The Friedman Archives Press

The Complete Guide to Canon's

Digital Rebels

XT / 350D XTi / 400D

"The Friendly Manual with Professional Insights"

by Gary L. Friedman

Chapter 7

Wireless Flash and Advanced Flash Topics

Get ready to add drama to your pictures!

Many people that the wireless flash is somehow "too advanced" or "too professional" for them to delve into. Don't let this happen to you! Wireless flash is a tremendously powerful tool to improve your photography, and the learning curve is not that steep!

In this chapter the workings of Canon's wireless flash will be de-mystified. Several examples of it in use will hopefully inspire you to go out and play with this incredibly versatile and capable feature. Additional flash topics, including how to balance existing light and flash in a somewhat intuitive way, are also covered.

Introduction

Earlier in the book, I sung the praises of Canon's wireless flash system. In this chapter, I will explain why it is so good and give examples of its use. I will also cover some additional flash topics that wouldn't fit into Chapter 5.

Figure 7-1: Wireless flash makes complex shots like this exceptionally easy!

"Wireless Flash" refers to the ability to move the accessory flashes (such as the 580EX or 430EX shown in **Figure 7-2**) away from the camera, position them anywhere else in the room, and still have them fire and auto-expose as if one of them was still sitting on the camera's flash-mount shoe. In the old days, it was very difficult to accomplish this, but the wireless technology makes off-camera flash as easy as autofocus makes it easy to focus.

Just to demonstrate the dramatic changes that can occur from even subtle changes in lighting, **Figure 7-3** shows a series of shots, showing one model and ONE FLASH using a multitude of flash positions. The left image was taken with on-camera flash (yuk!); the center with the flash off-camera and set into wireless mode (better!), and the right using an off-camera flash with softening umbrella (best!).

Just remember that a little bit of creativity can yield some pretty remarkable pictures. On the next pages are some more examples of wireless flash in use.

Figure 7-2: To use wireless mode, you'll need two EX-series flashes (such as the 580EX or 430EX (left and center), or at least one EX flash and the ST-E2 infrared transmitter (right). One device sits on the camera's hot shoe, and the other may be positioned almost anywhere around the room. Not all EX flashes can act as a "Master", however. See the next section for more information.

Figure 7-3: Move the flash around for greater impact. (See text).

This is an easy Product shot using two flashes. The "main" flash was placed above and to the right, while the 2nd flash was placed near the floor and pointed to illuminate the wall.

One reflector. One flash. All automatic.

Can wireless flashes do this? YES, and for less than the cost of a "real" portrait studio! This setup required only three slave flashes, and the setup is explained later on in this Chapter.

This shot was taken with ONE flash over shoulder with two front reflectors (see text) – Wow!!

The above shot is a truly remarkable image using only ONE FLASH, and again shows off the versatility of wireless flash in automatic mode. The flash was placed BEHIND the model and over her shoulder so that the bottom of the flash "beam" just touched her hair, and the majority of the beam hit the reflector placed out-of-frame, on the right. The right reflector was angled to reflect some of the light onto the

model's face, and some of it to the reflector placed out-of-frame to the left. This secondary-bounce light then illuminated the left side of the model's face.

One-light setup for the image above. Flash is over shoulder, and two large white reflectors bounce the flash first to the right and then the left side of her face.

How to Use Wireless Flash

Okay, enough examples. How do you actually use wireless flash? Well, basically it requires two accessory flashes: one that gets mounted on the camera's hot shoe (the "Master") and one or more that can be placed almost anywhere in the room (usually called the "Slaves" or the "off-camera flashes").

Let me state that again, and this time I'll add some additional detail. To use wireless flash, you have to attach an accessory Speedlite EX-series flash that can act as a "Master" wireless controller to your camera's hot shoe, and then one or more EX-series flash that can act as a Slave which can be placed almost anywhere in the room as long as it can see the control signals coming from the Master. A list of compatible flashes appears in **Figure 7-5**.

Figure 7-4: Look Ma! No wires!

Canon Flashes that can act as a "Master"	Canon Flashes that can act as an "Off-Camera Flash"
Speedlite 550EX, 580EX, 580EX II, or the infrared ST-E2 infrared transmitter	Speedlite 550EX, 580EX, 580EX II, 420EX, or 430EX

Figure 7-5: Canon Flash models that have wireless capabilities.

TIP: For the sake of completeness, the speciality MR-14EX and MT-24EX macro ring speedlites can also act as "Master" wireless E-TTL controllers (but not as as a Slave).

Explanation of Groups and Channels

It's true that there are a lot of variables to get your arms around before all of the features of wireless flash can be understood. It is also true that no two of Canon's Speedlite flashes have the same user interface when it comes to setting certain features. What's a camera-specific book author to do? Well, the approach I will take will be to explain what the variables and features are for, so that when you go back to read your flash's manual (you still have it, right?) it will make sense and you'll understand more clearly what it is telling you to do. And instead of showing how to invoke every feature on every flash out there, I will show procedures on how to set flash variables using the two flashes I have in my possession – the 580EX and the 420EX.

Let's start with the two concepts that most beginners get confused by when they read the flash manual:

"Groups" and "Channels". They sound kind of interchangeable, but I will explain it briefly and from then on the concepts should be intuitively obvious. ☺

Channels

You know how, when you watch television or listen to the radio, switching channels lets you enjoy completely different content? The concept of communicating over different channels means that information transmitted to one receiver will not interfere with information transmitted to another receiver tuned to a different frequency, even if that information is sent at the same time.

How does this apply to flash photography? Well, let's say that you're shooting with wireless flash in a room, and suddenly another Canon photographer comes in and and sets up his own wireless flashes to shoot something else in another corner. And every time he snapped a picture, YOUR wireless flashes went off!! An undesireable situation? You bet!

For this reason the wireless flash system was given "Channels" to ensure that two photographers can work in the same room without their equipment interfering with one another. Each flash can be programmed to work on either Channel 1, 2, 3, or 4, and it is essential that both the Master and the Slave be set to the same channel. Channel one is the factory default, and it is very likely that you will never need to change it in your lifetime.

Groups

Here's where the power of Canon's system really shines: You can have as many Slaves lighting your scene as you want, and you can even assign a group of Slaves to be "Group A", "Group B", or "Group C". (Canon's flash manuals refer to the Group name as the "Slave ID") Each time you take a picture,

all three groups are fired and autoexposure occurs automatically. So far so good.

But what if you did some test shots, and decided that you wanted the background a little darker? Well, if you had assigned all the flashes illuminating the background to "Group B", then all you'd have to do is tell your Master flash to say "All the Group B flashes must reduce their output by one stop" and then shoot again. Or you can have Group A overexpose a touch, without affecting the other groups of flashes. This is a TREMENDOUS time-saver when you're in the studio and you're experimenting with your lighting setup! If not for groups, if you wanted to modify the output of certain flashes, you'd have to walk over to each flash, dial in a manual exposure compensation amount, walk back and take another test shot. Nuts to that! All Canon flashes are set to Group A by default, and when you alter many of the settings on the Master (such as Flash Exposure Compensation, Flash Exposure Lock, Flash Exposure Bracketing), they are automatically invoked on the Slaves.

TIP: Not all Masters can control three groups (A, B, and C). In the case of the infrared ST-E2, it only addresses Groups A and B when it communicates with flashes. If you have any Slaves set to Group C, the ST-E2 will not trigger them.

Okay, so enough explanation. How do you actually use wireless flash? Below is a simplified guide:

1. Assign the flashes their proper roles (the on-camera flash as Master, the rest as Slaves) using your flash's switch as demonstrated in **Figure 7-6**.
2. Place the Slaves around the room and light your subject creatively. It turns out that the placement of Slaves is pretty versatile. You can take the off-camera flash and aim it at your subject, bounce it off the wall, aim it at the background, or [insert your own ideas here]. If the strength of the reflected pre-flash signals are adequately strong (as described in the next section),

the system will do its best to make sure the exposure comes out correctly.

Sometimes it's helpful to test the communication between the camera and the remote flash before you take the picture. To test the system, press the red PILOT button on the back of the Master flash. This will send out a "fire test flash" command which all of the Slave flashes will respond to if they are configured correctly and if they can see the signal from the Master flash. If you have the flashes assigned to groups, they will respond with a different delay – Group A will fire their test flash response first, then Group B, then Group C – each about ¼ second apart. *If you don't see the off-camera response, it means the off-camera flash cannot see the light coming from the built-in flash, and you may have to re-position the flash.* In practice, you'll be surprised at how well the flashes communicate even if there is no line-of-sight.

Figure 7-6: Setting the 580EX to "Master" and the 420EX to "Slave". (The user interface for other flashes will vary.)

How does it work?

The on-camera flash (the "Master") and the off-camera flashes (the "Slave") actually communicate with each other using tiny bursts of low-intensity light – kind of like a "Morse code" using long- and short-light pulses. (See **Figure 7-7**.) These pulses are too faint to significantly affect the final exposure, but are strong enough to communicate with any other flashes in the vicinity – even when they are reflected off the walls, ceiling, or the subject. This scheme allows the Master flash to control several Slaves at once without the need for cables. (This is a BIG DEAL if you've ever had to struggle with the cable method on a regular basis.) By generating long and short pulse widths of light at relatively small intensities, the Master flash can tell the other flash units how much light to output and when to start doing it.

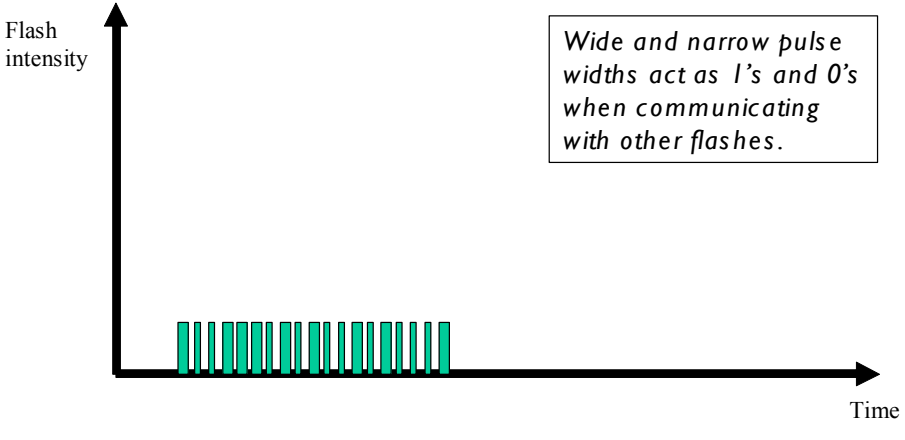


Figure 7-7: The flashes can communicate with each other using a "Morse Code" of wide and narrow pulses. In the blink of the eye this protocol can individually address groups of flashes and taylor the output of each group.

So, here's what happens from the moment you press the shutter release to the moment the camera finishes taking the picture:

1) The ambient light in the scene is measured.
2) The Master flash fires a "Morse code" that tells Group A to generate a short, fixed “pre-flash” of known intensity.
3) The pre-flash burst from Group A is reflected off of the subject and back to the camera. The reflected light is read by the camera’s metering cells and compared against each other and any ambient light present.
4) Another pre-flash command is sent to Group B, and the reflected light is measured as in step 3 above.
5) A third pre-flash command is sent to Group C (if the Master supports this – the ST-E2 can only address two groups instead of three) and again, the amount reflected off the subject is measured.
6) The exact amount of flash brightness needed by each group is calculated by the camera. If certain groups have been instructed to underexpose or overexpose by a certain amount, this is taken into account as well.
7) The camera then addresses each group of Slaves and communicates the calculated intensity values to them via a series of Morse Code messages.
8) The camera’s aperture closes down, the mirror flips up, the shutter opens, and the on-camera Master flash sends a Morse code command to ALL of the Slaves telling them to “FIRE!” at the previously dictated flash intensities.
9) All of the Slaves fire with their commanded intensities in a single burst.

10) The Master flash, in addition to sending out command signals, fires as part of Group A in order to add some light to the image. (The exceptions to this are if you're using an ST-E2 Infrared controller, or if you're using a 550EX, 580EX, or 580EX II and have disabled the main flash. In this way your subject is only illuminated by the Slaves, for the most dramatic effects.)

11) The camera's sensor may continue to collect light a little longer if you told the camera to use a longer exposure (for example, if you're in Aperture Priority mode with Custom Function 3 (Flash Sync Speed in Av mode) set to Auto). Then the shutter closes and the exposure is finished.

A real "conversation" between the Master and two Slaves has been recorded and appears in **Figure 7-8**. In this graph, time (in milliseconds) is represented by the horizontal axis, and each flash's output is represented in yellow (the Master flash), purple (a Group A flash) and blue (a Group B flash).

So that's the simple explanation. It actually can get more complex than this, for example when you're shooting in Ratio mode (so that one Group of Slaves outputs more light than another to get Hollywood-style portraits). I'll talk more about that later on in this Chapter.

TIP: What happens if you're shooting a subject that is too far away, or has low reflectivity, such as people in black clothing at nighttime? Or what happens when you're bouncing the flash off the ceiling, but the ceiling is so far away that very little (TOO little!) of the pre-flash bursts actually get to your subject and reflected back to the camera? In these instances the camera effectively sees no pre-flash reflection, and therefore has no idea what to do. This leaves the camera to just guess, which can be sometimes right but quite often will be wrong. Using the flash +/- compensation function in these instances will have no effect on the flash exposure, since you're trying to multiply a reflectance value of zero by a compensation factor. If you're shooting under difficult circumstances and flash compensation seems to have no effect on the exposure, the best thing to do is to put the flash into manual output mode (see Manual Flash Mode section later in this Chapter.)

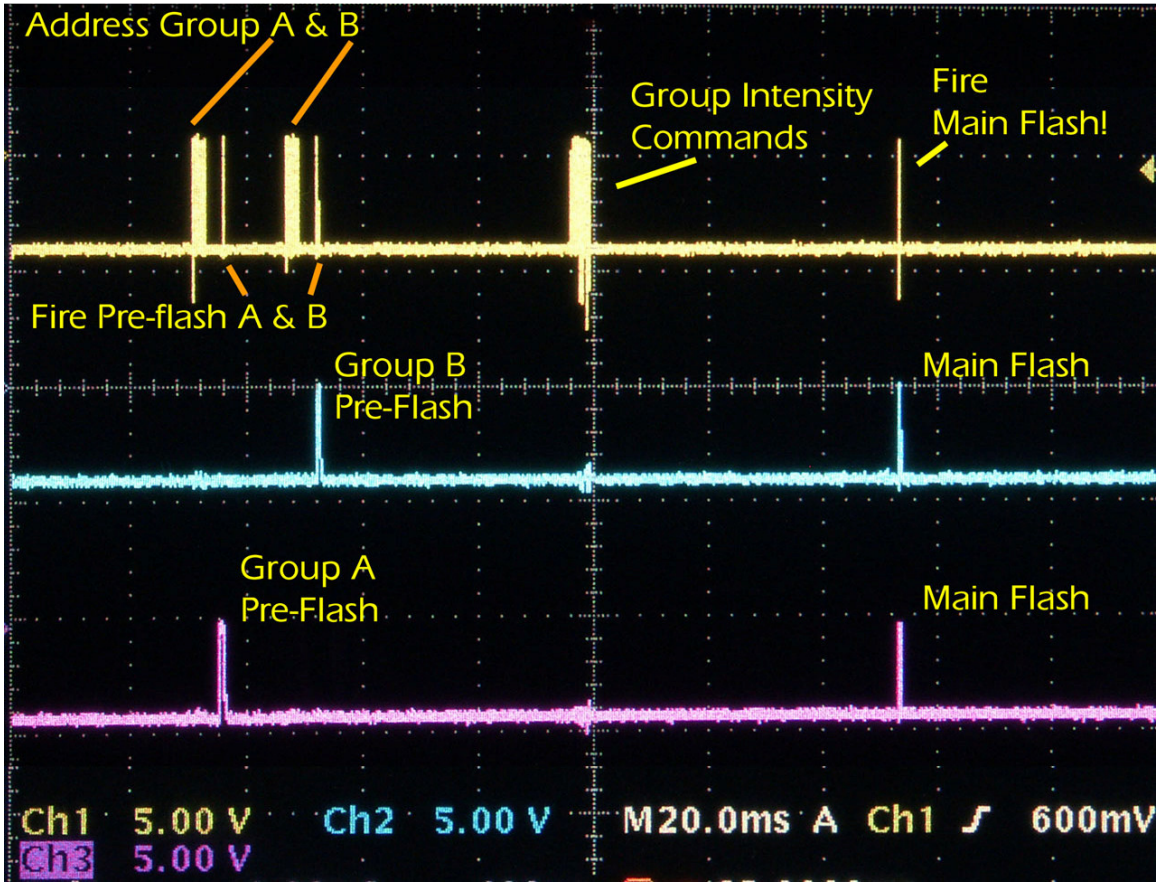


Figure 7-8: This is what a conversation between the Master flash (top, yellow) and the Slaves set to different groups (bottom, blue and purple) looks like on an oscilloscope. The Master addresses and communicates with each group separately. The camera then calculates the proper output levels for each group and communicates this information via "Group Intensity Commands". Finally, an "All Fire!" command is issued, and the off-camera flashes fire with the instructed intensity all at the same time.

Will the Pre-Flash Bursts Affect the Exposure?

No. The pre-flash bursts all occur before the mirror flips up and the shutter opens, so none of that activity ends up in the shot. But, as mentioned in Step 6 two pages ago, the Morse Code "FIRE!" command does indeed occur while the shutter is open and might be noticeable in the shot. Generally all Morse Code commands are of such low intensity that they will not be detectable in the final image; for example see **Figure 7-1** at the beginning of the chapter (and in fact all other examples given here as well!).

However, there are conditions under which the "FIRE!" Morse code command becomes visible and can affect the appearance of the subject. For example, if you're shooting a close subject with the lens wide open (as I did in the examples in **Figure 7-9**), the dramatic lighting effect is washed out. This won't happen very often but if it does there are two things you can do about it.

The first is to simply put a piece of cardboard between the Master flash and the subject, so that there's no direct illumination by the flash onto the subject. (Make sure that there's still a bounce path that the light can take to get to the Slave!) The 2nd option is to buy the ST-E2 Transmitter, which only sends Master control signals via an infrared light. (It's also less expensive and considerably lighter than putting a 580EX on your hot shoe!) With the ST-E2 the Slaves will still be able to see the control signals, but the same light will NOT appear in the image because the camera's imaging sensor has an Infrared filter built right in! (Okay, there's a 3rd option, which is to put an IR filter on your flash, making it behave like a giant ST-E2.)

Figure 7-9: Usually the "FIRE!" Morse Code command from the Master has no significant effect on exposure, but you can create conditions where it makes a big difference (usually in shooting close subjects with large lens openings.) For these shots a wireless flash was placed to the right, and the left image shows what a dramatic shot can look like when the light from the "FIRE!" command affects the shot. Using an ST-E2 or simply blocking direct illumination with your hand or a piece of cardboard, produced the intended dramatically-lit scene on the right.

TIP: As you pour through your flash's manual (especially that of the 580EX), you'll no doubt notice that many of the functions such as flash exposure compensation, AF Assist Beam (CF 5), and Second Curtain sync (CF 9) can also be set via the flash's controls. What if the settings conflict – for example, if you set Flash Exposure Compensation to -2 on the camera body and +3 on the flash? The answer is that if the flash's parameter had been changed from "normal", then the flash's settings win. This should be the first thing you check if a flash setting you make on your camera doesn't seem to be taking effect.

How to do "Ratio Flash" for Professional Lighting Results

Professional portrait photographers and cinematographers have learned that the most flattering and dramatic lighting for people is "ratio lighting", where you have two lights illuminating your subject from the left and the right sides, but one light is twice as strong as the other. **Figure 7-10** shows some examples of 2:1 ratio lighting (meaning that one light is twice as strong as the other).

Figure 7-10: Examples of 2:1 ratio flash.

To achieve ratio lighting, you'll need two Slave flashes, one set to Group A on one side of your subject, and one set to Group B on the other. Then you tell the Master flash to invoke RATIO mode, so you can specify the ratio of light from Group A : Group B. To do this on the 580EX, follow these steps carefully (and remember the flash will "time out" if you don't touch the buttons for five seconds):

1. Press the <ZOOM/ ⇆> button multiple times until the RATIO icon flashes.

2. Rotate the <⊛> wheel to the right until the word "on" appears. (There are two such settings – one with the RATIO A:B blinking, and the other with the RATIO A:B C blinking. Choose either one – it is explained in the next section.)

Figure 7-11: Invoking Ratio flash for the 580EX (left) and the ST-E2 Master (right). The yellow rectangles show the relevant indicators.

3. While Pressing the center button of the control wheel <●>. A Ratio scale appears (See **Figure 7-11a**)
4. Rotate the <⊛> wheel to the left or right and choose the desired A:B flash ratio, from 8:1 on the very left or 1:8 on the very right. (Or anywhere in between.)

To get out of RATIO mode:

1. Hit the <ZOOM/⇆> button multiple times until you see the RATIO icon flash.
2. Rotate the <⊛> wheel to the left, until you see the word "o ff" (it looks kind of funny that way).
3. Press the center wheel <●> or just don't touch any buttons for five seconds. RATIO mode will be off.

To set RATIO mode on the ST-E2:

1. Press the RATIO button. The "On" LED should light.
2. Use the left and right buttons to choose your desired A:B flash ratio, from 8:1 on the very left or 1:8 on the very right. (Or anywhere in between.) (**Figure 7-11b**)

To cancel RATIO flash on the ST-E2, simply press the RATIO button again. The LED should go out.

Figure 7-12 shows how the subject's lighting changes as the ratio goes from 8:1 (the left flash is eight times stronger than the right) to 1:8 (the right flash is eight times stronger), plus everything in between. The nice thing about this setup is that you can play with the light ratio and see the results instantly, all without moving from behind the camera. Now dialing in the desired amount of drama is quite easy!

Now some of you (okay, maybe only one of you) might be asking, "Gee, that's a brilliant use of 2 Groups. But what about the third group? Is it possible to employ a Group C while in RATIO mode?" The answer is yes. When you choose RATIO A:B C on the 580EX (Step 2 above – the ST-E2 can't do it), then any Slaves set to Group C operate exactly the same way as they would if the Master flash was not in ratio mode. So what the camera does during the pre-flash stage is to measure the reflections of the three groups, and then when calculating the final intensities for Groups A and B it factors in the ratio settings and commands the groups accordingly; then it calculates the flash intensities for Group C without any bias.

Why would you want this feature? What most photographers do is use Groups A and B to surround the subject, and then use Group C to illuminate the backdrop, dialing in flash exposure compensation for Group C as needed for the desired background effect.

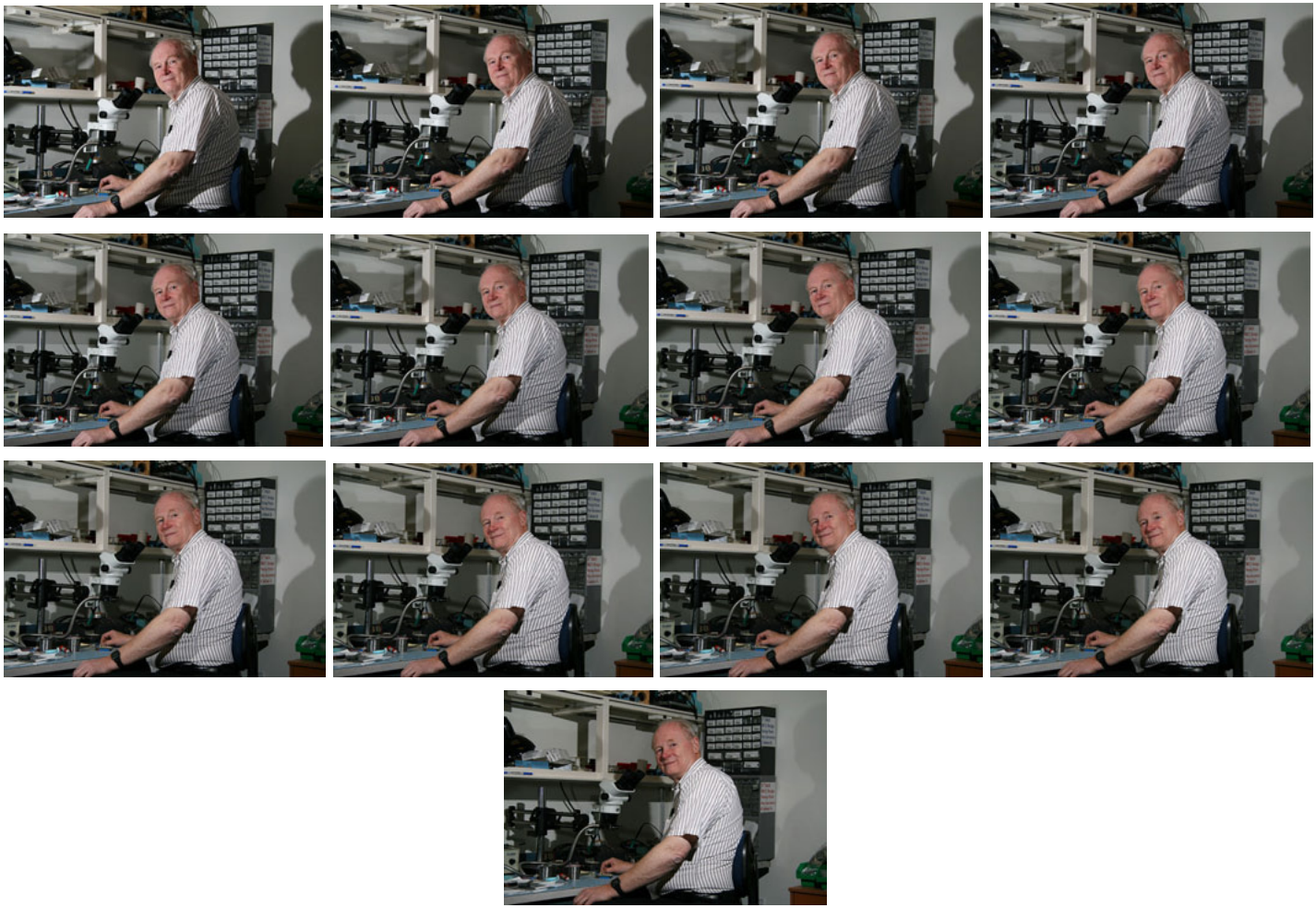


Figure 7-12: Using two Slaves, you can easily control the ratio of the two from the back of the ST-E2 or 580EX from anywhere between 1:8 to 1:1 to 8:1. Dial-in your dramatic light!

Manual Flash Mode

Some Canon flashes (the 430EX, 550EX, 580EX, and 580EX II) have the capability to ignore any flash metering commands and provide a fixed amount of light output when triggered by a Master flash. With the advent of automatic wireless flash exposure, why would you ever need manual control like this?

An example which provides the answer can be seen in **Figure 7-13**. This is the result of a portable studio I have set up using only three Slave flashes (two to illuminate the background, one bounced into a reflector umbrella for the subject.) In this scenario you cannot rely on the camera's auto flash exposure mode because of the predominantly white background – the camera's exposure computer would look at all that light coming back in from the background and say "Whooa! That's WAY too much light! I'll cut back to the total amount of light I command to make sure pictures looks about 18% grey!!" (This is the same problem with normal exposure modes of any camera, and it is discussed at length in Chapters 4 and 5.)

What to do? Studio photographers solved the problem ages ago by using large strobe lights (so they can shoot at small f/stops) that always flash with a fixed amount of light. The

Figure 7-13: 3 wireless flashes set to manual mode make for an inexpensive, portable studio setup.

photographer would use a handheld flashmeter to measure the light falling on the subject and calculate the proper f/stop to use. The background lights (which don't even illuminate the subject) would have to be measured with a flashmeter and adjusted as well.

Well, thanks to manual flash output mode, a Canon wireless photographer on a budget can do the same thing, and it's a whole lot less work to set up. A handheld flashmeter won't always work with wireless (it gets confused by all the control signals), but you can set things up by trial and error, referring to your camera's display and histogram.

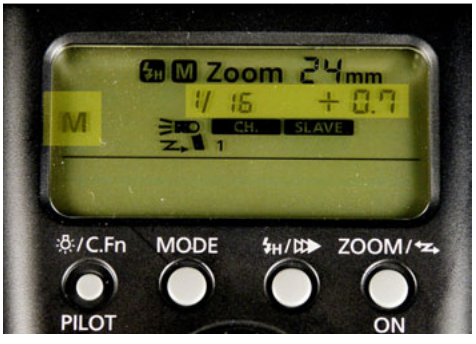


Figure 7-14: Manual mode setting for the 580EX in SLAVE mode. This is one way to override auto flash exposure and get a white background to be white. (See text.)

To put the 580EX into Manual mode as a Slave, do the following:

1. Set the switch at the bottom of the flash (near the foot) to "SLAVE".
2. Press and hold the MODE button for 2 seconds until you see the blinking "M" on the left hand side.
3. Press the <⊙> button and watch the "1/1" output indicator flash. (This represents the fraction of the flash's full output you want to select. "1/1" means full power.)
4. Rotate the <⊙> wheel to the left and select the desired power output level, anywhere from 1/1 (maximum) to 1/128th of full output (minimum). Notice that, as you're turning the dial you can also choose values between the fractions in 1/3rd stop increments. Think of this as choosing an "A+" or "B-" instead of just "A" or "B".

5. Press the <◉> button again and shoot away. The flash will always fire the same intensity as you commanded.

Voila! You're done configuring the flash for fixed light output. Now, every time the camera's Master flash is fired in Wireless mode, the Slave will put out the fixed amount of light you just specified. (Although your Slave flash is now in manual output mode, your Master flash is unaware of this fact, and will continue to send pre-flashes, intensity values, and the "FIRE!" commands via the Morse Code pulses described at the beginning of the Chapter.)

Figure 7-15 (next page) shows a diagram of how my portable wireless studio is set up.

Obscure TIP: When the 580EX is in Manual output mode, even though the wireless mode switch is set to MASTER, the flash will NOT act as a wireless controller. You can't do a Flash Exposure Lock, pressing the PILOT button actually fires the flash (rather than sending out a "Fire Preflash!" command), and most importantly the slave flashes will not fire.

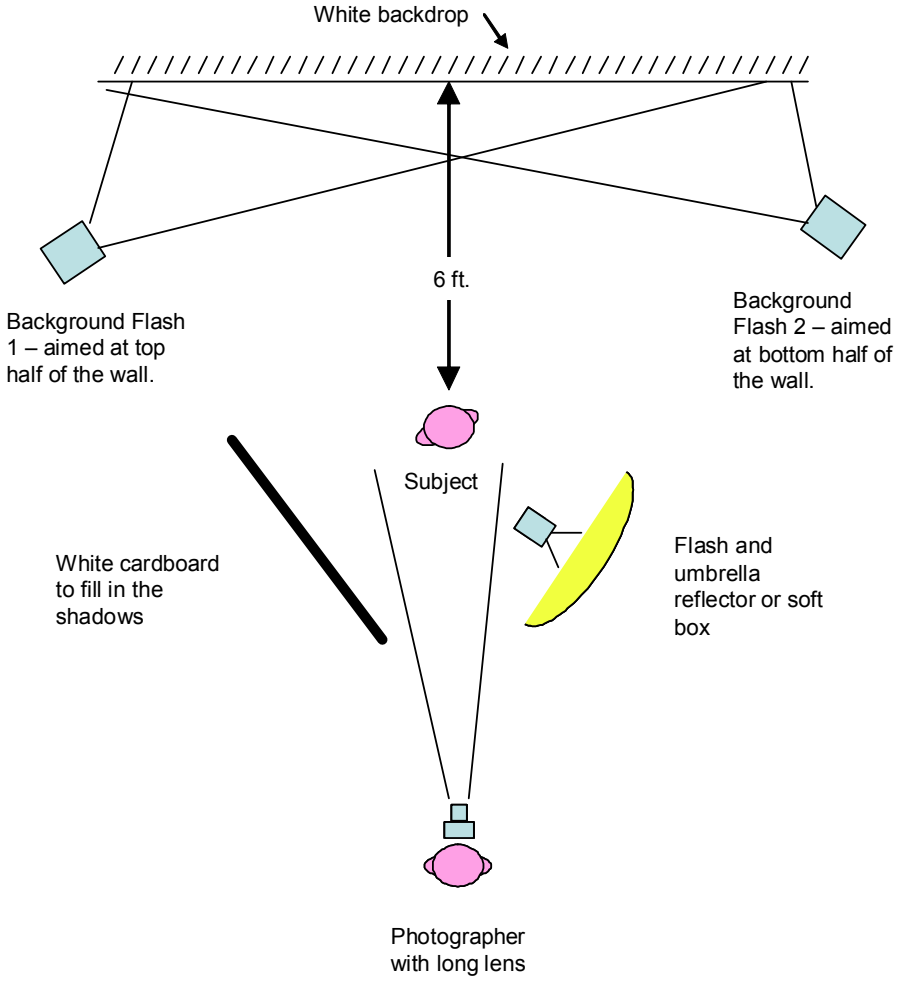


Figure 7-15: Bird's eye view of a portable studio using three wireless slaves.

Bounce Flash

Sometimes you don't have a softening umbrella with you to soften the light as in **Figure 7-3**. A nice trick used for decades by the pros is to use low, white ceilings (if they exist where you are) and bounce the light off of the ceiling – the ceiling acts as a softening diffuser and can make the light look very natural. (See **Figure 7-16**.) Rooms with acoustic ("cottage cheese") ceilings work almost as well except they can sometimes cast a yellow tinge to the image.

This is why some Canon flashes have the ability to tilt up – so the light can bounce off the ceiling. (Some flashes, like the 420EX, 430EX, 550EX, 580EX, and 580EX II can also swivel sideways, to allow bouncing when shooting in vertically; this was shown in **Figure 6-4** of Chapter 6.)

Figure 7-16 Bounce the flash off the ceiling for natural-looking light.

One of the challenges in bouncing a flash is the concept of light falloff – the more the light from the flash has to travel (from the flash to the ceiling and then to the subject), the weaker the flash will be once it gets there. (In technical terms, the the intensity of light is inversely proportional to the square of the distance. So if you double the distance the flash has to travel, the final intensity will be ¼ of what it was before you bounced. So, don't expect anything if you have vaulted ceilings. ☺

Light Modifiers

Even better lighting results can be had using a "light modifier" – pointing the flash UP (like you're going to bounce it off the ceiling) and then attaching a large sheet of paper as illustrated in **Figure 7-18**. (Another example of results using this technique is shown to the right in **Figure 7-17**). This very effective (and inexpensive!) tool takes some of the light going straight up and reflects it forward, sending soft, diffused light toward the subject. The rest of the light bounces off a low, white ceiling, providing natural-looking illumination for the rest of the room. The result is the best of both worlds and very natural looking lighting!

Since light is such an important ingredient to good photography, light modifiers are almost always a necessary part of a great flash picture. However, just like with using bounced flash, the tradeoff is it severely reduces your workable camera-subject distance. (A worthwhile tradeoff in my mind!)

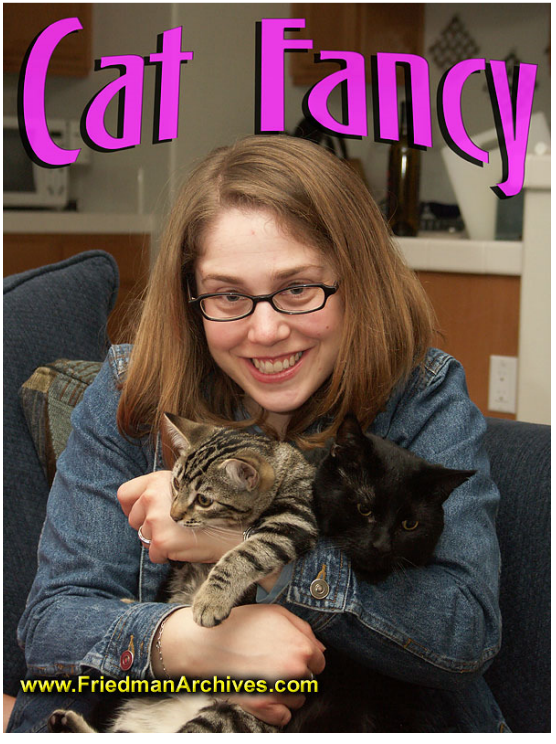


Figure 7-17: An example of natural light using a "light modifier" (a piece of paper attached to the flash, which provides both diffused front light and even more diffused ceiling light). (And fake magazine covers like this one make great gifts!)

Figure 7-18: Examples of Straight on-camera flash (Yuk!) vs. ceiling bounce. The third picture uses an easy-to-make light modifier which takes some of the light destined for the ceiling and converts it into a soft, pleasing subject light. What a difference!

TIP for 580EX and 580EX II owners: This flash has a built-in 17mm diffuser designed to widen the flash beam when using extremely wide-angle lenses. Behind this handy little diffuser is a small white plastsic card called a "catchlight panel" designed to get results similar to the third image in Figure 7-18 above. This trick works best for subjects that are close, like less than 6 feet away.

High Speed Synch (HSS) Flash

The same circuitry that allows a flash to communicate in Morse Code also allows the hotshoe-mounted flash to "spread out" the total light output by providing a steady stream of low-intensity bursts of light rather than just one large one. (See **Figure 7-20** on the next page.) *This means you can shoot with flash at a much higher shutter speed than normal.* In other words, you can shoot outdoors, wide open, and still have your remote flash expose everything automatically (see **Figure 7-19** for an example of this). Equally amazing, Canon has combined the ability to do HSS with Slave flashes wirelessly! This is actually quite a technical achievement, and someone should give the engineers an award for figuring out how to do this.

Figure 7-19: Wireless HSS lets you shoot wide open on a sunny day (1/2,000th in this case), providing for the out-of-focus background and still getting the benefits of wireless flash. Here, the wireless flash with a small softbox was set to the upper left of the subject, who was standing in open shade.

It's a little tricky to explain how they did it, so if you don't care and just want to know how to use it, skip to the "How to Activate HSS" section below.

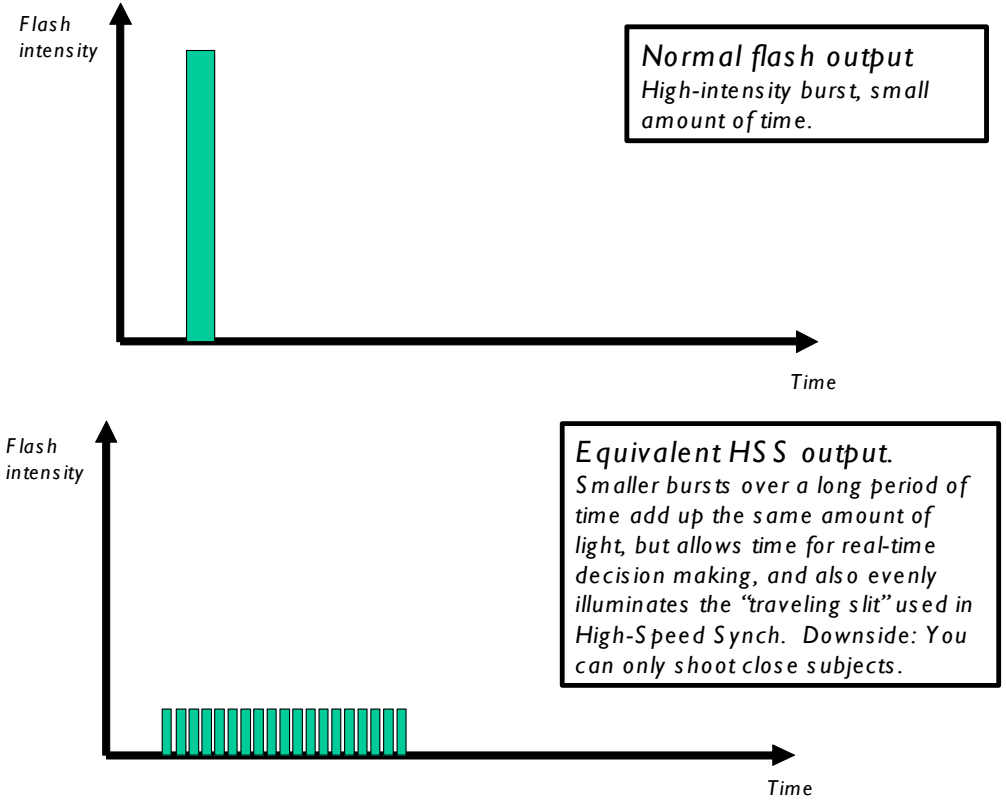


Figure 7-20: The basis of High-Speed Sync (HSS) flash.

How HSS works

Rather than waiting for the shutter to open all the way before triggering the flash (as was necessary before HSS was invented), the flash is told to output several consecutive flashes at once whose intensity is right for the subject (as determined by the pre-flash). This flash pulse stream seamlessly illuminates the subject while the shutter's "traveling slit" exposes each of these small flashes onto a different part of the sensor.

It's kind of like standing outside of a baseball park and looking at the game through a tiny little slit in the fence. You can't see the whole scene at once, but you can move your head left and right and "see" the entire scene a small slit at a time. That's how HSS works – as the shutter's "slit" travels across the face of the sensor, the sensor is provided another thin strip of the scene (via a flash pulse), and the pulses must be perfectly synchronized with the position of the shutter in order for the effect to work right.

Is there a downside to using HSS? Yes. Just as with bounce flash or using flash diffusers, your maximum camera-subject distance is drastically reduced. Knowing the advantages and the limitations can help you get the most out of this very useful option!

Refer to **Figure 7-21** for the button you need to press on the 580EX, the 420EX, and the ST-E2 to activate HSS.

Figure 7-21: To activate HSS, push the HSS button on the 420EX (top), 580EX (middle), or ST-E2 (bottom).

Balancing Ambient Light and Flash

This is probably one of the most difficult subjects to explain, yet one of the easiest to understand. (Kind of like Histograms ☺.) Balancing the ambient light in the room with the light from the flash is exactly what Night Portrait mode does (page 163), and so in a way this section is a bit redundant. The advantage to learning how to do it manually will enable you provide precise control over the intensity of the background (**Figure 7-22**). This section will also explain why the camera behaves differently (producing visibly differing results) when using flash in P, Tv, Av, and M modes.

And so, allow me to walk you through first principles so that by the time you finish reading this section, balancing ambient and flash will be intuitively obvious and you'll be able get exactly the effect you envision using your camera's Creative Modes.

Figure 7-22: The flash is only powerful enough to illuminate your subject, but not the background. In order to get the background to appear, you have to treat the shot as if two completely separate pictures were being taken: First set the exposure so the background will expose well, and then let the flash automatically meter for the subject in the foreground. (Make sure your subject is stationary! If not, they will be as blurry as the moving people in the background of the right image.)

Let's start with reviewing key concepts covered earlier in the book:

1) For any given amount of light, there is a combination of f/stop and shutter speed that will make it render "properly" in the camera. This is just as true for flash images as well as non-flash.

2) The built-in flash is only good for illuminating subjects that are about 12 feet or so away. An accessory flash is only good to about 66 feet. This means that when you take a flash picture of a subject that is far away from the background, the flash cannot possibly illuminate both -- only the subject will be illuminated, and the background will be very dark. This is exactly how point-and-shoot cameras handle their flash pictures, and can often result in images that look like the left image in **Figure 7-22.**

3) We learned in Chapter 4 that when the ambient light is low, you can use long shutter speeds and large f/stops to let in as much light as possible. It turns out that you can do this when using the flash as well. When your camera is in Av, Tv, or M modes, you can set your shutter speed and f/stop freely to match the ambient light level and make it come out as bright as you desire. (See **Figure 7-23**.) (Note: Custom Function 3 must be set to "0: Auto" in order for the shutter speed to adjust to ambient light in Av mode.) There are limits to using this technique – if the light is very very low, then you must use a tripod and your background and subject need to stay perfectly still, or else blurring will occur.

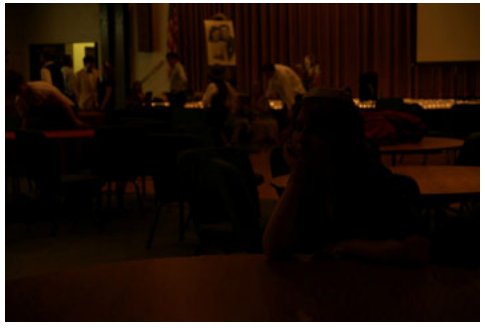
4) When the flash is turned on, the camera determines the proper flash exposure completely independently of how bright the background appears. Recall that the flash exposure is calculated by sending a pre-flash and measuring how much of that light bounces off the subject and travels back through the lens. If you're using a small f/stop, the camera realizes this and tells the flash to output more light to compensate.

5) REMEMBER, WHEN SHOOTING WITH FLASH, THE AMBIENT AND FLASH EXPOSURES ARE CALCULATED SEPARATELY. Making one brighter or darker will have no effect on the other.

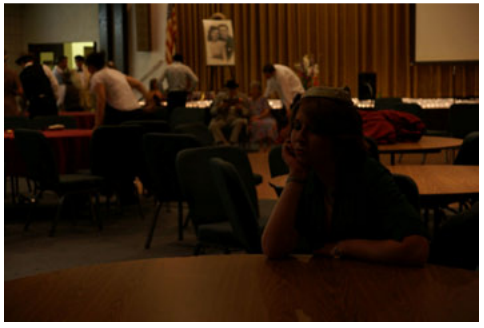
So, whenever I want to balance ambient and flash, I'll set my camera to M (Manual) exposure mode, open my f/stop all the way, and choose a shutter speed that is slow enough to allow more of the background to burn in. (At wedding parties and receptions, this usually translates to about 1/15th or 1/20th of a second – anything slower and my non-statue human subjects will move, causing them to appear blurred.) (I could also have used Av or Tv mode as well – the results would be the same.)

To see all the different variables in action, have a look at **Figure 7-23** and **Figure 7-24**. In the first figure I have the f/stop wide open and I'm changing the shutter speed several times, resulting in varying background intensities. (Ignore the fact that the subject is almost pitch black – we're concentrating on getting the background exposure right here.) Once I got the background to be as bright as I wanted, I turned on the flash and took the shot that appears in the lower-right-hand corner of **Figure 7-23.** Piece of cake!

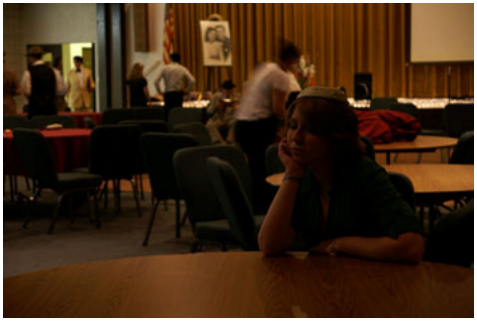
Figure 7-24 provides a little more insight into how changing one variable affects (or in this case, doesn't affect) another.



1/60th second



1/15th second



1/5th second

0.6 second

0.6 second with flash

Figure 7-23: Step 1: With the flash off, find the exposure that produces the desired background illumination. For these shots I opened up the f/stop all the way (f/4.5) and started changing the shutter speeds until the background came out the way I wanted. Step 2: Turn on the flash, and the last image is produced..

1/100th second 1/60th second 1/15th second

1/5th second 0.6 second

Figure 7-24: Here are the same settings as used in **Figure 7-23**, except the flash is firing each time. Notice that the flash will will illuminate the subject with same intensity regardless of how fast or slow the shutter speed is. That's because the camera does not take the ambient light into account when calculating the flash intensity. Plus, the actual flash pulse lasts only about 1/10,000th of a second – far shorter than any of the shutter speeds chosen.

So that's how it's done in principle. But many of you might remember reading somewhere that your Digital Rebel can (with certain settings) automatically balance the for ambient and flash automatically! Can't we just use that instead of learning the needlessly complex techniques of yesteryear's photography masters?

The answer is YES, we can, but in order for the next section to make sense it was important to talk about the manual way of doing things first. It turns out that your camera will handle the balance between ambient and flash differently depending on what creative mode you are in. The table below summarizes all the differences:

Creative Mode with flash "On"	What the camera will do
P or A-DEP	The camera will meter for the ambient light and set the f/stop and shutter speed so that the background will come out properly, **but it will not set the shutter speed any lower than 1/60th of a second.** This guarantees that your flash subject will not be blurry; on the other hand the fast shutter speed also makes it very likely that your background will come out black. You cannot balance ambient and flash in this mode.
Tv	In Shutter Priority mode, the camera will behave the same way as if the flash wasn't used: You dial in the shutter speed (from between 30 seconds and 1/200th of a second), and it will choose the best f/stop for the ambient light. If the amout of ambient light is still too low with the f/stop opened all the way, the f/stop will flash in the bottom of the viewfinder. If this happens, it means your background will likely come out dark. Try selecting

	a slower shutter speed.
Av	In Aperture Priority mode, you choose the f/stop, and the camera will choose the shutter speed according to Custom Function 3 ("Flash Sync. Speed in Av mode": • If CF 3 is set to 1, then the shutter speed will always be set to 1/200th of a second. (This will give you a blacker background than "P" mode above!) • If CF 3 is set to 0, then the shutter speed will be chosen to match the ambient light levels – down to 30 seconds if necessary. (This is identical to Night Portrait Mode.)
M	You can set any f/stop and shutter speed combination you want (between BULB and 1/200th of a second). Be sure to take test exposures to make sure the background is coming out with the intensity desired.
Night Portrait Mode	Identical to Av mode with CF 3 set to "0" (mentioned above). Night Portrait Mode simply gives you a faster means of getting the effect without having to check whether CF 3 was set to "0".

Scholarly Notes:

1) The "1/200th of a second" represent's the camera's fastest flash synch speed. Anything faster than that requires High Speed Synch (which was discussed in the previous section), which is not really compatible with the concept of ambient light flash balancing.

2) When you're looking through the viewfinder in M mode, the meter at the bottom of the viewfinder will only give you readings relevant to the ambient light. (And, in Av and Tv modes, the f/stop and shutter speeds you see in the viewfinder all are based on ambient light.) The camera's meter will NOT tell you whether your flash will expose your subject properly – as mentioned previously, the camera can only figure this out milliseconds before the shot via the pre-flash.

3) When in A-DEP mode, when the flash is ON, the camera behaves as if it were in "P" mode – the camera will NOT try to get near and far things into focus. This is because the flash can really only expose for one distance only, not two subjects at two different distances. (Try it one day!)

4) We learned in Chapter 5 about color balance, and how tungsten light can appear yellow unless corrected. Notice this yellow cast in the background of the sample pictures. Because we're also using flash, you can't correct for the tungsten background (by adding blue to it) because it would also add blue to the flash-illuminated subject, making her look, ummm, blue. And so the pictures must remain as they are, with mixed lighting.

Another Example

Here is an example which combines wireless flash and balancing Ambient and Flash, and shows how these techniques can make a huge difference in a shot. The top image in **Figure 7-25** was shot underneath the pier at the beach – I was hoping to avoid the harsh shadows associated with direct sunlight. Exposing for the face using the ambient light produced an image that was pretty good, but the background was overexposed, and if I had underexposed a little bit to compensate the subject's face would have been too dark.

So, I ran to my car and got my umbrella and light stand (doesn't everyone carry these things in their car?), attached my wireless flash to it and set it up to the left of the subject. I set the camera to Manual exposure mode, metered for the background, underexposed by 1 stop (so the background would be a little on the dark side) and snapped away. What a difference!!

Figure 7-25: Wireless flash outdoors can help you control the light and add a flair of drama to your portraits.

To Probe Further

You can tell I'm a big fan of wireless flash – it gives you some easy and incredible control of light, and in photography light is everything.

If you'd like more inspiration on what wireless flash can do to give you awe-inspiring images, I highly recommend you spend some serious time at the website www.strobist.com. From their introductory page:

> *Think of Strobist as a lighting idea bank, run by and for the most enthusiastic DSLR photographers. Our goal is to exchange ideas with other shooters and post many different lighting techniques - using real-world assignments as examples.*

I find that the multi-faceted blog is written in the same style (and with lots of instructive examples) as this book, making it a non-intimidating read by a blogger who truly enjoys sharing what he knows. If you want to explore wireless flash some more, this is the place to do it! And if you appreciate all the effort that David has put into his site, find the "Make a Donation" button on his site and let him know. ☺

Summary of Chapter 7

- The wireless flash system allows a Slave flash to operate off-camera, and still expose the image automatically as if it were on-camera.
- Lots of examples of its use are included in this Chapter.
- It operates by an on-camera Master flash communicating with the off-camera Slave flashes via tiny pulses of light – not enough to affect the exposure significantly, but strong enough to be seen by the camera even after bouncing off several surfaces first.
- It is a very versatile creative tool that I highly endorse and you really should try!
- Bouncing light off the ceiling and using a light modifier are other great tools for the location photographer's arsenal.
- Light modifiers combined with off-camera flashes are essential to compelling flash images.
- Canon's high-end flashes (like the 580EX) can also be programmed to fire manually, and can control up to three groups of flashes independently.
- High Speed Synch (HSS) allows you to take flash pictures at much higher shutter speeds than otherwise possible.
- The technical mysteries behind balancing ambient light and flash were explained.

Finally, an easy-to-understand manual that is as good as the cameras they describe!

Gary Friedman's book on the Canon Digital Rebel XT (350D) and XTi (400D) DSLRs provides a complete instruction manual which explains each feature in plain English and provides hundreds of visual examples as well.

In this book you'll learn:

- ✔ What every mode, knob, and button do - in plain, easy-to-understand text.
- ✔ The secrets of taking outstanding photos.
- ✔ All about the Wireless Flash - an incredible tool for creativity!
- ✔ The most common digital "jargon" and what it all means to you.
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