



High-speed Hummingbird Photography



In order to capture this image, the ISO was set at 1600 and the shutter was 1/3200 @ f8. The reason why the wings were barely stopped is because they were at the end of the downstroke. Indeed a lucky shot.

The Art of Shooting Hummingbirds

Hummingbirds are fascinating but challenging subjects to photograph. With their erratic flight and a wing motion of 80 beats per second (bps), these little creatures are hard to stop. Hummingbirds put your camera AF system and shutter to the test and will surely fill you up with frustration. It doesn't have to be this way. By understanding their behaviors, combined with some photo techniques, you can obtain some jaw-dropping images. The best way to capture hummingbirds in flight is with the use of a multi-flash setup which you all will have a chance to learn how to use. There's a lot of science behind these setups, but it's worth learning how it works.

Understanding Hummingbirds

Hummingbirds are an extremely dynamic species with high energy requirements. Therefore an easy species to attract to a sugar-water feeder. These tiny creatures only exist in the New World, and some countries such as

Costa Rica, Panama, Colombia and Ecuador are the best places to see them in good quantities. The United States has about 18 species of hummingbirds, most of which inhabit the western part of the country, while Ecuador boasts 132 species. Obviously, Ecuador provides a variety of habitats and flowering plants to maintain these many species and may be the land from which most of them originated. The tiniest of all hummingbirds is found in Cuba. The male Cuban Bee hummingbird is only 2.2 inches long. The largest hummingbird is the Giant hummingbird that lives along the Andes and it's nearly 9.1 inches in length. The smaller the hummer, the faster the wing beat; therefore, it's harder to freeze the wings of the Cuban Bee hummingbird at more than 80 bps than it is to stop the Giant hummingbird, which beats at 12bps.

When hovering in front of a nectar flower, the bird will approach, sip some nectar and move a few inches away to hover before trying again. This behavior will allow you to obtain focus when the bird is nearly still in the air, either hovering or while sipping nectar at the flower. Using the

AF-back button will allow you to simply focus on the bird intended flower then release. Once the bird moves in, you can re-activate the AF by pressing the AF-back button again. It's better to use continuous autofocus, but occasionally if the bird moves from the AF point, there's a chance your lens will hunt trying to catch focus on the background.

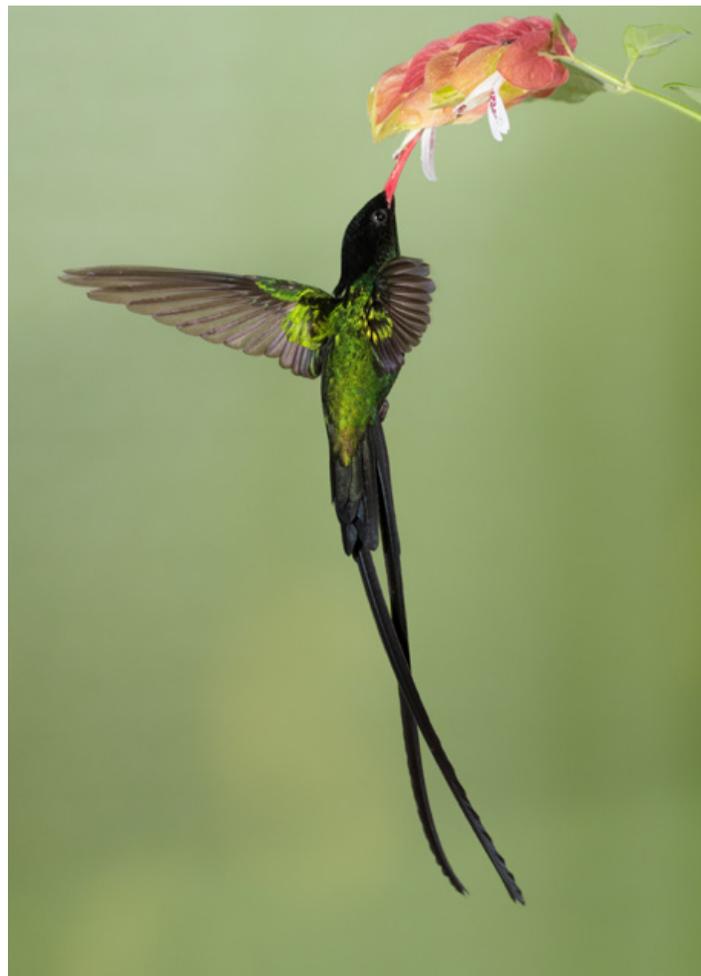
Hummingbirds slow down their wings when they reach the maximum range on both the down-stroke and up-stroke. This allows an opportunity to freeze their wings even when not using a multi flash setup. A single flash and a high ISO were used to stop the Violet-eared Hummingbird on the previous page. The camera was set to ISO 1600 and the shutter speed was 1/3200 at $f8$ with a flash set at 1/32 power setting. But only this shot out of ten came out good enough to keep. In essence you will need a shutter speed of nearly 1/20000 to freeze a hummingbird's wing. Unfortunately most cameras run short of this shutter speed. On average most cameras' maximum shutter is 1/4000 sec. How can we stop them? The answer is flash.

Stopping Power of Flash

The flash is an invaluable tool for the nature photographer, and this is never more obvious than when shooting hummingbirds in flight. While you may have heard that flash helps in getting sharp images in low light, or helps you avoid motion blur when shooting at slow shutter speeds, there's more to the operations of the flash and its full capabilities. It's important to understand how a flash works if one wants to maximize its use. The following section explains the two main flash modes you can use, and how they work.

TTL Mode

On this mode, the flash exposure is calculated based on the amount of light reflected from the subject which is measured by a dedicated flash sensor on your camera. This sensor is different from the ambient light sensor (Continuous light). Once the sensor receives the right amount of



This image was created using a 3-flash setup with an exposure of 1/200 sec. @ $f8$ and ISO 400. The flashes were set up at 1/32 power allowing the wings to be completely frozen.

light to expose a middle-tone subject, it sends a signal to the flash to stop the capacitors from powering the flash tube. This obviously happens at the speed of light. Since a dark subject will require more light to expose it correctly than a lighter subject, the flash regulates the exposure by increasing or decreasing the flash duration. Try shooting a very dark scene using TTL flash and you will experience long recycling time due to the flash discharging its capacitors fully in order to allow the longer duration needed. Doing the same test on a lighter scene will produce shorter recycling times. The TTL-Mode is an automated mode that allows you to tweak the exposure by means of flash exposure compensation either through the camera or directly on the flash.

Manual Mode

In this mode you are able to control the power setting of the flash in fractional increments from 1/1 to 1/128, consequently controlling the flash duration. Thus, the flash does not provide auto exposure, but the amount of light on the subject could be easily controlled by changing the distance between the flash and the subject, power setting, aperture or ISO. The shutter speed does little to exposure as long as that speed is below the x-synch (Flash Synch Speed) of your camera. More on this in the next sections, where we will delve deeper into the functionality of the flash.

Flash Duration

Contrary to most people's beliefs, flash is not just an instant burst of light, but rather a fairly fast release of energy in the form of light. We call that flash duration. When a flash is fired on full power (1/1) the duration is about 1/500 sec. In photographic terms, this seems like a long time. The same flash fired at 1/64 power is nearly 1/20,000 sec. On a full power exposure the process lasts 1/500 of a second from the moment the capacitor starts discharging until it's completely empty. This electro-physics phenomenon is what allows us to freeze a hummingbird even when our shutter speed is slow. In essence, when shooting hummingbirds with a multi-flash setup you will never use a shutter speed above the flash synch of your camera. On average, most cameras synch with flash between 1/60 sec and 1/200 sec.

Below are the typical flash durations of a Yongnuo 560 flash commonly used on hummingbird multi-flash setups.

1/1	1/313 sec.
1/2	1/1359 sec.
1/4	1/2,809 sec.
1/8	1/4,950 sec.
1/16	1/8,065 sec.
1/32	1/12,626 sec.
1/64	1/18,000 sec.
1/128	1/23,000 sec.



This image was shot using 1/500 and ISO 1600 with one on-camera flash on TTL-mode. The blur on the wings is caused by the available light registering the motion blur of the speedy wings.

The lower power settings produce the shortest flash duration. That's exactly what is needed for freezing a hummingbird's wings. While the shutter on your camera may be limited to no more than 1/4000 sec., a 1/20,000 sec. flash of light will be able to expose and freeze your hummingbird. A 1/20,000 sec. flash exposure can fit a hundred times in a 1/200 sec. shutter speed. The fact that the flash is used at its lower power settings also reduces its recycling time, providing non-stop flashes for as long as you press the shutter.

Since the mechanical shutter on your camera will be set at about 1/200, then a flash exposure at 1/20,000 will fit fine within the camera's exposure.

The Multi-Flash Setup

In a multi-flash setup the subject will be lit strictly by the light produced by the flash units. Available or natural light should be kept to a minimum to prevent ghosting - the effect when a faint-blurred double image occurs as result of the available light being recorded following a flash exposure. Hence, using a backdrop is the most effective way to capture hummingbirds in flight. The setup includes 3-4 flash units, a flower holder and a printed backdrop. The backdrop is usually an out-of-focus image of flowers or vegetation to recreate a shallow depth

of field image. Two of the flashes are aimed to light the hummingbird, while the other two could be used to fill the backdrop. In the next page you will find an illustration of the flash setup with the arrangement of flashes, backdrop and camera in reference to the flower to be used to attract the hummingbirds. To keep the birds coming to the same flower, sugar water is injected in it using a syringe.

Exposure will be determined after a couple of tests and can only be adjusted by means of stopping the lens or changing the ISO. Additional exposure adjustments could be made by adjusting the flash-to-subject distance moving the flashes and by feathering the flash, but we'll try to avoid this as it requires resetting all the

elements of the exposure. Once the exposure is tweaked, there's rarely any changes to be made, and all the pictures taken during a session will be well and evenly exposed. The flashes will be all connected to the same power source to prevent changes in their performance or misfires.

For sure you will need to be concentrated when shooting these super fast birds. For this reason, every participant will have a chance to shoot using the setup at intervals. Where we normally photograph the hummers, there are plenty of them to keep the feeder active at all times.

Have fun shooting hummingbirds!!!

