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# How to Make Exciting Flash Action Photos with Second-Curtain Sync

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14-17 minutes



## HOW TO MAKE EXCITING FLASH ACTION PHOTOS WITH SECOND-CURTAIN SYNC

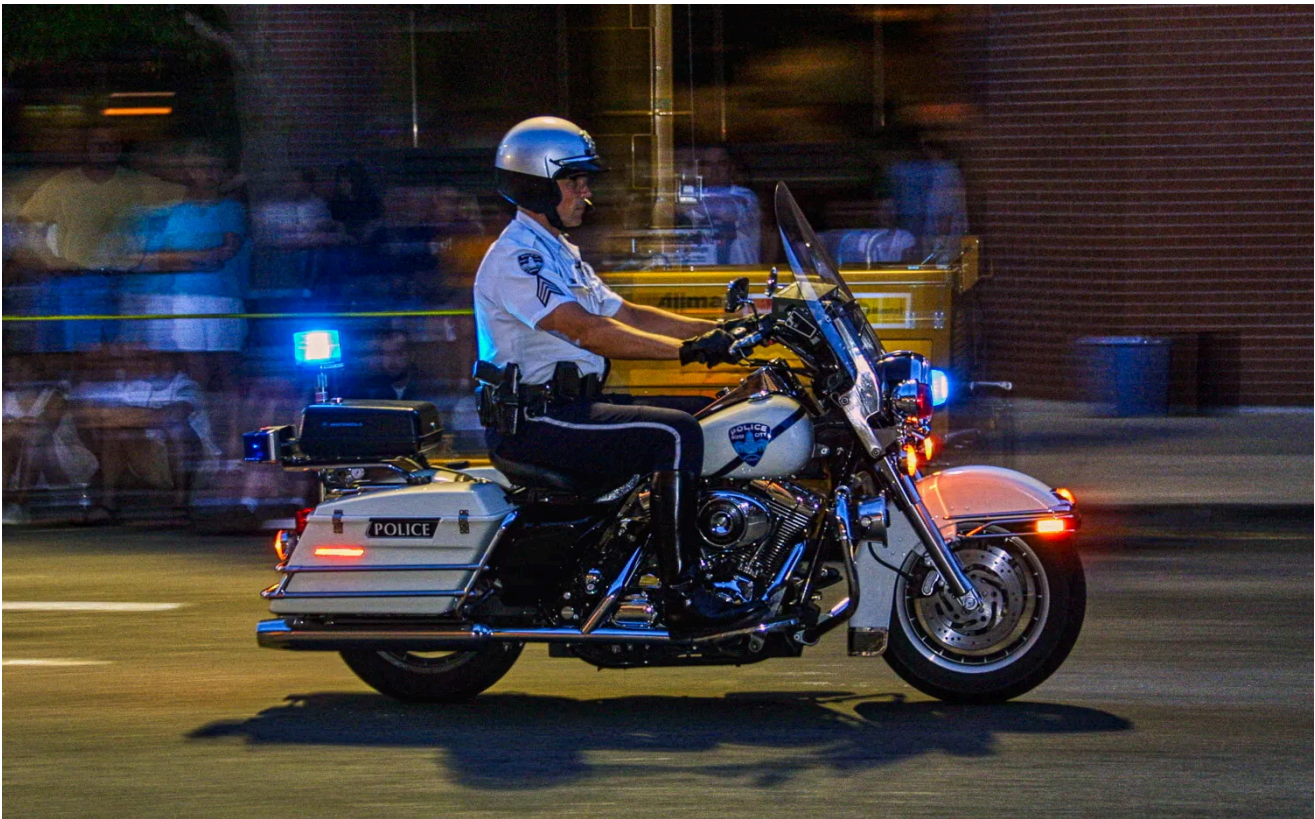


In still photography, we can choose to blur or freeze motion. Or... we can do both! Read on to learn how.

All the excitement surrounding the latest cameras seems to center around their video capabilities. Fine, I guess. But, maybe you're like me, a dedicated still photo shooter with no desire to make videos? I don't need to make things move in my photos, but I *do* want to [illustrate movement](#).

My options?

**1)** Use a [long exposure/slow shutter speed](#) causing moving things to blur creating the suggestion of movement, or



Panning with the subject, and using a slower shutter speed blurs the background, giving a sense of motion. Canon D30 with [Tamron 17-50mm f/2.8 lens](#). 1/60th sec. f/4 ISO 400.

2) Use a short shutter duration to [freeze the action](#), capturing a moment of motion that could not have been seen with the human eye, or



A very short shutter speed will freeze action in many cases. This was lit with bright sunlight only, no flash. Canon 50D with [Canon 50mm f/1.8 lens](#). 1/8000th sec. f/3.5 ISO 400.

**3)** Use the *very* short duration of a flash to capture an even thinner slice of time [freezing very fast-moving objects](#).

But have you considered the fourth option? How might you make flash action photos that combine the motion blur of a long shutter speed with the freezing power of flash in the same shot? Let's explore how that works.



Motion blur + Frozen action = Flash action photos. Combining slow shutter speeds with the freezing power of a flash. Canon D30 with [Canon 24-105mm f/4 lens](#). 1/20th sec. f/4 ISO 400. Canon 500EX flash – Second-curtain sync.

## An exposure within an exposure

When you make a [flash photo](#), you are really making two exposures in one. Open the shutter and whatever available ambient light is there streams in through the camera iris onto the sensor. How much light is controlled by two things; the size of the [aperture](#) (measured using f/stop terminology), and the duration of the exposure (controlled by the [shutter speed](#).)

When we use a flash, the burst of light happens during that same shutter duration. Flash duration is typically much shorter than the total shutter duration and happens “within” the total exposure. Thus, an “exposure within an exposure.”



There are two exposures in one here – The ambient light creates the blur using a longer shutter speed while the flash freezes the action at the end. Canon 50D with Tamron 17-50mm f/2.8 lens. 1-second, f/13 ISO 100. Second curtain sync flash – Canon 500EX.

## Open the curtain and let the show begin

Unless you're using a camera with a leaf shutter (rather rare anymore), your camera probably uses a focal-plane shutter. There are two "curtains" (and that's what they are called), between the rear of the lens and the sensor.

Watch this [slow-motion video](#) of what happens during an exposure.

When the shutter button is pressed: 1) With a DSLR, the mirror swings up out of the way. 2) The first curtain goes down, exposing the sensor to light. 3) The second curtain then comes down, again blocking light from the sensor.

The total exposure duration, the time between the opening of the first curtain and the closing of the second, that is the amount of time the sensor is exposed to light and is what we control with the shutter speed setting.

## Back in the outside world

Outside the camera in the real world, life goes on. If the subject or the camera moves during the exposure, the relative distance it moves during the exposure duration will be recorded as a blur.

Subjects that don't move at all won't blur even during a long exposure.

Fast-moving objects could move quite a bit and thus blur more unless the shutter speed is fast, the exposure duration short, and the amount of motion imperceptible during that brief period.

## Enter the flash

The above describes what happens when a photo is made using only [ambient light](#). It doesn't matter the light source; it could be the sun, the moon, candlelight, continuous man-made lighting sources like incandescent, fluorescent, LED, flashlights, whatever. For our purposes, ambient light is whatever light exists during the entire duration of the exposure.

The flash, however, will be comparably short and happen *within* the duration of the exposure. Depending on output power and the type of flash used, flash duration can be *very* short. Take a look at the chart below illustrating the flash duration of a typical Speedlight (here a [Canon 580EX](#)).

Flash Output Setting	Flash Duration
Full 1/1	1/250 of a second
1/2	1/919 of a second
1/4	1/2,066 of a second
1/8	1/3,759 of a second
1/16	1/6,024 of a second
1/32	1/9,470 of a second
1/64	1/14,000 of a second
1/128	1/20,000 of a second

The lower the power, the shorter the flash duration. However, less power also means less working distance.

At a 1/128th power setting, the flash duration can be as short as 1/20,000th of a second! Even fast-moving objects won't move far during such a thin sliver of time, so they will be frozen by the flash.



Flash did the freezing here – The room was dark, so no ambient light. The shutter speed not that fast – 1/60th sec. f/25 ISO 100 (but the flash at 1/16th power had a duration of just 1/16,000 sec. so everything is totally frozen with no motion blur.

## Ambient + Flash = Flash action photos

Since a photo using flash is an exposure-in-an-exposure, what if we harness the power of *both* ambient light and the flash to use the advantages of each?

What might we get if we used a long exposure to capture the ambient light and thus blur the moving subject and then a burst of flash to freeze it? We could get a photo that combined both motion blur and a frozen subject! We could call that a flash action photo.

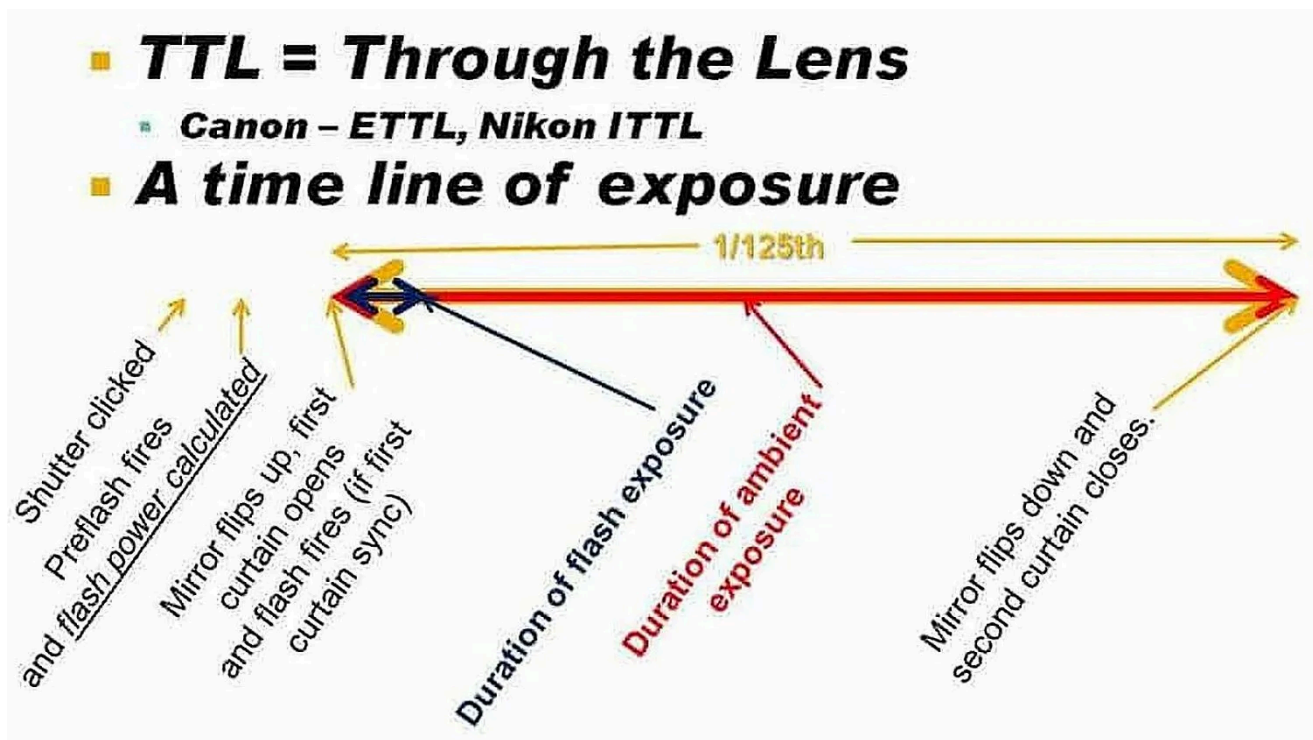


Combine a long shutter speed for the blur with a 2nd-curtain sync flash to freeze the action. Canon 50D with Tamron 17-50 f/2.8 lens. 1 Second, f/5.6, ISO 100

## First versus Second-Curtain Sync

The flash will be fired within the total duration of the exposure. If, say, the shutter speed is  $1/125$ th second and the flash duration at  $1/64$ th power is  $1/14,000$  second, when during that  $1/125$ th second does the flash fire?

The default for most cameras and flashes is to have the flash fire as soon as the first curtain drops to expose the sensor. This is what is termed “first curtain” (aka front curtain) sync.” The timeline below illustrates how that works.



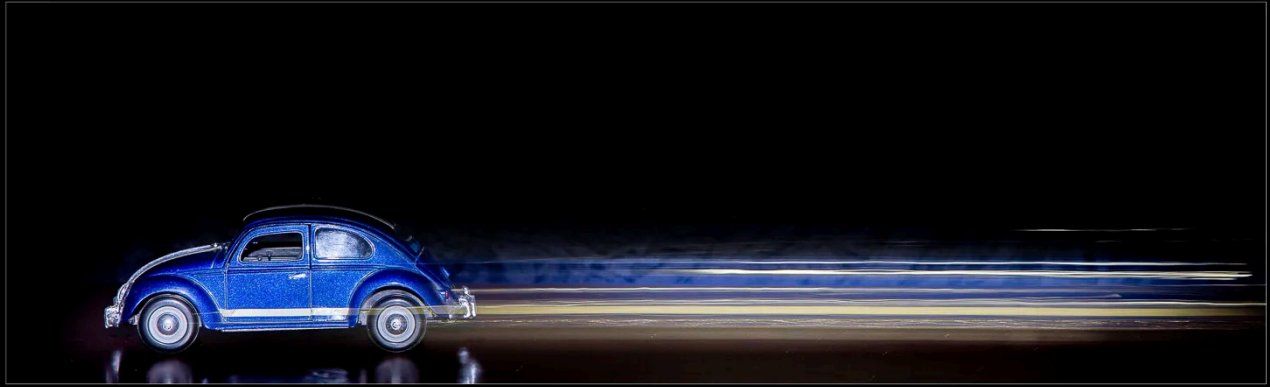
In a standard flash photo with the flash in **ETTL mode**, this will be the sequence with the default first-curtain sync:

- Shutter is pressed.
- Pre-Flash fires (Omitted if Flash is in Manual Mode).
- Camera calculates necessary flash output power needed (Only in ETTL Mode).
- First curtain drops exposing the sensor to ambient light.
- Flash fires.
- Ambient light continues for the duration of the exposure.
- Second (aka “rear”) curtain drops, covering the sensor and the exposure ends.

With most flash photos, especially **things like portraits** and such, the total exposure will be short enough there won't be a noticeable difference between the portion of the exposure made with ambient light and that made with the flash. To best capture the moment, having the flash immediately fire is usually a good thing and probably one reason manufacturers make first-curtain sync the default.

## So why use second-curtain sync?

We started out talking about photos that combine the blurred motion caused by a slow shutter speed with the freezing power of a flash. The problem with the default first-curtain sync that triggers the flash at the beginning of the exposure is that the frozen portion of the image happens immediately, and the blurred portion made with the remaining ambient light happens after. As the subject moves, the recorded blur will be in front of the frozen portion of the shot.



Canon EOS 6D Lens - EF24-105mm f/4L IS USM Exposure - 0.6 sec at f / 8.0 ISO 100



Canon EOS 6D Lens - EF24-105mm f/4L IS USM Exposure - 0.6 sec at f / 8.0 ISO 100

Assuming we want to make the car look like it's traveling forward, the top shot done with second-curtain sync flash looks more natural. All settings were the same and the toy car was pushed from right to left in both cases. The top shot is second-curtain sync, the bottom shot the default, first-curtain sync.

## But that looks weird

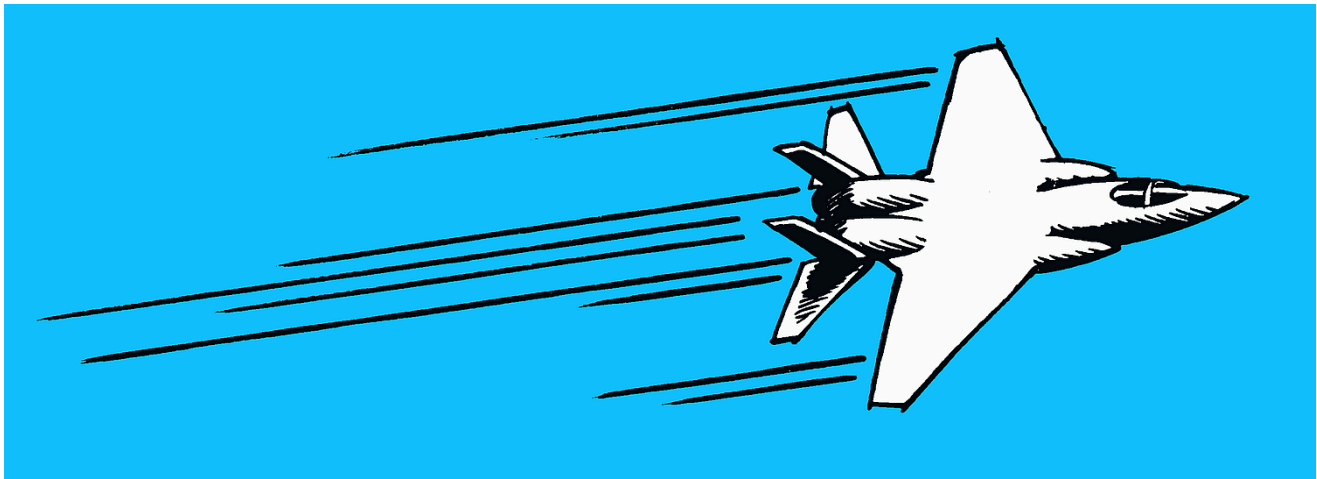
Standard convention is to see the blurred portion of action behind, not in front of the moving object. Illustrators and cartoonists know this and use motion lines (also called "sphericasia") to help depict motion. (They also use Quimps, Plewds, Grawlixes, and a bunch of other cartoonist marks. Check out this [fun read](#)).



Sometimes as photographers, we will [pan with a moving object](#), use a longer shutter speed, and if we pace our pan correctly, get a photo with a blurred background and the subject relatively frozen. The blur will be behind the subject, and that looks natural. But use a long shutter speed combined with a default first-curtain sync flash and...nope...that just looks weird.



Though flying at hundreds of miles per hour, this U.S. Air Force Thunderbirds jet can be made to look motionless with a very fast shutter speed. Canon 6D with Canon 400mm f/5.6 lens. 1/2000th sec. f/5.6 ISO 200.



This is how an illustrator or cartoonist might depict motion using “sphericasia” or motion lines.

## Activate second-curtain sync

So let’s make it look right and create some flash action photos that look correct. You will need to activate [second \(rear\) curtain sync](#). In some cases, this will be done on your camera. In others, you will do it on your flash. There are too many variables of camera/flash combinations for me to tell you just how to do it with your equipment, so you’ll need to get out your manuals. Look for second (sometimes called rear) curtain sync.



Left to right – This is the symbol that indicates second-curtain sync on my Canon 550EX flash. Center and right – Setting up second-curtain sync on my Canon 6D camera. Every camera/flash combination will differ, so you may need to consult your manual on how to get into second-curtain sync flash.

This is usually pretty easy. In the combo I used for this article, a Canon 6D camera with a Canon 550EX flash, it was done on the flash. Once set, I was good to go.



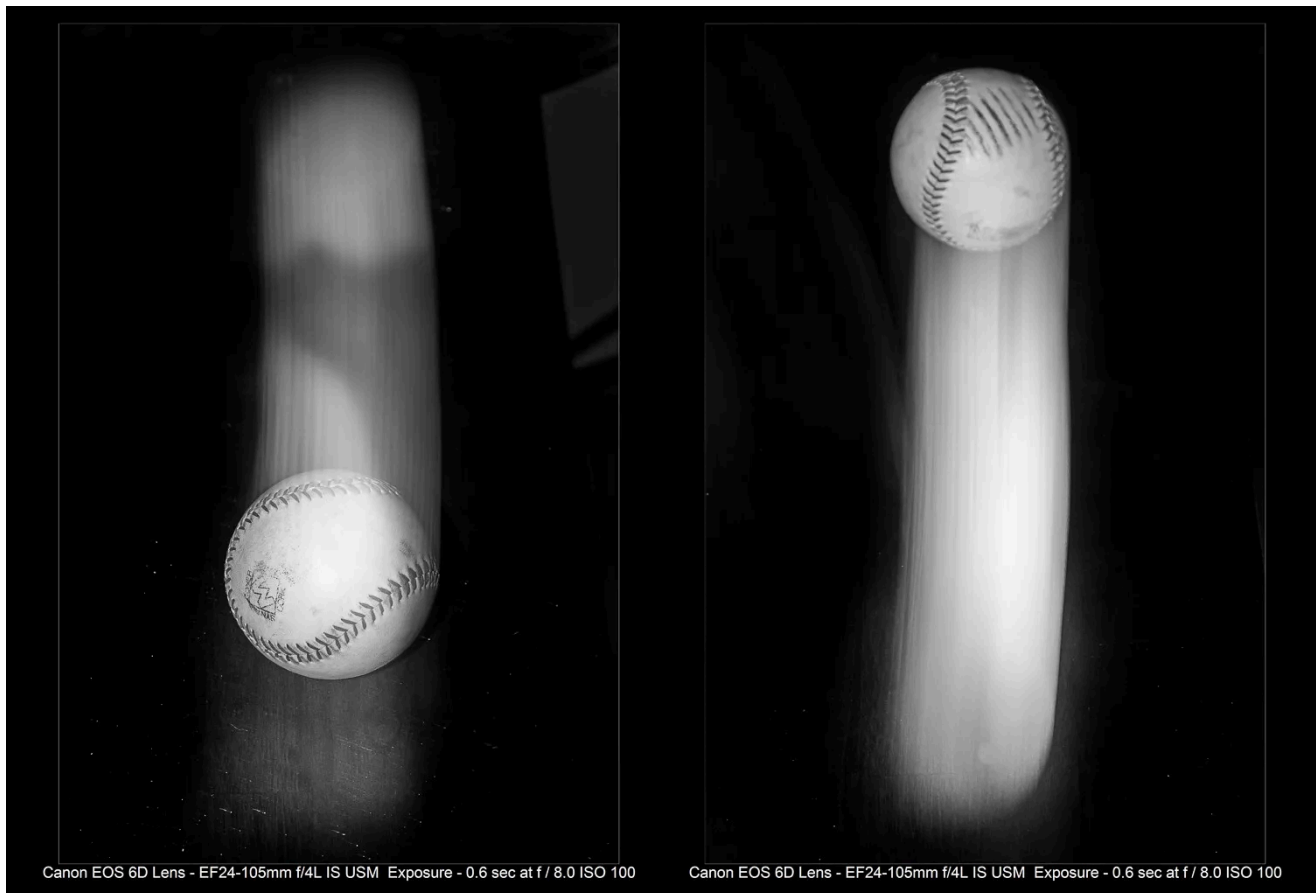
The same action, swinging the hatchet down into the log. was performed in both photos. All the settings were the same except, the left shot used first-curtain sync flash, while the one on the right used second-curtain sync flash.

## Other considerations

You will need to experiment to determine exactly what your settings should be given the variables of amount of ambient light, distance to the subject, speed of the moving subject, and exactly the look you're going for. There is no precise "recipe" here.

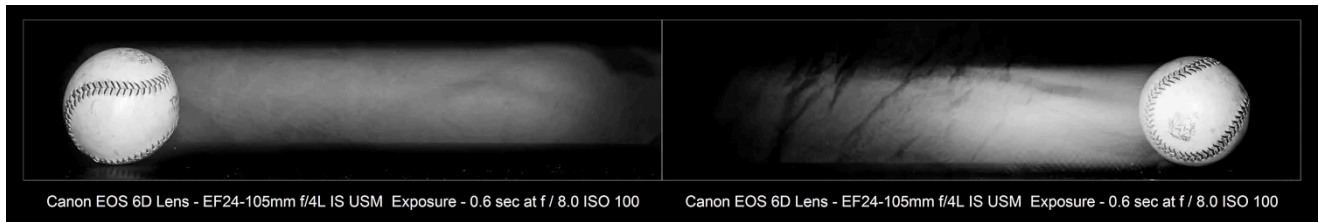
However, here are a few things that may help you get great flash action photos:

- Going **full-manual** with both the camera and flash will give you the most control.
- Going **manual with the flash** should prevent a pre-flash, which you *don't* want.
- Determine what **ISO** and aperture you need to expose for the given ambient lighting conditions.
- Shutter speed will vary depending on the speed of your moving subject, how much blur you want, and whether you'll be panning with the movement of the subject.



Which uses first and which second curtain sync flash? It's hard to tell with objects like this ball. Here's a clue – The ball was rolling away from the camera in both shots.

- You will need sufficient light on your subject to properly expose the ambient portion of the exposure. Take some test shots without the flash to see how things look.
- You will likely want to manually adjust the flash output power depending on how close you are to the subject and how much "freezing" power you want for that part of the photo. Use the aperture and ISO to control the ambient portion of the image, the shutter speed to control the amount of blur, and the flash power to control the frozen part of the image.



Another test... In both shots the ball was rolling right to left. So which uses first and which second curtain sync flash?



If you will be controlling the motion of your subject and also the camera, a remote trigger is handy. Here, I used a [Yongnuo RF602](#) radio trigger.

- The blurred portion of your moving subject made with the ambient part of the exposure will have a translucent, “see-through” look. You will need some contrast between it and the background to help it show up. Shooting a brighter subject on a darker background helps a lot, especially as you learn the technique.



Canon 50D with Tamron 17-50mm f/2.8 lens. 1/6th sec. f/ 4.5 ISO 100 w/ second-curtain sync flash.

## The key – practice!

As with so much of photography, there is no substitute for practice. Getting your camera/flash into second-curtain sync mode is the easy part.

After that, do some simple experiments such as I show, rolling a bright ball across a dark floor. That should help you grasp the concepts.

You will find that timing can be the tricky part. Know that the flash will fire at the end of the exposure, so experiment to determine where the object will be when that happens as it won't be when you first click the shutter.



Illustrate the fast and furious action of cycle racing but still get the expression on the rider's face with a 1/8th second shutter speed combined with second-curtain sync flash. Canon 6D with Canon 70-200mm f/2.8 lens. 1/8th second, f/8 ISO 800.

Move up to something like the hatchet photos I show here, or maybe someone swinging a golf club or baseball bat. When you have the concepts down, head out to a sporting event or something where there's [some action](#), to depict like the bicycle races I show or recruit some dancers or other performers.



Canon 50D with Tamron 17-50mm f/2.8 lens. 2 seconds, f/5.6 ISO 100. Second-curtain sync flash with Canon 550EX flash.

Flash action photos that combine blur and a frozen subject all in one shot, will teach you the principals of ambient and flash lighting. Best of all, you can make some really cool and unique images! Gotta scoot now... have fun!



Canon 6D with Canon 24-105mm f/4 lens. 1.7 seconds, f/8 ISO 100.

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[Rick Ohnsman](#)

Photography isn't just a hobby, it's an adventure! Photography is about sharing my personal vision. From the '70s, with a film SLR and a garage darkroom, college work with 4x5 view cameras, Kodachrome slides and into

the digital age, I've pursued photography for over 45 years. An enthusiastic member of the Boise Camera Club, I share this common passion and enjoy teaching new members. See my work here – [on 500px](#) and on [instagram](#).

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