were added in Photoshop using Hue/Saturation. Exposure: ISO 500, f/16, 1/1000 second using a 105mm f/2.8G VR.

That being said, you can also use special lenses, like macros or close-up filters, to get extreme close-ups to highlight texture, wide-angle lenses to distort the subject, and Speedlights with color filters to add chromatic effects.

One very important piece of equipment for abstract photography is inside the camera. You can use different settings to create abstract effects. For example, you can change the white balance, use Exposure Compensation (setFlash) to purposely under- or overexpose your images, or use the Slow-sync (flash slow) or Rear-curtain sync (flash rear) flash modes.

Technique

There's no clear-cut technique on what it takes to make an abstract image. What I do is keep an eye open for interesting lines, bold bright colors, textures, and patterns either singly or in combinations of one or all of those aspects.

Try shooting subjects from odd or different angles to get a different perspective. For example, you can shoot close up with a wide-angle lens to distort and accentuate lines, or to isolate a single aspect of a larger subject. Using a wide aperture for a shallow depth of field is also a good way to add abstractness to your photographs. You can also use compression from telephoto lenses as an effect for abstract imagery. Using a macro lens is a great way to highlight the texture or a single interesting aspect of a subject rather than the whole subject itself.



8.3 For this abstract shot, I used the fin of a '57 Chevy Bel Air against the sky to create an image based on line and form. Exposure: ISO 100, f/5.0, 1/500 second using a 28mm f/2.8G.

Action and Sports Photography

Action and sports is a very fun and often exciting pastime that many photographers enjoy. The D5200's expanded feature set, such as the 39-point Multi-CAM with improved 3-D tracking and speedy, 5 frames-per-second rate in Continuous high-speed shooting mode (■H), can help you capture action in the heat of the moment.

What draws people to action and sports photography is the way that a photograph captures a split second in time in a way that the human eye cannot. A photograph takes an action that happens in a fraction of a second and freezes it forever, allowing the viewer to examine the motion and action in minute detail.

Action photography doesn't necessarily encompass only sporting events. Action scenes can include just about any subject — just ask any parent — capturing a photo of a toddler is more akin to action than portrait photography.



8.4 Using Shutter-priority auto mode and a fast shutter speed of 1/1250 second, I was able to freeze the motion of this BMXer doing an invert. Exposure: ISO 100, f/3.5, 1/1250 second using a 10-24mm f/3.5-5.6G.



8.5 I caught this shot by positioning myself in a place where I could photograph the action. Exposure: ISO 220, f/4.0, 1/800 second using an 80-200mm f/2.8D AF-S.

Equipment

Action and sports photography often requires special equipment. Generally, if you shoot any type of organized sporting event, you need a telephoto lens to zoom in to the scene because you won't likely be permitted on the field with the players. Even when photographing from the sidelines of a football or soccer match, you need a longer lens to get close to the action.

Not only is a long lens essential for most sports photographers, it's also best if you have a fast one. Most serious sports photographers use a telephoto zoom lens with an aperture of f/2.8. A fast lens is imperative to shoot basketball, indoor hockey, or football at night. When shooting in bright sunlight you may be able to utilize a slower zoom lens like the Nikon 55-200mm f/4-5.6, but even on cloudy days you may be stretching the limits of your camera settings.

When shooting individual sports, like skateboarding, BMX, or sometimes motocross, you can use a wide-angle lens if you can coordinate with the athlete. When using a wide-angle lens to shoot sports, extra care must be taken because in order to get a dramatic shot, you often have to get very close to the action.

Finally, another good, if not almost essential, piece of equipment for most sports photographers is the *monopod*. The monopod reduces camera shake by providing support for the camera and lens, but doesn't restrict movement like a tripod can.

Technique

It may seem odd, but shooting sports and action requires some diametrically opposed skill sets because there are completely different ways of shooting action depending on how you want to portray the motion. When using the techniques I covered previously, you're either very far away and need to use a telephoto lens to get close to the action, or you get close to the action and use a wide-angle lens to create an image with more impact by using the lens distortion to accentuate the action. It's rare to find sports photographers using a midrange zoom.

The second set of techniques involve shutter speed. There are two ways you can show motion and, as I mentioned earlier, they are diametrically opposed. The most common (and probably the easiest) way is to use a fast shutter speed to freeze the action. Generally, you would use a shutter speed of 1/500 second or faster to catch most mid-to-fast-paced subjects.

TIP You can use a Nikon SC-28 or SC-29 TTL Remote Cord to use a Speedlight off-camera. This creates more dramatic lighting for action shots, while retaining full Through-the-Lens (TTL) metering for easy exposure.

The second way to portray speed in an action photograph is to slow the shutter speed down and introduce motion blur into the image. You can do this in several ways. You can keep the camera stationary and let the subject move through the frame, which will cause it to blur. You can also use a technique known as *panning*, in which you move the camera along with the subject to capture it in sharp focus and cause the background to blur. Panning is one of the most common techniques used by professional sports photographers. In theory, it's a relatively simple concept, but it takes a bit of practice. I also find that if you don't practice panning frequently, you lose the skill for it.



8.6 I used a Nikon SC-28 TTL cord to hold an off-camera, SB-900 Speedlight and add dramatic light to this skater's front-side grind. Exposure: ISO 400, f/16, 1/200 second using a 10-24mm f/3.5-5.6G.

As I mentioned earlier, the fast frame rate of the D5200 is good for firing off rapid shots, but the real key to action and sports photography is anticipating when to shoot. Each sport has a rhythm, and every motion has its peak. Catching the peak of the action is the deciding factor of whether you get an okay or exceptional action shot. Being familiar with the sport is, obviously, helpful; but if you aren't, take a few minutes to stand back and watch the action before jumping in and trying to shoot.

Another key to getting *the* shot is to know where the action is going to take place. This doesn't require being psychic — it's really just common sense. For example, 90 percent of the action during a basketball game is going to be at the hoop; for baseball,

if you have a runner at third there's a good chance there will be a play at home plate. Sometimes, action may occur in more than one place. In those situations, you must make a judgment call; for example, you can get great action shots of sprinters coming off the starting block or breaking the tape at the finish line.

Concert Photography

This is quickly becoming one of the most popular types of photography. It seems everyone wants the chance to capture the iconic image of his or her favorite band or performer. Concert photography can also be very technically challenging and demanding, for both the photographer and the equipment.

Concert photography is generally done in little to no light. When there is light, it is often sporadic — blinking, flashing, strobe, and moving lights are common. When you couple the low light with performers that often move quickly and/or erratically, you have the recipe for a demanding shoot.



8.7 One of the keys to getting a good concert shot is to make sure that the microphone isn't obscuring the singer's face. If he's playing an instrument, try to include the whole thing, as I did with this shot of Ed Sheeran at Stubb's BBQ in Austin, Texas. Exposure: ISO 200, f/2.8, 1/160 second using a 17-55mm f/2.8G at 55mm.

Of course, some photographers really like the challenge involved in capturing the right moment, and doing so against all odds; I'm one of these. There's something magical when everything comes together perfectly — that brief moment when the light hits a performer exactly as he strikes a pose and you hit the shutter-release button, capturing that optimal moment forever. Every concert photographer wants to catch her own version of Jimi Hendrix and his flaming guitar, Johnny Cash defiantly flipping the bird, or Elvis's trademark sneer.



8.8 Keep an eye out for interesting happenings during the show, like this shot of Justin Bieber being lowered to the stage with an enormous wing prop. Exposure: ISO 800, f/4.0, 1/200 second using an 80-200mm f/2.8D AF-S at 80mm.

Gaining Access

One of the most common questions I'm asked is how to gain access to photograph famous bands. There really isn't an easy answer; it's mostly hard work and partly luck. You can't start out photographing the Rolling Stones. The best place to start is the local music scene. Start out shooting local acts in bars and small venues and build up a portfolio. Find a local magazine or website to shoot for. Make friends with other established concert photographers in your city and on the web. Many (but not all) are happy to give some friendly advice.

Making contacts is important in this business because some people may not be able to shoot an assignment and will refer the photo editor to other photographers. This is *exactly* how I did it. I shot live music for the better part of a decade and a half before I received any assignments from *Rolling Stone* or *SPIN*. Perseverance and patience are key, and you have to *love* what you do.

Equipment

One of the most important pieces of equipment for concert photography is a camera that has good low-light capabilities. Although the D5200 is not the best camera for this type of photography, it is definitely very capable, as shown by the images in this chapter.

The other most important piece of equipment is a fast f/2.8 standard wide to short telephoto zoom lens. My lens of choice is the Nikon 17-55mm f/2.8G, but Sigma, Tamron, and Tokina also make fast zoom lenses in this range. Having a fast telephoto zoom is also nice, but usually, this is not an absolute requirement. A fast, ultrawide-angle lens is also an asset, but not a necessity.

Many folks on Internet forums swear that a fast prime lens is the best way to go, but in my experience, I've found that the compositional limitations of prime lenses usually outweigh the benefits of the extra stop or two that you gain. There are a few venues where I know the lighting is so bad, I *need* that extra light; however, this is the exception rather than the rule.

That being said, if you can't afford a fast f/2.8 zoom lens, an inexpensive, fast prime lens, like the Nikon 35mm f/1.8, may be the best option for you. The bottom line is that for most concert photography, you're going to find that the kit lens isn't practical and a wider lens gets better results. With a wider lens, you can compose loosely and crop in to get a good composition, rather than be stuck with a composition that is too tight from the onset. In fact, assuming that you're close enough to the performer, if you have to choose between a 50mm f/1.8 or 35mm f/1.8, the 35mm would be the better option.

Technique

The last thing you want when shooting a concert is to hear the first chords of a song and realize that your camera isn't ready to shoot. Always make sure your camera is set up and ready to go *before* the band starts. Before I even step foot in a venue, my camera is set to the following:

- ▶ **Spot metering mode (□).** Because the most important part of the scene is your focus point, setting the camera to meter from this point ensures the focus point is properly exposed. Outdoors during the day, I use Matrix metering mode (■). In ample, consistent lighting or outdoors when the sun has just gone down, I use the Center-weighted metering mode (○).
- ▶ **Single-point AF (□).** With all the flashing lights and movement, you can't trust the camera's autofocus system to make the right choice. You must actively decide where to place the focus point while shooting.
- ▶ **Continuous Servo AF (AF-C).** Rarely does a performer stand still during a show. This setting ensures that the camera is focusing constantly with every move.



8

8.9 Sometimes, you won't be able to get close to the performer, so you'll need an extra-long lens, like the one I used to get this shot of Diana Ross at ACL Live in Austin, Texas. Check with the venue beforehand so you know what to bring. Exposure: ISO 3200, f/4.0, 1/2500 second using a 300mm f/4D AF-S and monopod.

- ▶ **Manual mode (M).** Depending on the lighting and how much the performers are moving, I usually start with 1/125 second at f/2.8 and go from there. During fast numbers, 1/125 second is usually enough to freeze the action. If there is little movement, you can slow the shutter speed; if it's a punk or metal band, you may need to speed it up to avoid blur.
- ▶ **Auto ISO (AUTO).** This feature is so well implemented, I always use it unless I'm shooting in the daytime. For the D5200, I set the ISO limit to 3200.

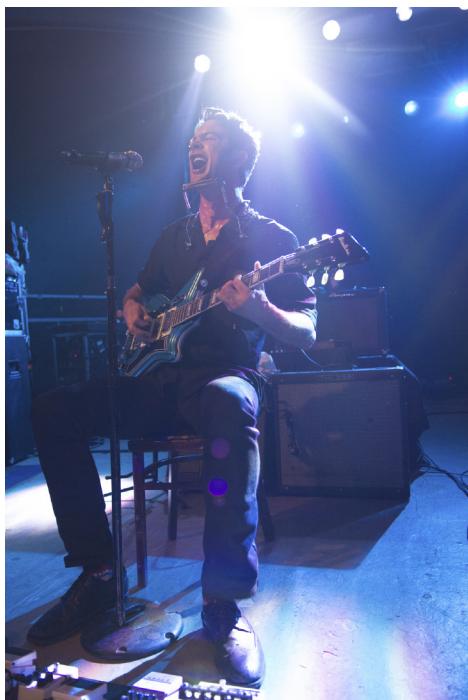
Another important thing to consider is composition. Many photographers aren't musicians and, as such, may not realize that what works for composing everyday shooting situations isn't always going to work when composing musicians. For example, many photographers compose shots of performers as if they were shooting a portrait: close-up shots that fill the frame with the head and torso. This can be great for a lead singer, but framing a guitar player in this fashion breaks another portrait rule — *do not sever limbs*. Severing a limb means that you cut the arm, hand, leg, or foot awkwardly out of the image. This includes chopping off the guitar headstock — it is an extension of the player and is just as important as an arm to the composition (not to mention that you can't sell photos to a guitar company or magazine if the brand isn't recognizable).

Using Flash

As a rule, flash photography isn't allowed when shooting more popular, touring bands at large venues. However, you can often use it in the bar and club scene. I don't recommend going with this method, but if you must, use a slower shutter speed or Slow sync flash mode ( SLOW) to capture some ambient light and bounce the flash to avoid that direct flash look.

Use the flash sparingly if you do decide to use it. As a professional musician and photographer, I understand why flash isn't appreciated. It's blinding and very distracting. Yes, I have asked photographers to stop using flash while I was performing.

Shooting concerts and live music is similar to shooting action and sports. Your subject is routinely moving and there's a general rhythm to the event. Getting the right shot is very dependent on timing. Fortunately, most music is based on timing. Very often musicians make very predictable movements when they are in a groove. This is especially true of drummers (who are the most often overlooked musicians). Guitar, bass, and keyboard players are a little less predictable, but they are still very rhythmic. Lead singers are often the most erratic, but also the most fun to shoot. As with sports, stop shooting for a second, listen to the beat, and watch the movements. It only takes about 5 seconds to get a good grasp on what kind of movement is happening. Listening for rising crescendos can also help you anticipate some kind of action.



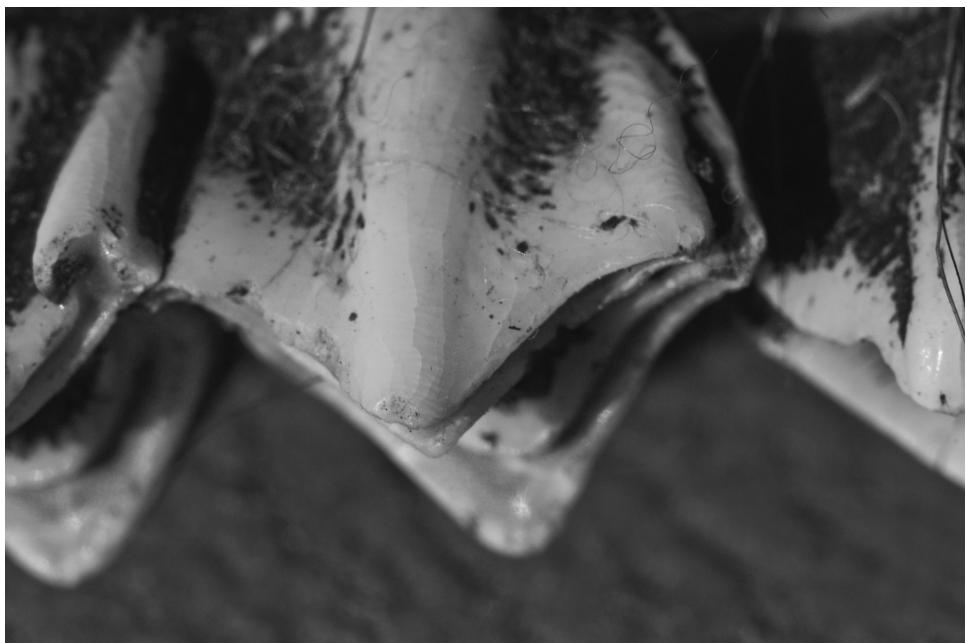
8.10 Timing is crucial in concert photography. Try to catch the performer in a moment of great action or expression, like this shot of G. Love and Special Sauce at Stubb's BBQ in Austin, Texas. Exposure: ISO 2800, f/2.8, 1/125 second using a 17-55mm f/2.8G at 17mm.

Macro Photography

Macro (or close-up) photography enables a photographer to show a world that can't be seen with the naked eye. Macro photography is almost an intimate view of some subjects. The photographer can give the viewer the ability to stare an insect directly in the eye on an almost personal level. It's also a great way to break a subject down into elemental parts and, instead of viewing it as a whole, you can inspect it in close detail.

Because most people don't get a chance to see subjects on this level, macro photography is extremely popular, not only with viewers, but also among photographers.

Macro photography relies on the ability to focus close enough on a subject that the image the lens projects onto the camera sensor is the same size as the subject. The relative size of the actual subject to the projected image is defined in terms of a ratio. For example, if your image size is the same as the subject size, you have a ratio of 1:1. Strictly speaking, the true definition of a macro image is one that has a ratio of 1:1 or better. These days, however, the marketing gurus at the camera and lens manufacturing companies have broadened the definition of macro lens to encompass any lens that allows you to get a ratio of 1:2, or even a little less.



8.11 I used a Manual focus, Pentax Macro-Takumar lens to get this extreme macro shot of the teeth on a deer skull. Exposure: ISO 400, f/16, 1/2500 second using a 50mm f/4.0.

Equipment

Technically, macro and close-up photography doesn't require a large amount of equipment, but it does require some specialized equipment, especially if you want to do it correctly. As I mentioned previously, some manufacturers market lenses as macro when they are actually close-focus lenses. Generally, these are telephoto or inexpensive, standard zooms that are mid-range in price. This is not meant to disparage these lenses — you can get some great images with them and some of them are actually more versatile than a dedicated macro lens. For example, one of my favorite lenses is the Sigma 17-70mm f/2.8-4 DC HSM OS Macro (quite a mouthful of a name). While the lens has the term *Macro* in the name, it only gets to about 1:2.7 (about 1/3 actual size). For close-up photography, this is good, and it also allows you the versatility of a wide-angle to telephoto range, which makes it a great all-around lens.

NOTE Nikon calls its macro lenses *micro* lenses.

If you are serious about getting true macro shots and want to capture the finest detail, the only option is a dedicated macro lens. Nikon's selection of micro lenses work perfectly with the D5200. Another less expensive option is an extension tube. Attaching this to a standard lens allows the lens to focus closer, thereby increasing magnification. To get into macro photography with the least investment, you can use a close-up filter, which acts as a magnifying glass for your existing lenses.

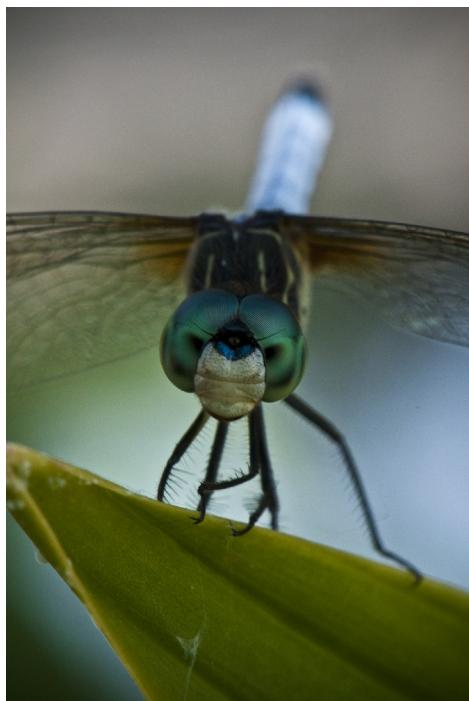
CROSS REF For more information on macro lenses and accessories, see Chapter 4.

One last option, which is less feasible on the D5200, is a *reversing ring*. A reversing ring screws into the front of the lens (where you would normally attach a filter) and allows you to attach the lens to the camera backwards, with the rear element facing outward. These can work well for macro photography, except, because there are no CPU contacts, all exposure calculations must be done by the photographer. Another drawback is that if you use a G lens (such as the kit lens), the aperture stops down completely, making the viewfinder very dim and difficult to focus. These work best with older lenses that have aperture rings. In the end, for the D5200, I find a reversing ring to be more time consuming and will likely prove to be extremely frustrating to anyone just starting out.

Once again, a tripod is one of the essential pieces of equipment for a macro photographer. If you're working with inanimate objects, there's really no reason *not* to use a tripod. When focusing up close, camera shake, as well as the subject, are magnified. The old 1 focal length rule doesn't apply, and getting sharp handheld images requires much faster shutter speeds. Combine these faster shutter speeds with the smaller apertures required to get enough depth of field and you can see why a tripod is necessary, even with additional light sources. Some macro lenses feature image stabilization, but even Nikon's excellent Vibration Reduction (VR) is less effective at higher magnifications.

Of course, using a tripod isn't always feasible, especially when photographing living creatures, such as insects. In this case, you may need to introduce more light into the scene by using a flash. When shooting close up, the built-in flash is all but useless because it is blocked by the close proximity of the lens to the subject. There are, however, a number of different flash systems you can use. The most convenient is what's known as *ring flash*. This flash mounts to the front of the camera lens and allows even, on-axis lighting. The Nikon R1C1 wireless flash works perfectly for close-up photography. The R1C1 can wirelessly control a number of flashes that attach to a bracket, which then mounts to the lens. However, this kit is rather expensive, so unless you are very serious about macro photography, you probably don't need it.

There are a number of inexpensive, bare-bones ring flashes available. I have a very cheap (around \$100) Phoenix 46N ring flash. It is manufactured in China, and I've seen it branded with other names, but it works with the Nikon iTTL (flash metering) system. For a little more



8.12 Getting sharp focus on the eyes is very important, even when shooting a bug portrait like this one of a blue dasher dragonfly. Exposure: ISO 1600, f/22, 1/100 second using a 105mm f/2.8G VR.

money, you can step up the quality and get a Metz 15 MS-1 Macro Ringlight or a Sigma EM-140 DG. These units are higher quality and also work with the Nikon iTTL flash system.

Instead of a ring flash, I often use one of the standard Nikon Speedlights, such as the SB-910, SB-700, or even the SB-400. I use a Nikon SC-28 TTL cable to get the Speedlight off-camera, and hold the Speedlight next to the front of the lens. This provides simple, on-axis macro lighting, with the additional benefit of more texture and contour because the lighting only comes from one direction.

Technique

Generally speaking, the most difficult aspect of macro photography is getting your entire subject in focus. The closer you focus on a subject, the less depth of field you have at any aperture, and it can be difficult to maintain focus. When your lens is less than an inch from the face of a bug, just breathing in is sometimes enough to lose focus on the area that you want to capture. For this reason, you usually want to use the smallest aperture you can (depending on the lighting situation) to get as much of the subject in focus as you can. I say “usually” because a shallow depth of field can also be very useful in bringing attention to a specific detail.

There are some problems with getting enough depth of field when doing macro photography, especially if you want to achieve the sharpest results. Generally, the smallest aperture that you can use is f/16. Most lenses stop down farther than that, but with apertures smaller than f/16, the images start to soften due to diffraction of light. Although for subjects at normal focus distance f/16 holds extremely deep depth of field, at close focus f/16 is still relatively shallow.



8.13 I held an off-camera Speedlight to the left side of the lens to illuminate this macro shot. The one-sided light provided more depth than a standard ring flash. Exposure: ISO 100, f/4.0, 1/200 second using a 60mm f/2.8G.

Manual Focus with Macro Photography

Although autofocus is a great help in most photography, there are times when it's beneficial to focus manually. Quite a few photographers swear that manual focus is the only way to do macro photography. Personally, I find that autofocus is a great benefit with macro photography, especially when trying to catch small, fleeting critters, but there are many instances where only manual focus will do.

When photographing up close, it's best to focus on the spot that you feel is the most important to the image (such as the eyes). When using autofocus, the best way to do this is to use a single point, but even then, you are relying on the auto-focus module, which may not always be exact. Simply switching to Manual focus (**MF**) and using your own eyes to determine if the point of focus is exact can be the best method to ensure that your image comes out exactly as you want.

Another option for inexpensive macro photography is a manual focus lens. Nikon has a few older MF micro lenses that are very sharp, and much less expensive than the newer, AF-S versions. You can also look into other options. I have an excellent Pentax M-42 screw-mount macro lens (Macro-Takumar 50mm f/4) that I found for next to nothing. With an inexpensive M-42-to-Nikon F-mount adapter that I purchased on eBay, I have a great macro setup that gives me a 4:1 ratio.

Don't overlook the benefits of taking control and focusing manually. After all, the camera is your tool; make it work *for* you, not against you.

When handholding for a macro shot, I recommend using Continuous Servo AF (**AFC**). This allows the camera to focus continuously on the autofocus point because even the smallest movements can shift focus. Point of focus is extremely important when doing macro photography. For example, when photographing an insect's face, if the point of focus is just a little bit off, the eyes will be out of focus but the area behind the subject will be sharp. As with any portrait (even those of nonhumans), the eyes should be sharp.

When shooting inanimate or nonmoving subjects (especially in the studio), I recommend using Single Servo AF (**AFS**) and, for even more accuracy, Live View mode (**Lv**).

Nature and Landscape Photography

Getting outside and shooting in nature is one of the things I like best about photography. Photographing in the outdoors affords you a lot of great photographic opportunity. There are so many different subjects out there just waiting for you to discover

them. Taking your camera into the wild on vacation is great fun, and gives you the opportunity to capture varying types of images, from vast, striking landscapes to flowers and foliage, as well as native wildlife.



8.14 This shot was taken near the pier in Hermosa Beach, California.
Exposure: ISO 100, f/11, 1/250 second using a 17-55mm f/2.8G at 55mm.

While going on a long, exotic photo safari adventure may be the ideal way to get some amazing nature photographs, the truth is you don't necessarily have to go any farther than your own backyard. Great landscapes may be found just a few miles down the road in a local park, or you can capture some exotic wildlife photos at the local zoo. You can also photograph the more common, but equally as interesting subjects native to your locale, like squirrels, birds, insects, or reptiles. Nature and landscapes are all around us. Even in the middle of a great metropolitan area like New York City, you have the ability to create nature photographs.

Equipment

The equipment used for nature and wildlife photography is as varied as the subject matter. Just about any type of lens can be employed, and there are many other accessories that may be helpful in some situations, but not in others. If you know what you intend to photograph, packing the right gear is much easier. Think about the type of photography on which you're likely to focus. If you're interested in shooting mostly landscapes, then a wide-angle lens and tripod are both necessary.



8.15 I used a long lens to photograph this squirrel in my backyard.
Exposure: ISO 400, f/2.8, 1/329 second using an 80-200mm f/2.8D AF-S at 200mm.

TIP If you go on an extended trip or long hike, try to pack lenses that can pull double duty, such as a 200mm macro. This lens can capture both distant wildlife and a close-up of a flower.

If you plan to photograph a lot of wildlife and birds, you need a long telephoto lens, a monopod, and possibly a teleconverter. If you shoot a wide variety of subjects, then you may want to get a good, all-in-one super-zoom, like the Nikon 18-300. It will have you covered for just about anything you might happen to come across.

CAUTION Don't forget to pack some protection for your camera in case you are caught in inclement weather. You can get two Optech rain sleeves for less than \$10. There's no reason not to have at least one of these in your bag at all times.

Technique

As with the equipment that you may need for nature and landscape photography, the techniques that you use will depend on the subject matter. A common theme in landscape and nature photography is to *take your time*. Stop what you're doing and really

look at your subject — not just through the viewfinder, but actually *look*. Don't get so caught up in the technical aspects that you don't take the time to enjoy your surroundings and the actual experience of being out in nature.

Here are a few more tips for shooting landscape and nature photos:

► **Shoot during the Golden Hour.**

The *Golden Hour* is immediately after sunrise or before sunset, when the sun is low in the sky. These are the perfect times of day to shoot just about any outdoor subject, from landscapes and flowers to wildlife. The light is soft and golden, and the shadows are long.

► **Experiment with backlighting.**

Backlight is a good way to add a different quality to your images. It can make plants glow and add cool lens flare to your landscapes. Backlighting is also essential if you want to create a silhouette.

► **Shoot smaller apertures for landscapes.**

When shooting landscapes you want to create a deep depth of field and capture the sharpest images you can. I recommended shooting in the *sweet spot* of your lens, which is usually between f/5.6 and f/11.

► **Shoot wider apertures for wildlife.** When photographing wildlife, using a wide aperture helps to separate the subject from the background. Most animals blend into their habitat, and a busy, sharp background makes it harder to separate the creature from its surroundings.



8.16 I shot this photo during the Golden Hour and used backlighting to add a glow to the plants. Exposure: ISO 100, f/1.4, 1/1600 second using a Sigma 35mm f/1.4 DG HSM.

TIP You can use the Silhouette scene mode () or create one manually by setting your D5200 to Spot metering mode (), and then metering on the brightest area in the scene. Lock the exposure by pressing the AE-L/AE-L button (), recompose, focus on your subject, and then press the shutter-release button.

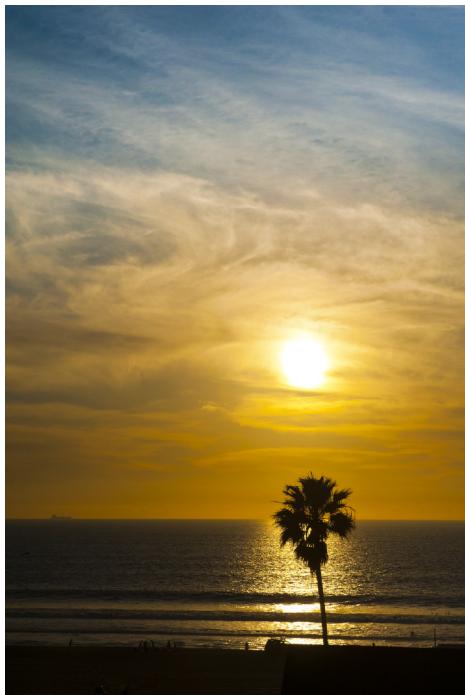
► **Try creative compositions.**

Shoot landscape images in portrait orientation and vice-versa. Most of my favorite landscape shots weren't taken in landscape orientation at all.

Night and Low-light Photography

Although successful photography depends on light, oddly enough, one of the best times to take photographs is when the sun dips below the horizon and the light gets low. Photographing at night and in low light affords the photographer an opportunity to adapt to different shooting conditions and use techniques that can't easily be replicated in bright light.

Just about any type of photography can be done at night or in low light, from land- and cityscapes to portraits, and more. The ultimate goal of low-light photography is to capture the delicate interplay between light and dark, highlight and shadow to create brightness where there is little illumination.



8.17 I composed this landscape image vertically to add a more interesting aspect. Don't be afraid to experiment. Exposure: ISO 100, f/2.8, 1/4000 second using a 28-70mm f/2.8D AF-S.

When confronted by darkness, the first thing most beginning photographers are tempted to do is pop up the flash to add some light to the scene. After all, that's what the flash is for, isn't it? Yes, but the problem is that flash kills any ambience that exists in a scene. It's best to use the flash sparingly; either increase the ISO settings or experiment with long exposures instead.



8.18 Not having a tripod handy, I used a wide aperture and higher ISO to capture this low-light image of Austin City Hall. Exposure: ISO 1100, f/1.8, 1/30 second using a 28mm f/1.8G.

Equipment

If you bought your D5200 with a kit lens, you already have a good piece of equipment for low-light photography. The 18-55mm Vibration Reduction (VR) lens (or the 18-105mm, if you went that route) is ideal for shooting in low light. Even though it doesn't have the fast aperture of a pro zoom, the Vibration Reduction (VR) lens allows you to handhold the camera at slower shutter speeds, so you can capture more of the ambient light without worrying about camera shake. Of course, Vibration Reduction only compensates for camera shake — it can't freeze moving subjects,

but sometimes that's a good thing. One cool effect is to have a sharp background with subtle blur in moving subjects within the images.



8.19 A little motion blur gave this night scene a sense of movement and made it more interesting. Exposure: ISO 450, f/1.4, 1/160 second using a Sigma 35mm f/1.4 DG HSM.

Of course, Vibration Reduction and handholding your camera only get you so far. I'd say the outside limit for handheld photography with a Vibration Reduction lens at a wide-angle setting is probably about 1/2 second, maybe a bit longer if you're *really* steady. To capture long exposures successfully, you need a decent tripod. The tripod holds the camera completely still so that you can capture enough light to make a good exposure without your picture being a blurry mess.

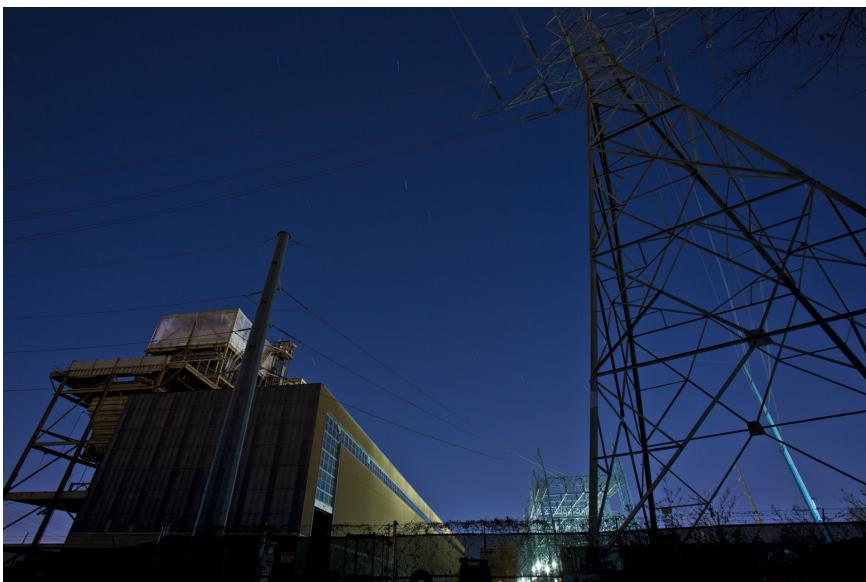
Another lens option for shooting in low light and at night is to use a fast lens with an aperture of at least f/2.8 or better. Ideally, the faster a lens is, the better, so if you can afford an f/1.4, you may want to invest in one if you like to shoot in low light. There are a number of options available; probably the best one for cost is the 35mm f/1.8G. It's about \$200 and has excellent image quality.

Choosing a Tripod

Tripods come in a great variety of sizes with many different features. You can get a small, lightweight one for about \$20, or you can spend a lot more (anywhere from \$300 to \$500) for a heavy-duty, carbon-fiber tripod with an optional fluid or ball head. For a small camera like the D5200, it's unnecessary to go overboard and buy the most expensive tripod, but I highly recommend buying a *good* one.

The \$20 tripods aren't very sturdy and tend to break, so you'll eventually have to replace it. Buying a good tripod is like investing in a good lens: you will use it for years and be glad that you spent the extra money. During my first few years as a photographer, I went the cheap route on tripods. When I finally spent the money for a good one (about \$350 altogether), I was kicking myself for not doing so earlier.

Another piece of equipment that I think is a real necessity for long exposures is a remote release. This allows you to trigger the shutter release without touching the camera and causing it to vibrate because even the slightest movement can cause a varying degree of blur in your image. The Nikon ML-L3 is an inexpensive wireless remote designed to work perfectly with the D5200, and it's very simple to operate.



8.20 I used a tripod and a Nikon ML-L3 wireless remote to get this super-long exposure of the defunct Holly Street Power Plant in Austin, Texas. Exposure: ISO 100, f/11, 5 minutes 15 seconds using a 10-24mm f/3.6-5.6G at 12mm.

Technique

The techniques for night and low-light exposures are quite simple: use a long shutter speed or crank up the ISO setting. While both of these are sound approaches, each comes with its own benefits and drawbacks. The most obvious solution is to increase the ISO setting until you get the exposure settings that are the best for your subject. This is usually the best way to go if your subject is moving, or you must handhold the camera for a specific reason (such as when you don't have a tripod handy).

In these situations, a great setting to use is Auto ISO (**AUTO**). Using this feature and setting the minimum shutter speed to *Auto* allows the camera to automatically keep the shutter speed fast enough to avoid camera shake at the given focal length. The only real downside to this is that you will see some increased noise and loss of resolution as the ISO sensitivity is increased. You can always do a bit of noise reduction in post-processing. I also find that reducing the image size also reduces the size of the noise structure, making it less noticeable. If you don't need the full 24MP size, you can resize the image and make it a little cleaner.

CAUTION Resizing an image isn't the same as cropping. Although both reduce the size of the image, dimension cropping doesn't reduce the size of the noise grain.

If you're going for a more artistic approach, you can try using longer shutter speeds. You can use longer shutter speeds while holding the camera, but most of your image is going to be blurry. This isn't always a bad thing — you can produce some cool effects if you handhold the camera during a long exposure. However, your results will be more consistent if you use a tripod. There are many advantages to using this method.

First of all, your camera is (obviously) going to be more stable on a tripod, allowing you to use much longer shutter speeds and get sharper images than you would if you handhold the camera. Second, in seeming contrast to the preceding statement, you can get sharper background images while allowing you to achieve motion blur in anything that is moving. Some cool examples of this would be a city scene in which you create blurs of people, trails from car headlights moving through sharp scenery, moving water, or stars traveling across the sky.

Longer shutter speeds capture more motion than shorter ones. It's a good idea to experiment with shutter speeds of varying lengths to see the different effects they can produce. For example, if you're shooting in a busy city and use a shutter speed that's too long, you won't capture people effectively because they move through the frame too quickly to be adequately recorded. At the opposite end of the spectrum, if you're photographing stars, a shutter speed that is too short won't allow sufficient time for them to move through the scene and leave a trail.

Generally, when doing this type of photography, I use Manual mode (**M**) and bracket my exposures. Bracketing allows me to get the exact exposure that I want and, if necessary, I can combine elements of different exposures. For my base exposure, I set the metering mode to Matrix (**ME**) and look at the light meter in the view-finder. I generally start my exposure settings where the meter says that it's 1 stop underexposed. I find that this is generally pretty close to the right exposure. I bracket five frames at 1-stop intervals from my base exposure. You can use smaller (1/3) or bracket more frames if you want more or less latitude in your exposures.



8.21 I shot this long-exposure of a string of lights handheld while twisting the camera, which resulted in this cool, spiraled blur.
Exposure: ISO 100, f/5.6, 2 seconds using a 10-24mm f/3.6-5.6G at 10mm.

TIP A smaller aperture not only increases your exposure time, but it also creates a starburst from points of light in the scene due to diffraction from the aperture blades. The smaller the aperture setting, the more pronounced the points of the starburst.

Portrait Photography

A portrait is simply an image that portrays the likeness of a person. While it's easy to define what a portrait is, it isn't always so easy to create a great one. What I mean by *great* is not necessarily that the model has perfect skin, there isn't a hair out of place, and the lighting and exposure are perfect. While all of these attributes can be contributing factors, they don't always create a *great* portrait.

A portrait, in addition to the primary function of simply showing what a person looks like, should ideally go a little deeper. A great portrait gives the viewer a glimpse of the essence of the subject. Of course, you can't capture the *complete* essence of a person in just a fraction of a second, but you can capture the essence of the person in *that* fraction of a second.

This is quite a bit of semantics because, although you can capture a very deep and emotional portrait of someone — whether that emotion is happiness, melancholy, anger, or indifference — you can only capture what the subject projects. As a photographer, though, you can also direct what emotion you want portrayed and a good model, like an actor, can convince the viewer that that emotion is real. Such is the dichotomy of the portrait; it should connect the viewer with the subject and project a sort of reality, but the reality is what you make it.

NOTE I'd like to draw a line of distinction between a subset of portrait photography — the headshot. While the headshot is, indeed, a portrait, the purpose is not to portray emotion on any deep level, but rather, to show a person's face in a generally pleasing manner.



8

8.22 I used an unmodified, off-camera Nikon SB-900 Speedlight connected with a Nikon SC-27 TTL cable to get this hard-light, film noir-type self-portrait. Exposure: ISO 400, f/1.4, 1/60 second using a 24mm f/1.4G.

Equipment

The D5200, as it turns out, is an ideal camera for portraiture. The high-resolution, 24MP sensor captures great detail. It also has a very impressive dynamic range for capturing subtle tones. But not only that, the small size of the camera makes it less intimidating for your models, especially if they aren't used to having a camera pointed at them. Another feature that makes the D5200 ideal for portraits is the Vari-angle articulated LCD monitor.

Decades ago, when medium-format film was the preferred medium for portraiture, most professional photographers used cameras equipped with what are known as *waist-level viewfinders*. Instead of holding the camera up to your eye to look through the viewfinder, you held it at or near waist level, and looked down at the viewfinder to compose the image. Photographers preferred this type of viewfinder because it allowed them to interact more easily with their subjects, thus putting them more at ease as opposed to having them looking down the barrel of a gun, so to speak. You can use the D5200's articulated LCD monitor in the same way. It really can make a difference, especially when working with children and inexperienced models.

Much of how portraiture is conveyed depends on lens choice. There are general guidelines that most people follow when selecting lenses for customary portraits. The general rule is use short to medium telephoto lenses. For a DX camera like the D5200, lenses with a focal length from about 50mm to 105mm are ideal. This is because wide-angle lenses create unflattering perspective distortion with facial structures, causing noses to appear too large, ears to appear too small, and just making faces appear all-around strange (there are situations in which you can use a wide-angle lens, which I cover shortly). Longer lenses tend to flatten the facial features, which is one reason that telephotos are recommended. However, a lens that is too long can flatten the facial features so much that your portraits might lack depth, not to mention the fact that you start gaining a lot of distance between yourself and the model, which can be a hindrance.

Wide-angle lenses are effective for portraits that show more of the background. These are known as *environmental portraits*. The key to making a wide-angle lens work with a portrait is to put some distance between you and the subject or to go all the way and make it look intentionally wacky. If you try to be in the middle, the portrait will just look odd, and not in a good way.



8.23 I used a fisheye lens to create this overly dramatic environmental portrait of artist Steven Sample. Exposure: ISO 100, f/5.6, 1/1600 second using a 10.5mm f/2.8D.

Most portrait photographers like to use prime lenses for their more compact size and sharpness. Luckily, Nikon has a plethora of prime lenses to choose from, and a few of them are very affordable. The 50mm f/1.8G is an inexpensive lens that is often used by photographers who are just getting started with portraiture. One of the best and sharpest lenses (although it's a bit more expensive than the 50mm f/1.8G) is the 85mm f/1.8G. Some photographers like to use the Nikon 105mm f/2.8G VR macro lens, which is my personal favorite for portraits. Its great focal length and near perfect image quality make this a great, if expensive, option. It also pulls double duty as a macro lens.

Technique

A whole book could be written about portrait techniques and, indeed, quite a few have been, so for simplicity's sake, I only touch on the basics here. In Chapter 6, I cover the *quality of light* — this plays a major role in portrait photography. Essentially, there are

two types of portraits: Hard-light and soft-light. For most practical purposes, soft light is preferred for portraits. It's smooth and generally flattering to just about any facial structure. People just tend to look good in soft light. Women, in general, almost always benefit from it. The downside of soft light is that it can lack the depth and drama that harder directional light can lend to a subject.

The following are some of the ways with which you can create a soft-light portrait:

- ▶ **Window light.** This is by far the easiest way to get great light for just about any subject. Window light has been (and is still) used by photojournalists and fashion photographers alike. Windows act as natural diffusers and filter the sunlight, turning it into pleasing, soft light. There's simply no easier way to get great portrait lighting than by sitting your model close to a window.
- ▶ **Bounce flash.** If you're stuck indoors and don't have access to a window, or if it's dark and there's no window light available, you can quickly achieve a decent soft light effect by using an external Speedlight, such as the Nikon SB-400 or SB-700. The key is not to aim the flash directly at your subject, but tilt or swivel the head, bouncing the light from the ceiling or an adjacent wall. Bouncing scatters the light, which softens and diffuses it.
- ▶ **Shade.** If you find yourself shooting portraits outside, you'll notice that the bright, overhead sun really isn't the optimum light source for portraits. Move



8.24 Using only the available light sometimes yields beautiful results. The mixed lighting in a bar created this colorful portrait of my friend Lindsay. Exposure: ISO 2800, f/1.4, 1/60 second using a 24mm f/1.4G.

your subject under the shade of a tree or porch overhang. You can also take advantage of the shade provided by clouds on a partly sunny or overcast day.

Soft light isn't always the best option for portraits. Sometimes, a more directional light source is necessary. This adds depth to a portrait, and it is often used to portray strength and character. Hard light accentuates lines and gives definition, whereas soft light plays down these attributes. Hard light is perfect for accentuating textures. Hard light is used more often on men than women because the definition it provides creates a more masculine effect.

Keep the following tips in mind when shooting hard-light portraits:

- ▶ **Use off-camera flash.** If you use a Speedlight off-camera with a TTL cable or the Nikon Creative Lighting System, it is much easier to get directional light. Of course, you can also use off-camera flash for soft light, but that requires modifiers such as umbrellas or softboxes. For hard light, you can use a Speedlight pointed directly at the subject with no diffusion. The farther away a light source is, the harder the light will be.
- ▶ **Use a dark background.** Hard-light portraits are high in contrast. A dark background creates a more distinct separation between the subject and background. This gives your portrait a stark, moody look.

CAUTION Pay extra-close attention to where shadows fall when shooting hard-light portraits. Errant shadows can ruin a portrait.



8.25 A soft-light portrait should retain some directionality of light, or it will lack depth and dimension. In this portrait, the light is coming from camera left. Exposure: ISO 100, f/2.8, 1/160 second using a 17-55mm f/2.8G at 48mm.

TIP Try converting your hard-light images to black and white for a more classic look.



8.26 This unconventional portrait was shot using the shade of a building to create soft light, and shows a great deal of model Rita Keller's character. Exposure: ISO 200, f/1.8, 1/500 second using a 28mm f/1.8G.

Still-life, Product, and Food Photography

The subjects of still-life, product, and food photography are similar in that they are all inanimate objects and relatively static. As a result, these subjects are easy to deal with, and knowing how to photograph them is a very good skill to develop. One difference about photographing this type of subject is that, as the photographer, you have almost complete control over the setup. For the most part, you can shoot at your leisure (although food usually photographs best when it's fresh). You can change the lighting, composition, and camera settings without being under pressure.

Some people may find shooting inanimate objects unimaginative or boring, but it can actually be as challenging as you want to make it. As with any other type of photography, you can use lens and lighting choice to portray a certain feeling. You can use the techniques covered in this section to create a version of an old masters style still life, photograph a well-prepared meal, or create professional-looking shots for online auctions.



8.27 I used an on-camera SB-600 Speedlight with the head swiveled 90 degrees to the side and aimed at a reflector to light this simple composition of a raccoon skull.

Exposure: ISO 200, f/11, 1/60 second using an 18-105mm f/3.5-5.6 at 105mm.

Equipment

The type of equipment you need changes depending on the scope of what you're doing. At the very least, a good midrange zoom (like the 18-55 kit lens) works, but a good macro lens (like the Nikon 40mm f/2.8G, 60mm f/2.8G or 85mm f/3.5GVR) is best. I tend to avoid wide-angle lenses because of the perspective distortion that occurs when I get close to the subject to fill the frame. If you have plenty of working distance, a telephoto lens is also a good choice.

I prefer to shoot most products using a tripod. This frees up my hands so I can move the subject or lights, or adjust the background without constantly picking up and putting down my camera.



8.28 Out-of-focus elements in the background give your shots a sense of place. Not all images should look as if they were done in a studio. Exposure: ISO 3600, f/2.8, 1/6000 second using a 17-55mm f/2.8G at 55mm.

Lights are also very handy to have — whether it's an inexpensive set of hot lights, a wireless Speedlight setup, or even studio strobes. Controlled lighting is a good way to give your images a professional look. Along with lights, another necessity is a reflector. This is probably the most essential piece of equipment that I can think of for this type of photography. A small reflector is inexpensive and folds up compactly (a 36-inch reflector folds down to roughly 13 inches). Reflectors can bounce flash, redirect continuous light to brighten shadows, and reflect available light onto the subject to brighten it.

Technique

There are three basic elements that are important for any still-life photograph: Background, composition, and lighting. All three elements must work together if the image is to be successful.

Selecting a background is one of the first things to do (after selecting the subject, of course). Usually, the best background is a simple one that allows the subject to stand out. Some options for backgrounds include seamless paper, poster board, cloth, and black velvet (often used when shooting jewelry to reduce reflections). The main option you're going to be looking at when choosing a background is the color. Two very simple choices are black or white. Either of these works well with almost any subject. Of course, you can use any color in the rainbow. A dark background gives you a *low-key* image, while using a white or light-colored background gives you a *high-key* image. High-key images tend to evoke a lighter feeling. A low-key image is dark with a lot of shadows and contrast. These images tend to be moody and evocative.



8.29 When using more than one recognizable element in an image, make sure that they complement each other. These two subjects create a retro vibe. Exposure: ISO 220, f/1.4, 1/60 second using a Sigma 35mm f/1.4 DG HSM.

TIP Use the D5200 High key (H) or Low key (L) Effects modes (**EFFECTS**) to shoot these types of scenes.

One thing to keep in mind when using colored backgrounds is it should add to, not subtract from, the image, or draw attention away from the subject. Using complementary colors to set off your subject is a great way to make the subject pop from the background, while using a background with a similar color can add a pleasing monochromatic theme.

Often when shooting still life rather than products, it's fun to build a scene or use props. Different scenarios could be using a cutting board and knife as a background for a shot with fruit, or a burlap sack with coffee beans for a shot depicting a cup of coffee. The key to building a background is to be sure your background props match your subject. You should also be careful not to add too many pieces to the background — you don't want it to draw attention away from the subject.

TIP The easiest way to light still life is with window lighting. This is the preferred method of many food photographers.

When considering lighting, I find that the best approach is to keep it simple — especially when you're just starting out. Even if you're using flash, try to make the lighting look natural. Window lighting is always an option, especially for food. However, some photographers like to take it a step further and move the dish to a more brightly lit, but relatively shaded, outside area to get a little more directionality. Using a reflector can sometimes help soften the edges if the shadows start to get too hard.



8.30 This tasty little cupcake was lit by nothing more than the light from my open kitchen door. Exposure: ISO 320, f/1.4, 1/320 second using a Sigma 35mm f/1.4 DG HSM.

CROSS REF See Chapter 6 for more information about calculating manual flash exposures.

When using flash, be it Speedlights or larger studio strobes, I usually modify it, usually by bouncing from a reflector or an umbrella. On location, I sometimes use whatever is on hand. I've used everything from a wall to a drink menu. Once you learn the basics of lighting a shot, you can start exploring other possibilities and more advanced techniques. However, you'll find that, about 80 percent of the time, a simple lighting setup goes a long way.



8.31 One light stand, one off-camera Speedlight, one umbrella, and a piece of poster board is all it takes to get studio-quality product images.



8.32 The finished product of the setup shown in Figure 8.31. Exposure: ISO 400, f/8, 1/200 second using a Nikon 18-105mm f/3.5-5.6 at 105mm.

Using Wireless Flash with the D5200

Unlike the D7100, the D5200 doesn't have the capability to perform the Advanced Wireless Lighting feature of the Nikon Creative Lighting system using the built-in flash. To get the full features of this function, you need at least two Speedlights: one to act as a Commander flash and one to act as a remote.

I have discovered a work-around that can be used effectively if you don't mind setting the flash manually, and a little trial and error with your exposures. Although the built-in flash of the D5200 can't do the pulse modulation that the Speedlights need to see to perform iTTL metering, the built-in flash can trigger other flashes with an optical sensor to fire wirelessly.

Nikon's flagship flashes all have an optical sensor built in, and can be used in SU-4 mode (SU-4 is the Nikon code word for optical sensor). The Nikon SB-800, SB-900, and SB-910 all feature SU-4 mode, and you can also use them on-camera with full functionality. This is the more expensive route, but you can get started if you can afford one good Speedlight. Nikon has a few older Speedlights designed for their film and early digital cameras that also have SU-4 mode: the SB-26, SB-50DX, and SB-80DX. These are less expensive than the newer models, and they can also be used on-camera with limited capabilities.

The key is to set the D5200 flash to Manual flash in the Custom Setting menu ( e1), and then set the output to the lowest setting of 1/32. This reduces the chance of exposure from the built-in flash on the subject. There's also a little gadget called the Nikon SG-3IR that slips into the hot shoe and dangles an infrared filter in front of the built-in flash to reduce actual flash exposure (however, these are in short supply). You *must* use Manual flash () because iTTL flash () emits pre-flashes for metering purposes, which trigger the remote flash before the shutter opens. This results in little or no flash on the subject while the exposure is made.

Viewing, Downloading, Managing, and Editing Images

The D5200 experience doesn't end once you're done photographing. For some photographers it's just the beginning of the image-making process. First off, you can play back the images right on the LCD monitor, or you can plug the camera into your television and view them as a slide show with your friends and family. Eventually you will need to transfer them from the camera to your computer.

Some folks are finished with their photos at this point. They may post them to the web or e-mail them just as they are right out of the camera. Other people like to add effects, tweak and modify the colors, fix blemishes, and more. You can make simple edits to your photos using software such as the Nikon View NX2 packaged with the D5200. There are also a great number of very good options for editing software.



Taking the photo is just the beginning of the photographic process.

Viewing Your Images

The D5200 offers two different ways to view your images: You can simply press the Playback button (▶) and view them directly on the LCD monitor, or you can connect the camera to a television and view your pictures on the screen. You can connect to an HDTV using the HDMI out port, or you can connect to the RCA inputs on a standard-definition TV with the EG-CP16 A/V cable supplied with the D5200. If your HDTV also has standard RCA inputs, you can connect it there as well, but the output will *not* be high definition.

To play back and review your images, press the Playback button (▶). This displays the current image. You can then use the multi-selector left (◀) and right (▶) to scroll through the images on the active memory card. Press the multi-selector up (▲) or down (▼) to display the photo information. How much information is displayed depends on the settings in the Playback menu (▶) → Playback display options.

TIP If you prefer, you can also use the Command dial to scroll through images in Playback.

You can also use the following buttons and options during playback:

- ▶ **Delete button (>Delete).** Press this button to display a confirmation dialog box asking if you want to delete the current image. Press the Delete button (>Delete) again to erase the photo permanently.
- ▶ **Retouch menu (>Edit).** Press the OK button (OK) to display the Retouch menu (Edit). You can use these options to retouch or edit your images, and save a copy to the memory card.
- ▶ **Protect button (Protect).** You may notice above the AE-L/AF-L button (AE-L/AF-L) there is a key icon. This is the Protect button (Protect). Press this button to mark an image as protected and prevent it from being deleted accidentally. Once the image is protected, simply press the button again to remove the protection status.

CAUTION Protecting an image may also lock the file and prevent you from making changes to it on some computers and software.

- ▶ **Zoom in button (Zoom in).** Press this button to zoom in on an image for a closer look to check for focus, sharpness, and so on. After you zoom in on an image, you can use the multi-selector to navigate to different areas of the image. If faces

are detected in the image, you can press the Info edit button (INFO) once, and then use the multi-selector to center on the face (or faces) in the scene. Rotate the Main Command dial to scroll through the other images on the memory card at the same magnification ratio.

- ▶ **Zoom out/Thumbnail button (Q).** In the default full-frame playback mode, press this button to switch to thumbnail playback, and display numerous thumbnails of the images. Press the Zoom out/Thumbnail button (Q) once to display four thumbnails, press it twice to display nine thumbnails, and press it three times to view 72 thumbnails. If you press the Zoom out/Thumbnail button (Q) a fourth time, a calendar appears in which you can select to view images taken on a particular date. When playback is in Thumbnail mode, you can use the multi-selector to highlight an image. You can then zoom in, delete, retouch, or protect the image. To exit Thumbnail view, press the Zoom in button (ZOOM) until the camera returns to full-frame playback.

As mentioned previously you can connect your D5200 straight to your TV. It functions exactly the same as it does in Playback mode when viewing on the camera's LCD monitor.

Being able to view your images and videos straight from the camera on your high-definition or standard television is a handy feature. You can set up a slide show to show all your friends the photos you shot that day, or you can edit your photos using the Retouch menu (■) straight from the camera while being able to view the images larger than life. If your HDTV is device control compatible (HDMI-CEC), you can also use your television's remote control to browse the images and camera menus. Isn't technology great?

This brings up an important issue regarding connecting your camera to an HDTV that is CEC compatible. When you connect the camera to a CEC-compatible HDTV, the camera will *only* function in Playback mode *unless* you go into the Setup menu (Y), select the HDMI option, and then select Device control and set it to Off.

NOTE If your HDTV is HDMI-CEC compatible, the camera displays CEC in place of the number of remaining frames.

When you turn the Device control option Off and connect the camera to an HDTV, you see exactly what normally appears on the camera's LCD monitor. The camera's LCD monitor also continues to display the images. To connect your D5200 to a high-definition device, you will need to purchase a Type C mini HDMI connector from Nikon or the nearest electronics store.

Follow these steps to attach the D5200 to your HDTV:

- 1. Turn the camera off.** This helps prevent static electricity from damaging your camera.
- 2. Open the connector cover.** The connector cover is on the left side of the camera when the lens is facing away from you.
- 3. Plug in the Type C mini-pin HDMI cable.** The cable is available separately from almost any electronics or camera store. Plug the cable into the HDMI out jack. This connection is clearly labeled, and located just below the USB port.
- 4. Connect the HDMI cable to the input jack of your HDTV.**
- 5. Set your HDTV to the HD in setting.** This may differ depending on your TV. See the owner's manual if you are unsure.
- 6. Turn on the camera, and then press the Playback button (▶).** Playback functions the same as if you were looking at the LCD monitor.

Downloading Your Images

While viewing your images on the LCD monitor is nice, and plugging the camera in and enjoying them in full high-resolution on your HDTV is even better, there's going to come a time when you're going to want to get those images into your computer and off of the memory card in the camera. Once they're downloaded to your computer, you can edit them, post them to your social media accounts, e-mail them to friends and family, print them, and so on.

You can approach the downloading process in any of the following ways:

- ▶ **Camera to computer.** Probably one of the easiest ways is to use the USB cable supplied with the D5200. Plug the smaller end (Type B mini) into the USB output port on the camera, and then plug the larger end (Type A) of the USB cable into your computer. While this may be the most convenient option, there are a couple of drawbacks. The transfer usually takes a long time and the process is energy intensive, so you need a charged battery. If the battery dies midtransfer, you run the risk of losing some (or all) of the images, or damaging the memory card and rendering it unusable.
- ▶ **Card reader.** A card reader is a device that accepts the memory card into it (just like the card fits into the camera) and connects to your computer usually via USB

port. Card readers transfer data at a much faster rate than the camera does, and the card reader doesn't require a power supply like the camera does. A lot of computers these days have SD memory card slots built right in. My MacBook Pro does, and it's such a handy feature not having to worry about whether I packed my reader or not. I have a collection of card readers because I've had to buy them numerous times while on location shooting or on vacation because I forgot to grab one. Of course, card readers are relatively inexpensive. Some readers transfer data faster than others, so if you're using a faster card, make sure your reader supports a fast transfer rate.

- ▶ **Eye-Fi.** The Eye-Fi is an SD card like any other, *but* it has Wi-Fi built in. This allows you to upload your images straight from your camera right to your computer's hard drive wirelessly. You can also transfer photos straight from the camera to your smartphone, so you can share *real* photos instead of low-quality camera-phone pics. The Eye-Fi cards have different features for different models. Check out the Eye-Fi site for more info.

File Management and Workflow

File management is a very important part of digital photography and an often overlooked one. One thing I can guarantee is that if you didn't have a good workflow system worked out before you got your D5200, you will realize after a few weeks that you *need* one. The 24MP sensor of the D5200 has a lot of information. The file sizes are huge. If you're shooting in RAW (as you should be), you will notice very quickly that you are using up more and more drive space faster and faster.

Because photography is my full-time job, I likely shoot more than most casual users do, so having a good system for managing my files is very important. The thing is, after you have been doing photography for a while, you'll find that you can't find the images you're looking for if you haven't developed a good file management and workflow plan. You start losing track of your files, and you wish you had a better system in place. The best thing to do is to get into the habit of a good workflow early and save yourself a headache in the end.

How do I know all of this? I went through this whole process. My original workflow consisted of making contact prints of my negatives and keeping the contact print with the negatives in the sleeves in three-ring binders. When I made the switch to digital I saved pretty much all of my files, even the unusable ones (after all, I didn't throw out negatives). I basically just dumped all of my images into folders with random names

that I'd come up with pertaining to the shoot. After a couple of years my hard drives were a complete mess. In short, get a good workflow started from the get-go. My workflow may not work perfectly for you, but in time you will develop your own system.

Folder structure

To download your images, you need a place to which you can download them. Many software options, such as Lightroom, Photoshop Elements, Windows Photo Gallery, or iPhoto, can help you with this. While most of these have ways to do this for you automatically, I prefer to download images directly to my hard drive manually so I can place them exactly where I want them. Because I put the files there manually, it helps me remember where they are. I shoot many types of things, so I have different hard drives for most job types. I rarely have any of my sessions stored on my main computer hard drive. Of course, this is unusual — you can use one drive, but you should *always* have at least one backup, preferably two.

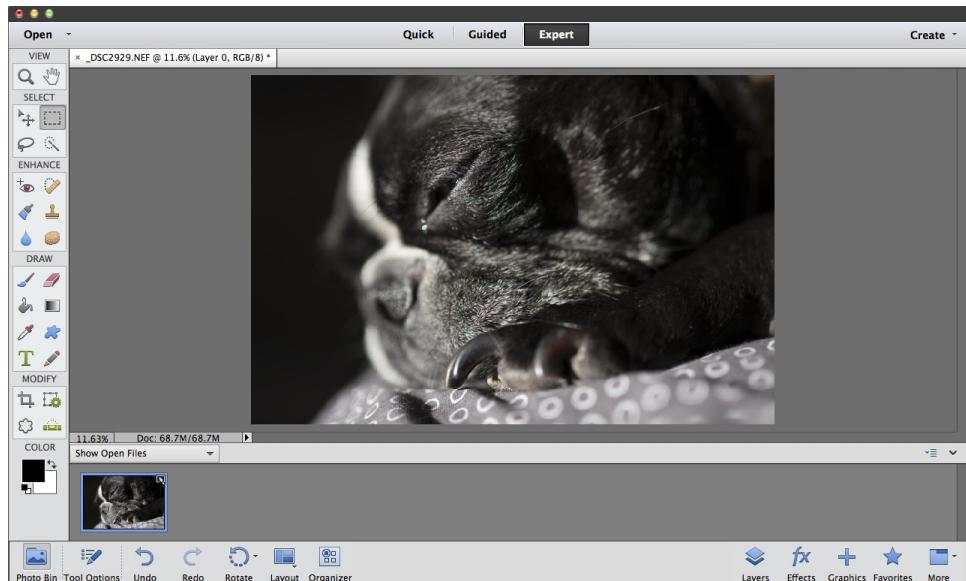
I have separate folders for each type of photography: Concert, Wedding, Event, Commercial, Personal, and so on. From there I go into subcategories. For concerts, I simply use the band name, and within that folder I create another with a date where I store the originals. If I shoot the band again I create a second folder with another date, and so on. For weddings, I use the couple's last names (Smith/Jones); for events, the name of the event. For personal work, I name the type of photography: Landscape, macro, portrait, and so on. If it's a trip, I make a folder with the destination name and so on. The key is to be specific, so you know exactly what you're looking for when you want it. For example, if I get a request for a photo of a Joshua tree I know that it will be in Travel → JoshuaTree. This may sound very complicated, but you can build folders as you go, and once you get the basic folder structure down, it's quick. After you have your folder system created, just drag and drop your images where you want them to download them to your computer or drive.

Editing

After the files are transferred, I do a quick edit. This is where you find the keepers and delete any of the unusable ones or duplicates. This is a very important process because it prevents your hard drive from filling up with terabytes of images that will never be used. Some programs you can use to browse through and look at images are Lightroom, Photoshop Elements, Windows Photo Gallery, or iPhoto. This is just a quick once-over to delete the images that are *obviously* unusable. Some of the criteria I look for are highly over- or underexposed images, images that are completely out of

focus, and images from a series for which I fired a number of similar shots (I pick the best one or two, and then trash the rest). All of these images should be immediately eliminated.

Don't throw away all of the images that you aren't attracted to straight away because you can always revisit them later, and you may see something in them that you didn't before, or maybe a different crop will make them work.



9.1 Adobe Photoshop Elements is a simple, yet powerful image-editing tool. It's perfect for both beginning and advanced photographers.

9

Filenames and metadata

Renaming your files is a very good idea because it gives every one of your files a unique name. Remember that the default filename that the camera assigns is finite in its numbering system; every 9999 images will have the same filename. There's no set way you should go about it, but I recommend using a system that keeps the filenames individual. My personal naming convention is a pretty simple one, the subject name, my initials, and numbers. For example, a musician would be TomWaits_JDT_001.NEF or a wedding might be SmithJones_JDT_001.NEF. There are no really hard and fast rules, but the filename should be indicative of what it is so that it is easier to pull up in a search.

One thing that I don't think a lot of beginning photographers use, or necessarily understand, is metadata. Metadata is simply data about data. The following types of metadata are all stored in a single file:

- ▶ **EXIF.** EXIF stands for Exchangeable Image File Format. This metadata is written and fixed at the time the file is created and can't be easily changed without special software. EXIF data contains the information about your camera, the make and model, serial number, the number of shutter releases, lens focal length and maximum aperture as well as the shooting data such as the exposure settings, metering mode, and more.
- ▶ **IPTC.** This is an important and underutilized metadata feature. IPTC stands for International Press Telecommunications Council. It is editable metadata that allows you to imbed captions, descriptions, keywords, copyright information, locations, GPS positioning, and more. I initially started using this when I began shooting for newspapers, online publications, magazines, and especially with my photo agency. Now I add IPTC data to all my images. It makes it easier to find in a search, both on your own computer and online. Keywords are especially helpful. I can shoot a landscape and tag it with a number of keywords, such as landscape, mountain, pine tree, river, Allegheny, Pennsylvania, and so on. If I (or a photo editor) need a specific image, say one with a pine tree in Pennsylvania, a quick search pulls up this image.
- ▶ **XMP.** This stands for Extensible Metadata Platform. These are also known as *sidecar* files because they "ride along" with files, and tell software and programs how to interpret some of the data. XMP is usually found with RAW files. This is what tells the RAW converter how to initially process the data. It contains information for exposure data, the white balance, proprietary noise reduction, and things of that nature.

Tonal Adjustments and Color Corrections

After you get the file management worked out, you can go thorough and select the images that you want to edit. Some people opt to edit images one at a time, and some do them in batches. I do them both ways depending on the scope of the assignment. If it's a concert or a wedding I generally take a more generalized approach and work in batches, and then go back and do individual tweaks.

I almost always shoot in RAW because rarely is an image perfect straight out of the camera. Images usually need minor adjustments, either to make them better or simply to get them to look the way that you want. It may just need a minor white balance adjustment, or maybe sweeping tonal adjustments to recover lost detail in the shadows or highlights.

I don't like to recommend one system over another; I like to use whatever is quickest and easiest for me. If I'm working on a large number of images at once, such as hundreds from a wedding, I prefer using Adobe Bridge CS6 to preview and select my images. I then open them all in Adobe Camera RAW and make my adjustments. I also retouch any spots, make any localized tonal corrections to specific spots, and then save them to the specified folder.

If I'm working with single images, I tend to use Adobe Lightroom 4 because it is a good tool for making simple corrections. It is one of the most powerful programs you can get at a relatively affordable price. Lightroom 4 is an all-in-one image organizer, photo editor, and RAW file converter. However, I find it rather slow and not very user-friendly for working on large amounts of images. The learning curve is also rather steep.



9.2 Adobe Lightroom 4 is a powerful tool for making image adjustments.

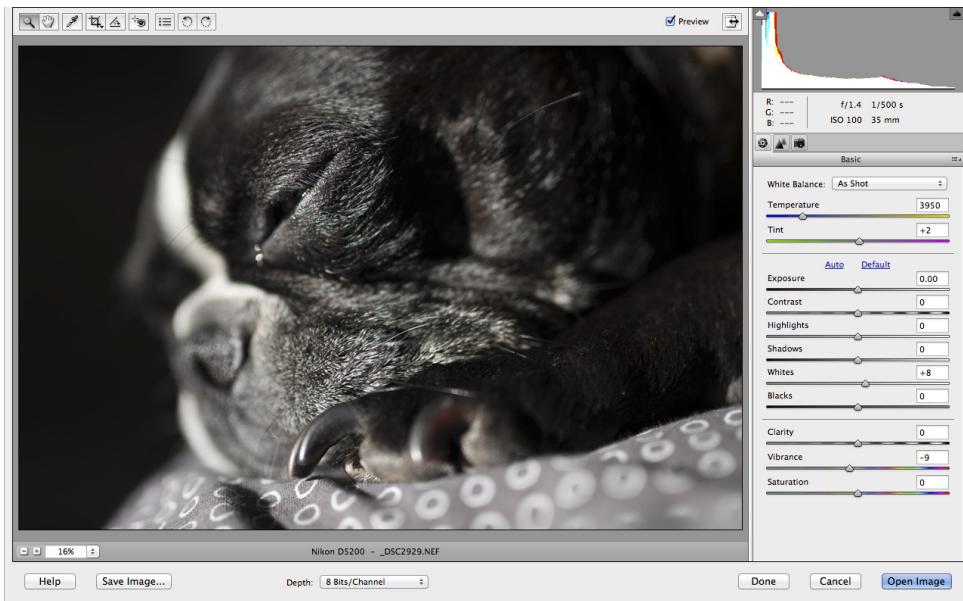
For simplicity, and the most features for the least amount of money, I recommend Adobe Photoshop Elements 11. This is two programs rolled into one: Elements 11 Organizer and Photoshop Elements Editor. The Organizer is a very intuitive, fast way to keep your images arranged. The Smart Events feature puts images in order based on the date they were shot, and the Places feature allows you to view images tagged with GPS information on a map.



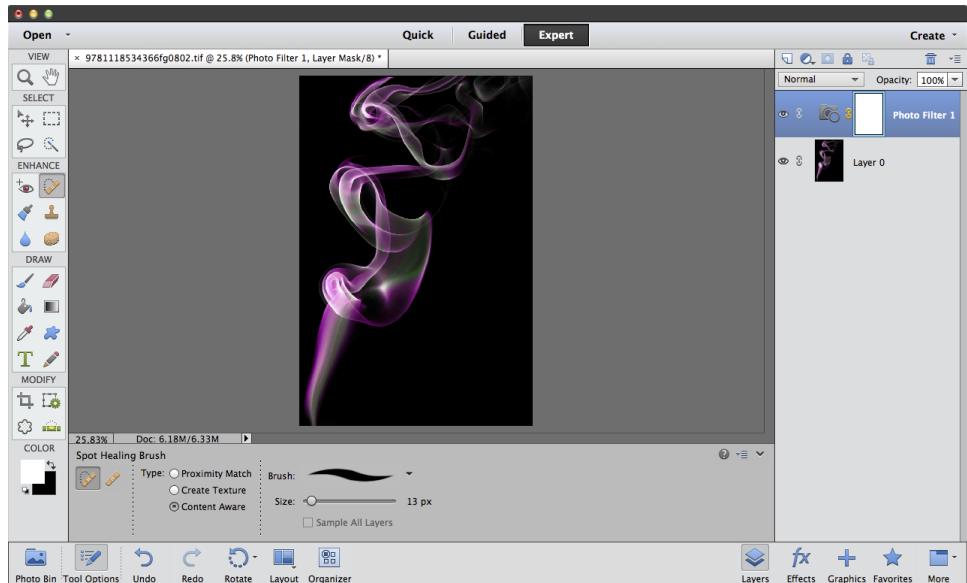
9.3 The Organizer in Adobe Photoshop Elements 11 helps you keep your images arranged logically.

The Editor has some of the same features that make Photoshop CS6 the de facto software for imaging professionals, but is much simpler to use. You can make tonal and color corrections, crop, retouch, and a whole lot more. This program features Adobe Camera RAW built right in so you can make all tonal and color adjustments to the RAW file, which ensures that you are making the most of the RAW data from the camera's imaging sensor.

There are many programs you can use to convert RAW files, including Nikon's View NX2, which is included with the D5200. View NX2 comes bundled with Nikon Transfer 2 to help you transfer your files from the D5200 to your computer. While some programs are more powerful than others, even the most basic RAW file converters, like View NX2, allow you to adjust color, white balance, and tonality.



9.4 Adobe Camera RAW is built in to Photoshop CS6 and Photoshop Elements Editor. The application launches automatically when you double-click the file to open it.



9.5 Adobe Photoshop Elements Editor allows you to do basic tonal and color corrections, as well as retouching.



9.6 The Nikon View NX2 software comes with your D5200. It allows you to do basic tonal and color corrections.

The first thing to do when making minor adjustments to your image is to assess the white balance. If it's good, leave it alone, but white balance usually needs a little tweak to get it just right. Add a bit of blue to cool the tone or amber to warm it up. The reason why white balance is the first thing you adjust is because changing the white balance affects the histogram, which can have an impact when you start doing tonal adjustments.

Next, you evaluate the exposure. You do this not only by taking a look at the image itself, but also, more importantly, the histogram. The histogram in the RAW editor is likely going to look different than it did on the LCD monitor because the preview on the LCD screen is based on the 8-bit JPEG, while the RAW file has a 14-bit histogram. The histogram will probably change in real time as you move the sliders, so pay close attention.

After analyzing the exposure and histogram, you can determine what (if anything) you should do to adjust it. Most of the time, an image requires a slight contrast boost. To do this, you adjust the Levels or Curves, or use the Exposure or Highlight recovery sliders, depending on what software you're using.

Next, I usually add a bit of saturation to make the image pop, maybe a tiny bit of sharpening or noise reduction, and then I save it to a separate Save folder to keep the adjusted file separate from the original.

This is just a simple method of image editing when you're just starting out. You can get very complex with editing your images. There are many different filters and borders that can be added (similar to the Instagram and Hipstamatic apps). There are effects and conversions you can do, such as black and white or sepia. The possibilities are almost limitless.

General Composition Tips

Photography, like painting, drawing, or just about any visual arts medium, has general rules of composition. These guidelines have been developed through the ages because, to put it simply, they work. That isn't to say that every time you put your eye up to the viewfinder, you should strictly adhere to all or even any of the so-called rules of composition; sometimes the subject calls for a different approach. However, when you're just starting out, it's good to pay attention to these tips because they will definitely help your images stand out from the general snapshots that many people capture with their phone cameras.

Eventually, following the guidelines will become second nature to you. It's important to know the rules of photography because, once you know them, it's easier to recognize when you should break them.

Keep It Simple

One of the easiest ways to create an interesting composition is to *keep it simple*. Having a strong subject that is easy to pick out and focus on holds the viewer's attention. Having a slew of competing elements in a composition causes it to be messy and distracting, which often leaves the viewer confused.

An easy technique for achieving simplicity in a photograph is to use a wide aperture and a shallow depth of field to isolate the subject from a busy background. By causing the background to go out of focus, you help the subject to stand out better.



AA.1 A simple, uncluttered image makes for a strong composition. Exposure: ISO 1000, f/4.0, 1/80 second using a Nikon 50mm f/1.4G.

Another easy way to isolate your subject is by changing your perspective. Shooting from up high or down low can completely change the background of the same subject; for example, instead of shooting down on a subject and including the ground in the composition, try shooting upward to use a plain blue sky as the background. Simplicity in an image can speak volumes. Try to concentrate on removing unnecessary elements to achieve simple photos with more visual impact.

The Rule of Thirds

Beginning photographers tend to place the subject in the middle of the composition. Although this approach seems to make sense, placing the subject off-center can make your images much more interesting — this is called the Rule of Thirds.

The Rule of Thirds is one of the best compositional guides, and artists throughout history have used it. It involves dividing the image into nine equal parts using two equally spaced horizontal and vertical lines, kind of like a tic-tac-toe pattern. You want to place the main subject of the image at or near the intersection of one of these lines. The D5200 has an option that displays a grid in the viewfinder. Although this grid isn't quite an exact setup for the Rule of Thirds, it's close. If you interlace the subject just inside the gridlines in the four corners of the viewfinder, you will be close to creating the Rule of Thirds. You can activate the grid view in Custom Setting Menu (MENU) d2.

When using the Rule of Thirds with a moving subject, you want to keep most of the frame in front of the subject to create the illusion that the subject has somewhere to go within the frame.



AA.2 Placing the main subject in accordance with the Rule of Thirds makes for a more interesting visual composition. Exposure: ISO 100, f/1.4, 1/1000 second using a Nikon 50mm f/1.4G.

Leading Lines and S-Curves

Another very helpful technique is to use natural lines that occur in the scene to help draw the eye through the image. Sometimes these lines may be very distinct, such as the lines of railroad tracks leading to a vanishing point, or the lines can be subtler, like a gentle S-curve in a country road. The key is either to look for leading lines and incorporate them in your images, either as the main subject, or to bring attention to the main subject.



AA.3 Here, I used a very simple subject to create heavily patterned leading lines.
Exposure: ISO 200, f/8.0, 1/40 second using a Sigma 17-70mm f/2.8-4 HSM OS.

The Odd Rule

The Odd Rule is a more obscure compositional rule. It's named not for using subjects that are *odd* in appearance but for the number of elements that are included in the subject, the point being that an odd number of major elements appears more aesthetically pleasing to the eye than an even number of elements (although even numbers can also be used for symmetrical compositions).

The human eye is naturally drawn to the center of a composition when one central subject is surrounded by an even number of supporting elements (leaving you with an odd number). Compositions with an even number of elements tend to cause the brain to divide the composition, causing the viewer to see the image in separate pieces rather than as a whole.

The Odd Rule works best with three elements in the composition. This provides a pleasing triangular shape or allows two objects to support a third element allowing for a stable appearance. Using more than five elements in the composition generally leads to the photograph appearing cluttered.



AA.4 These three flowering stalks of grass are a simple subject, but also follow the Odd Rule. Exposure: ISO 800, f/8.0, 1/640 second, using a Micro-NIKKOR 105mm f/2.8G VR.

Helpful Hints

There are many compositional tips and guidelines that can help you make your photography more interesting than a standard snapshot. The following list covers a few of the basics:

- ▶ **Frame the subject.** Use elements in the foreground to frame the subject; this draws the viewer's eye to it.
- ▶ **Avoid shots in which the subject looks directly out of the side of the frame to which he is closest.** If your subject looks out of the photograph, it can distract the viewer. For example, if your subject is on the left side of the composition, positioning him so that he is facing right is better, and vice versa.
- ▶ **Avoid mergers.** A *merger* occurs when an element from the background appears to be a part of the subject, like the snapshot of granny at the park that looks like she has a tree growing out of the top of her head.

- ▶ **Try not to cut through the joint of a limb.** When composing or cropping your picture, it's best not to cut at a joint, such as an elbow or knee. Also, if hands are included in a photo, you should keep all fingers in the frame.
- ▶ **Avoid bright spots or unnecessary details near the edge of the frame.** Anything bright or detailed near the edge of the frame draws the viewer's eye away from the subject and out of the image.
- ▶ **Fill the frame.** Try to make the subject the dominant part of the image. Avoid a lot of empty space around the subject unless it's essential to make the photograph work.



One complete set
with plain and wound strings:
010 .012 .017 1/16" .019 .028 .038 .048

GRETsch
Chet Atkins
RHYTHM 'N BLUES
GUITAR STRINGS

Accessories

You have a wide choice of accessories for the D5200 that serve varying purposes. In recent years, Nikon has released more accessories that enable wireless operation, and the flexibility and ease that come with being wire-free. There are also standard accessories, such as Speedlights, that work with the D5200. This section covers some of the accessories Nikon offers for the D5200 that can enhance your shooting experience.

Speedlights

A Nikon Speedlight is, in my opinion, one of the most invaluable accessories you can buy for your D5200. Speedlights are used on- or off-camera for shooting in low light, or for lighting a subject creatively. Speedlights give you the power and flexibility of professional lighting at an affordable price. They are compact and can be controlled wirelessly from the D5200 with an additional commander unit (either another Speedlight or the dedicated SU-800 Commander).

Nikon Speedlights operate as part of the Nikon Advanced Wireless Lighting (AWL) system and are part of what is known as the Nikon Creative Lighting System (CLS). AWL allows you to control multiple Speedlights and groups of Speedlights wirelessly while using the Nikon proprietary i-TTL flash metering system. This allows you to achieve professional lighting results with a much smaller budget and a much smaller gear bag.

The D5200 allows you to control up to two groups of additional Speedlights using an SB-700 as a commander, and up to three groups of flashes when using a commander, such as an SU-800, SB-800, SB-900, or SB-910.

The SB-600, SB-700, SB-800, SB-900, and SB-910 can all be used as remote flashes. You can find SB-600, SB-800, and SB-900 units used (and sometimes new), so don't hesitate to buy one if you find it at a good price. They are fully functional with all current Nikon dSLRs, and will likely continue to work with future models.

NOTE The SB-600, SB-800, and SB-900 Speedlights are discontinued, but still work perfectly with the D5200.

Nikon's current lineup of available Speedlights includes the SB-910 flagship model, the SB-700, the SB-400, the SU-800 Commander, and the R1/R1C1 Wireless Close-Up Speedlight System.



Image courtesy of Nikon, Inc.

AB.1 The D5200 with the SB-400 Speedlight attached.

The GP-1 GPS Unit

For traveling photographers, the Nikon GP-1 GPS unit automatically geotags images with latitude, longitude, and specific time information acquired from GPS satellites. This is one of my newest gadgets and I have to say that it works pretty well. Having geotags automatically applied to your images is a great feature, especially for nature and wildlife photographs. The GP-1 can be attached via the hot shoe or to the strap with an included adapter.

You can use Nikon's free ViewNX 2 software to correlate the images with a map. Adobe Lightroom 4 also supports geotagging map features. I find that geotagging my images makes searching them a snap in Lightroom 4 because I usually remember where a picture was taken, even if I don't remember where I saved it on my hard drive.



Image courtesy of Nikon, Inc.

AB.2 The D5200 with the GP-1 attached.

The ME-1 Stereo Microphone

If you're serious about video, an external microphone is an essential accessory. The Nikon ME-1 is a small stereo microphone that fits into the D5200's hot shoe. This external microphone records sound much more clearly than the internal microphone.

Also, because it is located farther away from the lens, The ME-1 also minimizes the chance of recording noise created by the autofocusing mechanism in the lens. The ME-1 comes with a windscreen to reduce wind noise when shooting outdoors, and also features a low-cut filter to reduce other unwanted low-frequency noises.



Image courtesy of Nikon, Inc.

AB.3 The Nikon ME-1 stereo microphone on the D5200.

Wireless Accessories

These days, many accessories allow photographers to interact with their cameras wirelessly. These devices allow you to do everything from controlling your camera from a distance to sharing your images directly from your camera. Some accessories make it more convenient to operate your camera in a studio environment or jump into

a photo yourself. In the future, I expect more of these wireless features to be implemented directly inside the camera, but, for now, these cool gadgets are available to accomplish the task.

The WU-1a Wireless Mobile Adapter

Nikon's latest mobile accessory allows you to synchronize the D5200 with smartphones and other devices, such as iPads. You can use the WU-1a to transmit images automatically to your device, so you can share and save them directly to your device, as well as the memory card. This relatively inexpensive wireless adapter also allows you to use your smartphone as a remote release using the camera's Live View feed, which is visible on your smart device using a free app.

The only downside to this accessory is that, so far, you cannot adjust exposure settings using the app — any changes to the settings must be made on the camera body. Hopefully, Nikon will add this capability in the near future because it could revolutionize remote shooting in the studio.

The ML-L3 Wireless Remote Control

Unlike its larger sibling, the D800, the Nikon D5200 has two infrared receivers (front and back), which allow you to remotely trigger the camera using the ML-L3 infrared remote. This handy little accessory is perfect for shooting long exposures, taking self-portraits, or including yourself in a group portrait.



Image courtesy of Nikon, Inc.

AB.4 The Nikon WU-1a Wireless Mobile Adapter.



Image courtesy of Nikon, Inc.

AB.5 The Nikon ML-L3 Wireless Remote.

The best part about this accessory is that it is very inexpensive. The ML-L3 usually costs less than \$20; the infrared remote for higher-end Nikon cameras, though, is over \$200.

The WR-T10 Wireless Remote Controller/Transmitter

This is Nikon's latest wireless device, and it offers much more flexibility than the simple ML-L3 wireless remote. The WR-T10 is a combo package because it includes both a transmitter (WR-T10) and a receiver (WR-R10), which also serves as a transmitter to daisy chain the WR-R10 for extended reach. Unlike the ML-L3, the WR-T10 uses radio signals as opposed to infrared (IR). IR signals require a visual line of sight to operate and can be unreliable in bright light. On the other hand, radio signals need no line of sight, so they can be operated around corners, through walls, or over longer distances. You can also use one transmitter with a number of receivers on different cameras and control them all with a single button.

The WR-T10 enables wireless focusing and shooting stills in the Single (s), Continuous high-speed (■H), and Continuous low-speed (■L) release modes. It also allows you to start and stop video recording, and use select features of the Function button (Fn). This is all a big step up from the ML-L3.



Image courtesy of Nikon, Inc.

AB.6 The Nikon WR-T10 Wireless Remote Controller/Transmitter.

How to Use the Gray Card and Color Checker

Perfect and consistent color doesn't happen by accident. Knowing how to use your included gray card and color checker could save you a lot of postproduction hassle. While they aren't tools I would often use at a wedding, they are a must-have for studio or product photography.

The Gray Card

The color temperature of light varies and is dependent on the source from which it comes. You may even see variances in color temperature from the same light source, such as a speedlight or studio strobe, when the power settings are changed. Color temperature changes can also occur as the light source ages or, in the case of the sun, as it moves across the sky. Although you may believe that you have a neutral item in your scene from which you can select a custom white balance (**WB**), the best way to know for sure is to use a gray card. A gray card is designed to reflect the color spectrum neutrally, providing a standard (or baseline) from which you can measure white balance in other images taken within the same scene and with the same light source. By taking a test shot that includes the gray card, you guarantee that you have a neutral item against which you can adjust colors later if you need to. Make sure that you place the gray card in the same light as the subject for the first photo, and then remove it and continue shooting.

TIP When taking a photo of a gray card, de-focus your lens a little to ensure that you capture more even color.

My software of choice for cataloging, culling, and editing images is Lightroom. In the Develop Module, Lightroom allows you to use the White Balance Selector to select an area of the image that is completely neutral, thereby eliminating any unwanted colorcasts. By placing and photographing your gray card in the first image of your series, you can refer to it later in Lightroom (or your preferred image-editing program) to apply the correct custom white balance.

If you prefer to make adjustments during a shoot (and if the lighting conditions will remain mostly consistent while you shoot), use the gray card, or a tool called an ExpoDisk, from Exploring Imaging, to set a custom white balance (**WB**) in your camera. You can do this by taking a photo of the gray card or ExpoDisk, and filling as much of the frame as possible. Then, use that photo to set the custom white balance (**WB**) in the Custom Setting menu (MENU) of the camera.

The Color Checker

A color checker contains 24 color swatches that represent colors found in everyday scenes, including skin tones, sky, and foliage. It also contains red, green, blue, cyan, magenta, and yellow, which are the colors used in most printing devices. Finally, and perhaps, most importantly, it has six shades of gray.

The process for using a color checker is very similar to using a gray card. You place it in the scene so that it is illuminated in the same way as the subject. Photograph the scene once with the color checker in place, and then remove it and shoot away. You should create a reference photo each time you shoot in a new lighting environment, or when you change power output settings on your speedlight or studio strobe.

In Lightroom, open the image containing the color checker. Measure the values of the gray, black, and white swatches. The red, green, and blue values in the gray swatch should each measure around 128; the black, around 50; and the white, around 245. If the camera's white balance (**WB**) was set correctly for the scene, your measurements should fall within the range (deviating by no more than 7 points either way). If so, you may rest easy knowing that your colors are true. (Isn't there a song about that?)

If your readings are more than 7 points out of range either way, you can use software to correct the image. You can also use the levels adjustment tool to bring the known values back to where they should be (gray around 128, black around 50, and white around 245).

If you prefer to shoot JPEGs rather than RAWs and your camera offers custom styles, you can also use the color checker to set (or adjust) them. Simply take a sample photo and evaluate it using the on-screen histogram (preferably, an RGB histogram if your camera has one). You can then choose that custom style for your shoot — perhaps even adjusting it to better match your color expectations. This will have no effect on your RAW image.

Glossary

Active D-Lighting A camera setting that preserves highlight and shadow details in a high-contrast scene with a wide dynamic range.

AE See *Autoexposure (AE)*.

AF-assist illuminator An LED light that is emitted in low-light or low-contrast situations. The AF-assist illuminator provides enough light for the camera's autofocus to work in low light.

ambient light Lighting that naturally exists in a scene.

angle of view The area of a scene that a lens can capture. The area is determined by the focal length of the lens. Lenses with a shorter focal length have a wider angle of view than lenses with a longer focal length.

aperture The opening of a lens, which is similar to the iris of the eye. The designation for each step in the aperture is called an f-stop. The smaller the f-stop (or f-number), the larger the opening of the aperture; higher f-numbers designate smaller apertures, letting in less light. The f-number is the ratio of the focal length to the aperture diameter.

Aperture-priority auto An exposure mode in which you choose the aperture and the camera automatically adjusts the shutter speed according to the camera's metered readings. Aperture-priority auto is often used to control depth of field. See also *Autoexposure (AE)*, *Programmed auto*, and *Shutter-priority auto*.

aspect ratio The ratio of the long edge of an image to the short edge as printed, displayed on a monitor, or captured by a digital camera. The native ratio for the D5200 is 3:2 for still images and 16:9 for video.

Autoexposure (AE) A camera mode that selects the aperture and/or shutter speed according to the camera's built-in light meter. See also *Aperture-priority auto*, *Programmed auto*, and *Shutter-priority auto*.

Autoexposure/Autofocus (AE/AF) Lock A camera control that lets you lock the current metered exposure and/or autofocus setting prior to taking a photo. This allows you to meter an off-center subject and then recompose the shot while retaining the proper exposure for the subject. The function of this button can be altered in the Setup menu under the Buttons heading.

Autofocus (AF) A camera mode that determines the proper focus of the subject automatically.

backlighting A lighting effect produced when the main light source is located behind the subject. Backlighting can be used to create a silhouette effect or to illuminate translucent objects. See also *frontlighting* and *sidelighting*.

barrel distortion A lens aberration in which the lines at the horizontal and vertical edges of the image are bowed outward. This distortion is usually found in shorter focal-length (wide-angle) lenses.

bokeh The out-of-focus areas of an image. It is derived from the Japanese word *boke*, which is loosely translated as *fuzziness*.

bounce flash A technique in which the flash head is pointed upward or toward a wall so that the light bounces off another surface before reaching the subject. Bounce flash softens the light reaching the subject, and often eliminates shadows and provides smoother light for portraits.

bracketing A photographic technique in which you vary the exposure over two or more frames. This ensures proper exposure in difficult lighting situations in which your camera's meter can be fooled.

broad lighting A lighting technique in which the main light illuminates the side of the subject facing the camera lens.

camera shake Camera movement (usually at slower shutter speeds) that produces a blurred image.

center-weighted metering A light-measuring algorithm that emphasizes the area in the middle of the frame when calculating the correct exposure for an image.

chromatic aberration A flaw in the design of a lens in which the lens doesn't focus all of the wavelengths of light on the same plane. This is typified by color fringing at the edges of high-contrast areas of the image.

colored gel filter A translucent material that is placed over a flash head or light to change the color of the light emitted from the flash. Gels are often used to match the flash output with the ambient light. They are also used to change the color of the background when shooting a portrait or still life, by placing the gel over the flash head and then firing the flash at the background.

compression A technique that reduces the size of a file by digital encoding, which uses fewer bits of information to represent the original subject. Some compression types, such as JPEG, actually discard some image information, while others, such as lossless compressed RAW (NEF) files, preserve all the details in the original.

Continuous Servo autofocus (AF-C) A camera setting that allows the camera to focus continuously on a moving subject.

contrast The range between the lightest and darkest tones in an image. In a high-contrast image, the tones extend through the entire range between white and black. In a low-contrast image, the tones are compressed into a smaller range.

curvilinear A term used to describe a lens that does not adjust for the curvature of the lens elements, resulting in an image that appears curved, especially at the edges. Fisheye lenses are curvilinear. See also *rectilinear*.

dedicated flash An electronic flash unit — such as the Nikon SB-910, SB-900, SB-800, SB-700, SB-600, or SB-400 — designed to work with the autoexposure features of a specific camera.

depth of field (DOF) The portion of a scene from foreground to background that appears sharp in the image.

diffuse lighting A soft, low-contrast lighting.

Digital single-lens reflex camera (dSLR) A digital camera design in which the light from a scene enters through the lens and is reflected by a mirror into the viewfinder. This enables the photographer to see the scene exactly as it is coming through the lens. When the shutter release button is pressed, the mirror flips up and out of the way, and flips back down when the exposure is completed.

D-Lighting A camera function that can correct the underexposure that often

happens to images that are backlit or in deep shadow. D-Lighting (not to be confused with Active D-Lighting) works by adjusting the levels of the image after the image has been captured.

DX The Nikon designation for digital single-lens reflex cameras (dSLRs) that use an APS-C-sized (23.6mm × 15.8mm) sensor.

dynamic range The range of brightness or luminosity in any given scene from shadow areas to highlights. Dynamic range can be wide with lots of contrast or narrow with almost no contrast.

equivalent exposure An exposure with different settings that yield the same results. For example, an exposure of ISO 400 at f/4.0 for 1/125 second is an equivalent exposure to ISO 200 at f/5.6 for 1/30 second.

equivalent focal length A DX-format digital camera's focal length, which is translated into the corresponding values for 35mm film or the FX format.

exposure The amount of light allowed to reach a camera's sensor, which is determined by the ISO setting, the light admitted by the aperture of the lens, and the length of time determined by the shutter speed.

exposure compensation A technique for adjusting the exposure indicated by a photographic exposure meter, in consideration of factors that may cause the indicated exposure to result in a less-than-optimal image.

exposure mode Camera settings that control how the exposure settings are determined. See also *Aperture-priority auto*, *Programmed auto*, and *Shutter-priority auto*.

fill flash A lighting technique in which a flash provides enough light to illuminate the subject in order to brighten the shadows. Using a flash for outdoor portraits often brightens the subject in conditions in which the camera meters light from a broader scene.

fill lighting The lighting used to illuminate shadows. Reflectors, additional incandescent lighting, or an electronic flash can be used to brighten shadows. One common outdoor technique is to use the camera's flash as a fill.

flash An external light source that produces an almost instant flash of light to illuminate a scene. Also known as *electronic flash*.

Flash compensation A feature that adjusts the flash output. If images are too dark (underexposed), you can use Flash compensation to increase the flash output. If images are too bright (overexposed), you can use it to reduce the flash output. This is also sometimes referred to as Flash Exposure Compensation (FEC).

flash modes Modes that enable you to control the output of the flash by using different parameters. Some of these modes include Red-Eye Reduction and Slow Sync.

flash output level The output level of the flash as determined by one of the flash modes used.

focal plane The point at which the lens focuses the image. In a dSLR, the focal plane is where the sensor lies.

frames per second (fps) A term that describes how many images are being recorded per second.

Front-curtain sync A camera setting that causes the flash to fire at the beginning of the period when the shutter is completely open in the instant that the first curtain of the focal plane shutter finishes its movement across the film or sensor plane. This is the default setting. See also *Rear-curtain sync*.

frontlighting The illumination coming from the direction of the camera. See also *backlighting* and *sidelighting*.

f-stop See *aperture*.

FX The Nikon designation for digital single-lens reflex cameras (dSLRs) that use a 35mm-sized (36mm × 24mm) sensor.

High Dynamic Range (HDR) Imaging that allows you to portray a photograph with more tonal range than is possible to capture in a single image, by combining images with two or more exposures. HDR is also a feature on the D5200 that automatically combines two exposures and blends them together.

histogram A graphic representation of the range of tones in an image.

hot shoe The slot located on the top of the camera where the flash connects. The hot shoe is considered hot because it has electronic contacts that allow communication between the flash and the camera.

ISO sensitivity A setting that indicates the light sensitivity of a camera's sensor. In digital cameras, a lower ISO setting provides better-quality images with less image noise; however, a lower ISO setting also requires more exposure time. ISO stands for International Organization for Standardization.

JPEG (Joint Photographic Experts Group) An image format that compresses the image data from the camera to achieve a smaller file size. The compression algorithm discards some of the detail when saving the image. The degree of compression can be adjusted, allowing a selectable trade-off between storage size and image quality. JPEG is the most common image format used by digital cameras and other photographic image-capture devices.

kelvin (K) A unit of measurement of color temperature based on a theoretical black body that glows a specific color when heated to a certain temperature. Direct sunlight is approximately 5500K.

lag time The length of time between the pressing of the shutter-release button and when the shutter releases. The lag time on the D5200 is so short that it is almost imperceptible. Compact digital

cameras are notorious for having long lag times, which can cause you to miss important shots.

leading line An element in a composition that leads a viewer's eye toward the subject.

lens flare An effect caused by stray light reflecting off the many glass elements of a lens. Lens shades typically prevent lens flare, but sometimes you can choose to use it creatively by purposely introducing flare into your image.

macro lens A lens with the capability to focus at a very close range, enabling extreme close-up photographs. Nikon calls its macro lenses *micro* lenses.

Manual exposure An exposure mode in which the aperture and shutter speed are controlled by the photographer, not the camera.

Matrix metering A Nikon-exclusive meter that reads the brightness and contrast throughout the entire frame and matches those readings against a database of images (over 30,000 in most Nikon cameras) to determine the best metering pattern to be used to calculate the exposure value.

metering A technique for measuring the amount of light in the scene by using a light meter.

Nikon Electronic File (NEF) The name of the Nikon RAW file format. See also *RAW*.

noise The appearance of pixels with randomly distributed color values in a digital image. Noise in digital photographs tends to be more pronounced in shadow areas with low-light conditions and long exposures, particularly when you set your camera to a higher ISO setting.

Noise Reduction (NR) A technology used to decrease the amount of random information in a digital image, often caused by long exposures and/or high ISO settings.

pincushion distortion A lens aberration in which the lines at the horizontal and vertical edges of the image are bowed inward. It is usually found in longer focal-length (telephoto) lenses.

Programmed auto (P) A camera setting in which the shutter speed and aperture are set automatically. See also *Aperture-priority auto*, *Autoexposure (AE)*, and *Shutter-priority auto*.

RAW An image file format that contains the unprocessed camera data as it was captured. Using this format allows you to change image parameters, such as white balance, saturation, and sharpening. Although you can process RAW files in-camera, the preferred method requires special software, such as Adobe Camera Raw (available in Photoshop), Adobe Lightroom, or Nikon Capture NX2 or View NX 2. See also *Nikon Electronic File (NEF)*.

Rear-curtain sync A setting that causes the flash to fire at the end of the exposure an instant before the second, or rear, curtain of the focal plane shutter begins to move. With slow shutter speeds, this feature can create a blur effect from the ambient light, showing as patterns that follow a moving subject, with the subject shown sharply frozen by the flash at the end of the blur trail. This setting is often used in conjunction with longer shutter speeds. See also *Front-curtain sync*.

rectilinear A term used to describe a design feature that corrects (or rectifies) for the field curvature found in wide-angle lenses. Most wide-angle lenses are rectilinear, whereas a fisheye lens is not and retains the field curvature. See also *curvilinear*.

red-eye An effect from flash photography that appears to make a person's eyes glow red or an animal's eyes glow yellow or green. This effect is caused by light bouncing off the retina. It is most noticeable in dimly lit situations (when the irises are wide open), as well as when the electronic flash is close to the lens and, therefore, prone to reflect the light directly back.

Red-Eye Reduction mode A flash mode used to prevent the subject's eyes from appearing red. Multiple flashes are fired just before the shutter opens, causing the subject's irises to contract, therefore reflecting less light from the retina to the camera.

selective focus A camera setting that uses shallow depth of field to isolate the subject and make it more prominent by blurring out the rest of the image.

self-timer A mechanism that delays the opening of the shutter for several seconds after the shutter-release button has been pressed.

short lighting A lighting technique in which the main light illuminates the side of the subject facing away from the camera and lens.

shutter A mechanism that allows light to pass to the sensor for a specified amount of time.

Shutter-priority auto A camera mode in which you set the desired shutter speed and the camera automatically sets the aperture for you. It is best used when shooting action shots to freeze the subject's motion by using fast shutter speeds. See also *Aperture-priority auto*, *Autoexposure (AE)*, and *Programmed auto*.

shutter speed The length of time the shutter is open to allow light to fall onto the imaging sensor. The shutter speed is measured in seconds or, more commonly, fractions of a second.

sidelightning Lighting that comes directly from the left or right of the subject. See also *backlighting* and *frontlighting*.

Single Servo autofocus (AF-S) A setting that locks the focus on the subject when the shutter-release button is half-pressed. This allows you to focus on the subject and then recompose the image without losing focus.

Slow Sync mode A flash mode that allows the camera's shutter to stay open for a longer time to record ambient light. The background receives more exposure, which gives the image a more natural appearance.

Speedlight A term for Nikon accessory flashes.

spherical aberration A problem with lens design that causes the light coming through the lens not to converge at a single point, resulting in soft or unfocused images. Most lenses on the market today include an aspherical lens element that corrects this problem.

spot meter A metering system in which the exposure is based on a small area of the image. On the D5200, the spot is linked to the autofocus point.

Through-the-Lens (TTL) A metering system in which the light is measured directly through the lens.

vanishing point The point at which parallel lines converge and seem to disappear.

Vibration Reduction (VR) A function in which the lens elements are shifted by a mechanism in the lens to reduce the effects of camera shake. Note that VR is a Nikon proprietary term, and third-party lenses have other designations that mean the same thing, such as Optical Stabilization (OS; Sigma) and Vibration Compensation (VC; Tamron).

white balance A setting used to compensate for the differences in color temperature from different light sources. For example, a typical tungsten light bulb is very yellow-orange, so the camera adds blue to the image to ensure that the light looks like standard white light.





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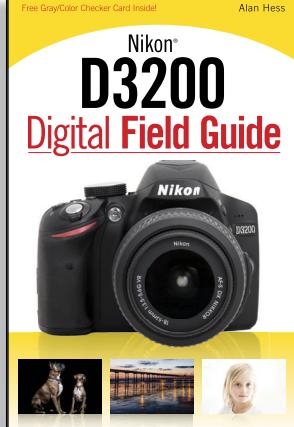


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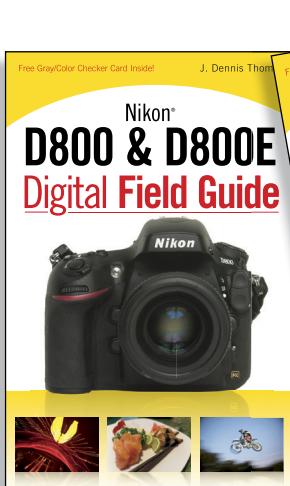
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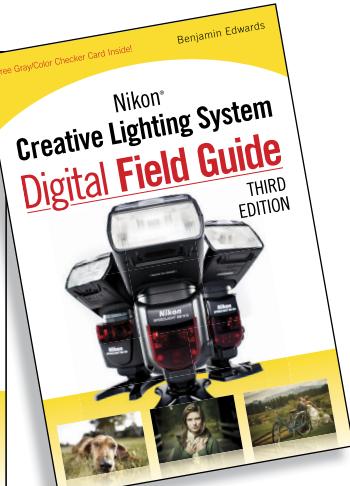
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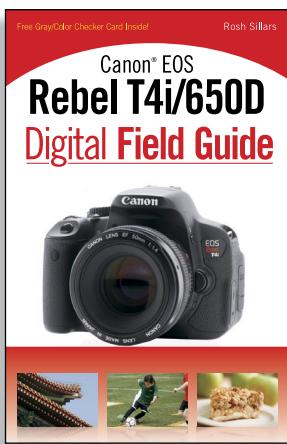
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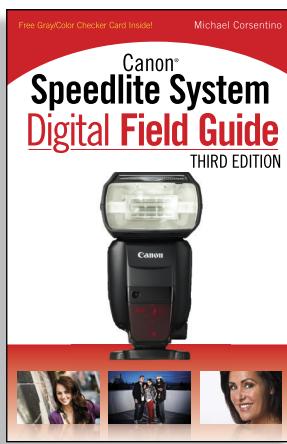
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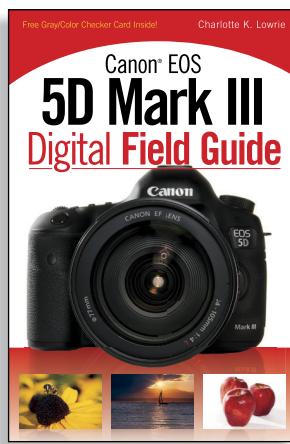
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