Day 12: Control Your Flash Exposure

This lesson is designed to give a little more guidance when using a flash. Here are some simple rules of thumb, but remember that this is always a process of adjusting and muddling though.

First Set Your Background Exposure Level

- Use Shutter speed to do so
- Keep ISO low

Then Set Your Subject Exposure Level

The variables are:

- Camera Controls
  - Aperture: this also controls depth of field, so consider using flash controls.
- Flash Controls
  - Zoom (moves the flash head): simplest way is to limit to one setting (i.e., 35 mm).
  - Power: Your main variable - more about good starting points below.
- Distance
  - Quantity of Light: Determined by Inverse Square law (doubling the distance costs you 2 stops (doublings) of light. Light falls off at a 2:1 ratio to distance.
  - Quality of Light: Determined by distance - the closer the light, the softer it will be.

Indoor/Studio Settings

- As a quick rule of thumb, start with these settings if working in a studio or other interior environment: Shutter 1/160; Aperture f/5.6; ISO 100; Flash Power 1/4. Adjust from there.

Determining Aperture Size

- Sometimes, you want to use a given flash power, but change exposure using aperture.
- When doing so, use this rule of thumb: with flash at full power, if your subject is 10 feet away, use an aperture of f/11.

Determining Flash Power

- Other times, you will want to use a given aperture, such as f/5.6, and change subject exposure using flash power.
- When doing so, use the following rule of thumb: when subject is at 10 ft. use 1/4 power.

Count stops to make adjustments from rules of thumb. Remember to adjust for whatever diffusers or modifiers you use.

Additional Commentary

Part 1
Using Flash Controls and Keeping It as Simple As Possible

In yesterday's lesson we talked all about how to use your flash. We talked all about how to use it and, in particular, how to tone down the power so you don't have that harsh glare in your pictures. But we didn't talk in detail about the power settings. That's what we're going to do today.

The power of your flash depends on many things. It depends on the overall power the flash is capable of producing. And then it depends on what fraction of that power you have set the flash to use. It also depends on how far away your flash is from your subject. And finally, as we discussed yesterday, it depends on your exposure settings - aperture in particular. With all these variables, you may be wondering how to know what settings to use. It can get complicated and perhaps even overwhelming, so before we get into any of that, here are a few ways you can keep things simple.

1. Eyeballing the Exposure

Before we get started, I should note that simple trial and error is an acceptable way to approach the flash. You don't need to get into the technicalities and measurements if you don't want to. That said, I urge you to at least skim this so that you have an understanding of how flash power works, but if, at the end of this, you decide to yourself that this is all too complicated and tedious, and you'd rather just sort of "eyeball" the exposure and adjust from there . . . well, better photographers than I have succeeded with that method, so go for it.

2. The Gist of It

Next, let me try to avoid all the complexities for those who just want simple answers. If you are in a studio or similar indoor setting, it is pretty easy. You simply set your exposure settings to the following:

- Shutter Speed: 1/160th of a second
- Aperture: f/5.6
- ISO: 100
- Flash Power: 1/4

It doesn't get much simpler than that. Remember that this is just a starting point for you, and you should adjust from there.

If you are out and about, however, you will face all sorts of different lighting situations and may not know where to start. Remember to start simple and set your background first. You already know everything you need to know to do that. In doing so, however, if you want to keep things super simple, keep your aperture at f/5.6. This aperture setting is usually large enough to blur out the background and keep it from becoming a distraction, but not so large that your entire subject won't be in focus. After that, just set your flash power according to the following distances:

Distance	Flash Power
20 ft.	1/1
15 ft.	1/2
10 ft.	1/4
7.5 ft.	1/8
5 ft.	1/16

Again, remember that these are just starting points, and you can and should make any adjustments you deem necessary, including adjustments for any diffusers or modifiers you added to the situation.

Part 2
Determining Flash Power and Aperture Settings

If you are satisfied with the explanation set forth previously, you need not read further.

This is for those who want to understand more about how flash exposure works. I don't want to confuse anyone, but at the same time I wanted to provide more for those who are interested in more technical details.

Setting Your Background

Like I mentioned yesterday, you will use your ISO and shutter speed (not your flash) to set the background of your picture. Then you will use the aperture and your flash power to control the exposure of your subject. Let me now flush this out a bit more.

Your flash is firing very, very last. The actual speed will depend on the power you use, but it will generally be under 1/250th of a second. This is important for a few reasons. First of all, it means that the flash will generally fire during the time you have the shutter open, which means that shortening the shutter speed will do nothing for you.

To demonstrate this, let's walk through an example. Let's say that you are using a shutter speed of 1/60 and you have your flash set to fire. Again, the flash is going to fire at something like 1/250th of a second, so it will fire during the time that the shutter is open. But now let's say you want to dial back the exposure so you decide to shorten the shutter speed by a stop to 1/125. You take the picture with the flash, however, the subject looks exactly the same. What happened? Since the flash is firing during the time that the shutter is open (either way), the change in shutter speed won't matter. The flash is controlling the exposure of your subject and the flash power remained the same.

If you are in the field, use whatever shutter speed and ISO suit you. Every situation will be different and there is little I can offer you in the way of guidance. If you are shooting in a studio or you just don't want any background in your picture, there are standard settings that get used. Go with a shutter speed of 1/125 and ISO of 100. These are the settings most studio photographers use.

Studio Settings

If you are working in a studio (or a similar indoor location), try starting with the following exposure settings:

Shutter:	Aperture:	ISO:	Flash Power:
1/160	f/5.6	100	1/4

In fact, this is so common that when asked what exposure settings they are using, many studio photographers will tell you only the aperture. I always find this odd when working with studio photographers, since I'm used to working with all three exposure controls.

As an Aside: High Speed Sync (HSS)

One issue I haven't addressed is what happens if you want to use a shutter speed faster than 1/250. I mentioned that most flashes fire at speed of about 1/250. So, it stands to reason, if you are using a shutter speed faster than that, wouldn't that reduce the overall exposure? Not really – and in fact it will cause you pretty serious problems with your picture. What happens is that the shutter will block a portion of the flash's light as it opens or closes. That usually results in a dark or black area on one side of your picture.

Is there anything you can do about it? Yes. Many flashes support a function called High Speed Sync (HSS), which causes your flash to fire multiple times to address this problem. Using this will reduce the power of the flash, but it will let you use a much faster shutter speed. That's one of the reasons I recommended the upgrade to the Yongnuo YN600 series flash (the Canon, Nikon, etc. models will support this as well). You'll find this particularly useful when photographing outdoors in bright light.

Ok, getting back to the subject at hand – which is setting the exposure for the background – just remember that this will be set with shutter speed and ISO. As set forth in yesterday's lesson, setting the background exposure is Step 1 in our flash process. Get this set first and then we can move on to lighting your subject with the flash.

Subject Exposure

Now let's talk about how we expose our subjects using flash. Before getting into the flash controls, there is one *camera* control you can use, which is the aperture. There are also two controls on your flash, which are the power and the zoom. We'll talk about how each works in the context of flash exposure and then dig into the numbers that you'll need to use.

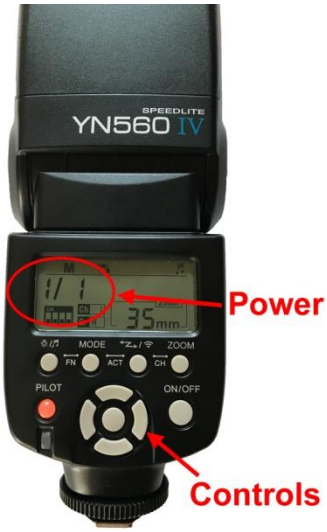
Control with aperture

As you know from our lessons on exposure, the aperture is the opening in the lens that allows light into the camera. You can change the size to let more or less light into the camera during the time that the shutter is open. The aperture is important when thinking about exposure in the context of flash because it will affect how much of the lighting from the flash actually gets to the camera meter.

We'll talk more about specific numbers and settings you might use in your aperture in just a bit. For now, just understand that the aperture setting will be a player when it comes to controlling flash exposure. The measurements, the changes in stops, and the effect on depth of field are all the same as what you learned earlier.

Controlling Flash Power

There are only two controls on your flash. Those two controls are power and zoom. We're going to use those to control the power settings and I will try to make it simple for you. Things get tricky, however, because the distance of your subject has such a dramatic effect on things.



Control #1: Zoom

First let's talk about the zoom on your flash. This control makes the light more concentrated so it can be used at longer distances, or less concentrated so it covers a wider area. Press the button

labeled "zoom" on your flash and watch the top of the flash unit where light comes out – you'll see it move as you press the button. Concentrating the flash allows you to use it at longer distances, but the field of coverage is not very wide. So you can use the flash at, say, 105 mm on your lens at full power and you should be able to light up something very far away. But if you want a wider field of coverage to, say, 24 mm on your lens, you have to set the flash to a wider zoom.

I recommend that you just set your zoom to one level you use most of the time, and then forget about it. You will have enough other things to worry about, so simplifying this will help you (especially when you are just starting out). Try setting it at 35 mm, which is wide enough coverage for almost any of the shots you might contemplate and is just a good, versatile setting. A lot of advanced photographers limit themselves in this way to make all the numbers understandable.

Control #2 - Power

The other control on your flash is the "power" of the flash unit. As you saw in yesterday's lesson, you can control the fraction of the power that gets used. The range is anywhere from full power of 1/1 all the way to 1/128. But what is full power? When we say 1/1, what is the "1" here? How do we determine how much light our flash is blasting out? Is it the same for every flash?

No, it is not. But it is often close. If you want to dive into the numbers, there will be a chart with your flash (or online) that gives you guidance as to the power of your flash. It will tell you the limits of your flash at different power settings using different focal length settings, and it will look something like this:

Guide Numbers for Yongnuo YN560

Flash	Flash Coverage							
Output	14 mm	24 mm	28 mm	35 mm	50 mm	70 mm	80 mm	105 mm
1/1	15.0/49.2	28.0/91.9	30.0/98.4	39.0/127.9	42.0/137.8	50.0/164.0	53.0/173.9	58.0/190.3
1/2	10.6/34.8	19.8/65.0	21.2/69.6	27.6/90.7	29.7/97.4	35.4/116.1	37.5/123.0	41.0/134.5
1/4	7.5/24.6	14/45.9	15.0/49.2	19.5/64.0	21.0/68.9	25.0/82.0	26.5/86.9	29.0/95.1
1/8	5.3/17.4	9.9/32.5	10.6/34.8	13.7/45.2	14.8/48.6	17.7/58.1	18.7/61.4	20.5/67.3
1/16	3.8/12.5	7.0/23.0	7.5/24.6	9.7/32.0	10.5/34.4	12.5/41.0	13.3/43.6	14.5/47.6
1/32	2.7/8.9	4.9/16.1	5.3/17.4	6.9/22.7	7.4/24.3	8.8/28.9	9.4/30.8	10.3/33.8
1/64	1.9/6.2	3.5/11.5	3.8/12.5	4.9/16.0	5.3/17.4	6.3/20.7	6.6/21.7	7.3/24.0
1/128	1.3/4.3	2.5/8.2	2.7/8.9	3.5/11.4	3.7/12.1	4.4/14.4	4.7/15.4	5.1/16.7

These are referred to as guide numbers, and they are telling you the maximum distance for your flash at a given power and zoom level. Overwhelming, isn't it? That's one of the reasons I

recommend limiting your zoom to 35 mm (so you only have to look at one column). In any case, I'm trying to give you some shortcuts here so that you never have to dig into one of these charts.

Using the Guide Numbers

If you did want to use the guide numbers, there is a way you could do so. It all comes down to this formula:

Guide No. / Distance = Aperture

In other words, when we take that guide number for your flash and divide it by the distance of our subject to the flash, we get the aperture that we should use for our shot to get proper lighting of our subject. An example will help you make sense of this.

The chart above says that at full (1/1) power at a 35 mm zoom level, our guide number is 128 (I rounded from the 127.9 in the chart). Let's assume we have a subject 10 feet away. 128/10 = 12.8. Our aperture setting should be 12.8. We'll round to the nearest full stop, which is f/11 (generally round down because sometimes these manufacturers are pretty aggressive about their guide numbers for marketing purposes).

This is how we get to a general rule that you use f/11 at 10 feet. I have looked at the guide numbers for many flashes, and the math works out for virtually all of them. So it is a safe assumption that this is a good starting point for you.

The Effect of Distance on Flash

Now we have a good starting point in that we will use f/11 at full power when our subject is 10 feet away. All we need to do now is figure out what to do when our subject is closer or further away.

If you have used flash at all, you already know that distance has a huge impact on the strength of the flash. The effect rapidly diminishes the further you get from the flash. In fact, the flash will have no impact on things that are far away. Conversely, it will have a huge impact on things that are very close to us. This is one of the things that makes flashes so tricky to control.

There is a rule that allows us to determine how much impact a flash is going to have depending on your distance from the subject. It is called the "Inverse Square Law." It says that as you double your distance from flash to subject, it costs you two stops of light. That is, you need to add two stops of light to keep the same exposure. In works in the opposite direction as well, so that when you halve the distance between flash and subject, you have added two stops of light.

Remember that a stop is a doubling of light. Therefore, doubling the distance means you have to double the light twice to keep things the same. It is a 2-1 relationship.

Changing Aperture to Set Subject Exposure

We remember that the Inverse Square Law says that every doubling of distance costs us two stops of light. If we double our distance from 10 feet to 20 feet, we know that is going to require 2 stops of additional light in order to light our subject properly. We can change our aperture settings to get there. Doing so gets you something like this:

Distance	Aperture
5 feet	f/22
10 feet	f/11
20 feet	f/5.6

From there you can fill in the gaps. Therefore, with our starting point of knowing only two things, we can now have a pretty good idea of how to set your aperture should be for almost any distance.

Powering Down Your Flash

I just spent a lot of time telling you how to power down your flash using the *aperture* on your camera. Of course, all this says nothing about how to power down your flash using the *flash power settings*. That may be what you want to do. Or it might be that you have a specific aperture in mind and don't want to be changing it to control your flash.

Controlling your flash with the power buttons is easy if you keep the discussion we just had above in your mind. This is another situation where using stops as the common currency of exposure comes in really handy.

You already know that using the Guide Numbers, you should start with f/11 at 10 feet. If you want to stick at f/11, you can just count stops and you get the following:

Distance	Aperture	Flash Power
10 feet	f/11	1/1
7.5 feet	f/11	1/2
5 feet	f/11	1/4

But now let's say you want to shoot at f/5.6. You can just count stops to get there, or you can use the following chart to help you:

Distance	Aperture	Flash Power
20 feet	f/5.6	1/1
15 feet	f/5.6	1/2
10 feet	f/5.6	1/4
7.5 feet	f/5.6	1/8
5 feet	f/5.6	1/16

Putting It All Together

To keep you from having to worry about a lot of different numbers, let me try to break it down to a few core precepts:

- After you set your exposure for your background, if your flash is at full power just remember that at 10 feet your aperture is f/11. This is a very common distance for subjects when shooting with flash. Just knowing that should help you quite a number of times.
- If you like to shoot at f/5.6, which is a pretty common scenario for portrait shooters, just start at 1/4 power when your subject is 10 feet away.
- Make adjustments from there, just remembering that it costs 2 stops of light every time your subject doubles their distance from you.
- Remember too that there is no mathematical certitude in the field. There is only "pretty close." Don't fuss too much over distances. These are numbers to get you started. Take the picture, then adjust.

In any event, I want to stress again that in the real world you won't be out there with a tape measure. You'll be moving around. Your subject will be moving around. Time will be limited. This is all going to be fluid and approximate. Get comfortable with this in your head, that way in the field you can work quickly.

Day 12 Assignment
Portrait

Description:

Take a portrait of a friend or family member. Try at least 3 different poses/settings. Use your flash to create it, and work through the 5-step process we covered in yesterday's lesson.

Keys to Success:

- Get a head start: work with your ambient light and flash a little bit *before* starting to photograph your subject.
- Pay special attention to the effect of distance on your light.
- If possible, get your flash off the camera. Not only will this add shape to the light, it will also keep the light a set distance from your subject while you move around.
- Take many exposures and continue to refine the light. Remember that it is a building process. Start with defaults/guide numbers but then adjust from there (often quite a bit).
- Have fun! The quality of your portraits will be directly proportional to how much fun you - and, more importantly, your subject - are having.

Upon Completion of this Assignment:

You should have a nice portrait. In addition, this assignment will put you on your way to getting comfortable with your flash. Don't be worried if you still have to fumble around with your flash - it happens to the best of them.