



How to take photos like the one you are seeing here. It's a glass of Champaign, being shot with a BB gun. It is the same idea as posted in [his gallery](#). You can use this technique to take picture of exploding things like tomatoes, watter balloons, watermelons, or even you Canon camera as you smash it against a wall for not understanding the menu (Sorry, could not resist...)



Freezing fast motion (AKA High Speed Photography), can give some pretty special photographic effects. High Speed Photography is used in physics, health research, sports and more. This guide describes how to capture super fast movements using ordinary camera gear and a little home made electronics. I will describes the setup I used the problems I encountered and what I did to solve or work around them.

Here is a nice example of High Speed Photography:

Capturing a balloon just as it punctures



Nuking an apple



Capturing such images introduces a lot of challenges. How does one handle timing with exposures times

faster than $1/6000$ second!?

We have to handle shutter lag, synchronize the flash and time the exposure to just the right moment.

But the shutter lag of any normal camera is so long that it will be all most impossible to time the exposures. And how do you synchronize the flash with an exposure time of less than $1/6000$ second?

To work around the problems with shutter lag and flash synchronization, the exposure is done in a

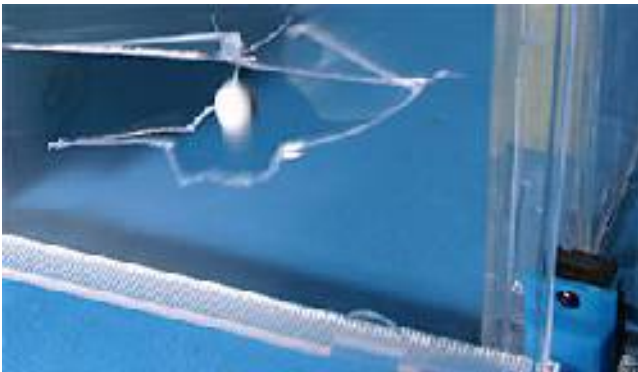
completely dark room. This way the shutter can be opened without actually getting an exposure. The exposure time set on the camera just has to be long enough for the action to happen while the shutter is still open. Because the room is dark, the long exposure time will not have any effect on the final output (this is because no light enters the lens to hit the sensor / film)

To actually get an "exposure", a flash is fired. The flash light duration will now become the actual exposure time.

SO now we need to see how long it takes the flash to fire. It turns out that the output power of the flash, actually affects the duration of the light, so to get exposure times. If you need exposure faster than 1/6000 seconds, the output needs to be reduced. For more information on the light duration please see the [test I ran on my Sigma EF-500 flash](#).

Now we only need to synchronize the flash with the action we want to capture.

This can be done in several ways. For example synchronizing with a balloon puncture, can be done via sound. Impact-actions, like a BB Soft air gun pellets, can be triggered with a mechanical switch, like in the picture below. When the pellet hits the cd-cover it's pushed on to the switch, which then triggers the flash.



Here is my High Speed Photography setup and work flow (Balloon Shot).

The Gear:

- Balloon (OK - we are going to nuke this one, so don't use your favorite)
- Digicam
- Tripod
- Sigma Flash
- Home made sound trigger ([more info](#)). If you do not have an optical slave you can use the [Universal Sound Slave Circuit](#)
- Needle (or BB-gun, see below)
- Backdrop (I use a black Bristol sheet)

The Setup

First step is to set-up the scene. The black Bristol sheet is [used as backdrop](#). The balloon, flash, microphone and camera are placed like in the image below



Gear settings:

- Flash: optical slave and 1/16 output power.
- Camera: Exposure time: 1-2 sec. ISO 100-200 Aperture F 11-16 manual focus.
- Microphone: The distance between the balloon and microphone, is used for synchronization. 50-70cm is good for balloon punctures :-)

Next step is framing and focusing:

While trying to stay within the best performance on the lens, I either zoom or move the tripod, until I have the desired framing. Focus can be obtained either automatic or manual, but do remember to switch to manual to lock focus, otherwise the camera will try to focus when the lights are switched off.

Now it's time to test the setup and lightning. All lights are switched off and the shutter is set to bulb.

To fire the flash I just clap my hands. Then I review the image on the camera, checking for exposure, framing, focus and DOF.

To get the correct amount of light / exposure, one can Increase or decrease:

- the strobe distance to the balloon
- the output power of the flash
- the aperture on the camera
- ISO sensitivity on the camera

Taking the shot (pan intended :))

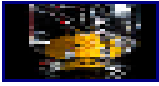
The test is repeated until satisfactory result have been reached, and the real photo can be taken. This is done the same way as when testing, but instead of clapping, the balloon is punctured with a

needle.

One could also just fill the balloon with water and shoot it with a BB Soft air gun :-)



This article was contributed by Karsten Stroemvig (aka [Lullaby](#)), see his other great [high speed photograph projects](#)



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Final Product What You'll Be Creating



*This entry is part 18 of 19 in the [In the Studio](#) Session - [Show All](#)
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Every two weeks, we revisit some of our reader favorite posts from throughout the history of Phototuts+. This tutorial was first published in December of 2009.

This tutorial will make for a fun weekend project that has the potential to spark your imagination, teach you some interesting lighting techniques and even give you some great shots for your portfolio. It's a great way to spend a few hours, experimenting and honing your photography skills.

Step 1 – Get Equipped

- Digital camera with manual exposure control and RAW shooting
- External flash with manual setting (wireless trigger system not needed)
- A tripod
- Photoshop and Adobe Camera RAW
- A towel
- Black backdrop (black material, wall, etc)
- Black surface (shiny piano chair, black material on a table, etc)

- Glass vase / large glass cup, filled with water
- Piece of fruit (eg. a lemon or apple)
- Aluminium foil, cardboard and wax/tissue paper
- Other miscellaneous items for holding things up, anything that can be found around the house
- A very dark location (this is easiest at night)



Step 2 – Setup

Although from the picture below, the setup may seem fairly complex, it is actually quite simple. Put your camera on a tripod, facing your glass vessel for splashing, placed on a black surface, roughly a metre from a black backdrop.

For the lighting (the most important part of this experiment) it is best to shoot the flash through some kind of moderately transparent paper (like “Glad Bake”) to diffuse the light slightly. I also used some aluminium foil, taped to a piece of cardboard to reflect some of that light back on to the setup. More on this in step 4.

The red candles and mic stand are there to help hold everything up, though the redness of the candle adds some nice red highlights to the splashing water as the light bounces off it.



Step 3 – Camera Settings

The key to getting your high speed photos looking good is your camera's settings. The first thing to pay attention to is your lens. I chose a 50mm lens as it kept the camera dry yet did not send me too far away from where I needed to be dropping the fruit.

You will need to ensure that there is as little ambient light as possible, so turn off all lights, shut doors and cover windows. I found that I could get an almost black image if I used an aperture of $f/5.6$, shutter speed of 1.3 seconds and ISO 250. These settings will ensure that everything stays in focus, we have long enough to drop the fruit and take the photo and that the flash can be used on a relatively low power (smaller aperture -> brighter flash -> longer flash duration -> blurry photos).

For focus, frame the image as you want it for taking the photo, put your piece of fruit in the jar and focus on that using auto-focus. Once focus has been achieved you can switch the camera back to manual focus. Make sure throughout your shoot, you check that nothing has been moved and the focus is still tack sharp.

It is important for you to shoot with your camera in RAW instead of JPEG. Though many debate this fact, I believe that it makes post-processing easier and more effective.

Also, if available on your camera, shoot with a two second or ten second timer delay.



Step 4 – Flash and Lighting

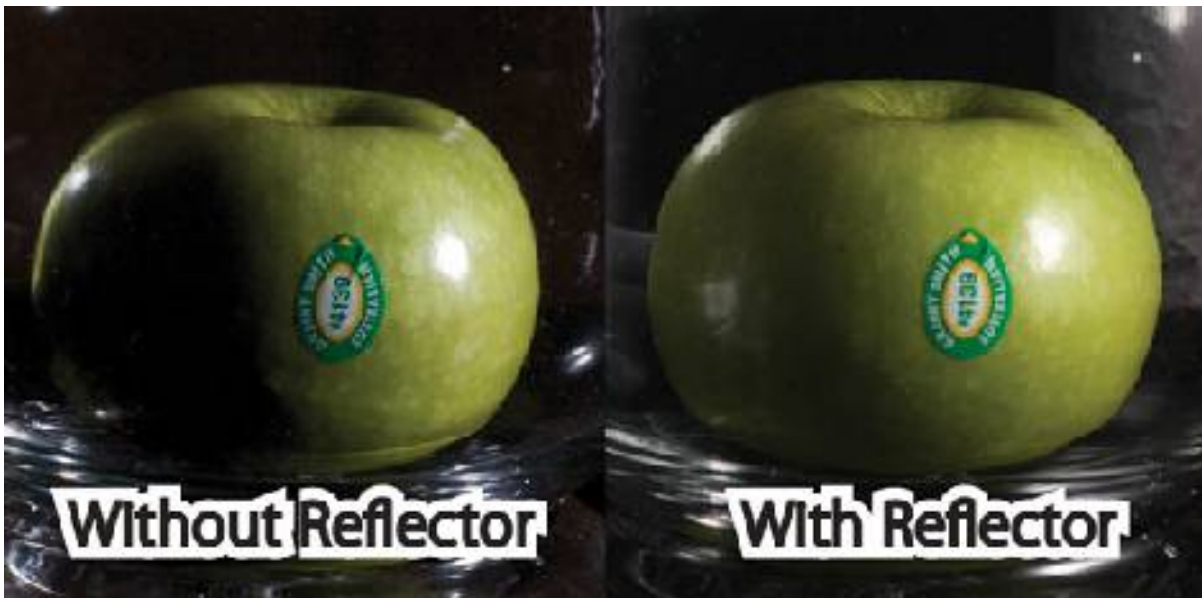
It is important to light this well so that you don't need to do a major operation during post processing. It is important to get the background at least a metre away from your main set-up so that no light is spilt onto it and it remains completely black.

When choosing which flash to use, make sure that it has manual power control and can also be manually triggered (generally by a "test" button). Because you will be manually triggering the flash during the exposure to time it with the splash of the apple (rather than timing, dropping the apple for the flash which is harder) you do not need a wireless flash trigger, just some ninja reflexes and timing (it isn't really that hard).

Shooting the flash through a paper diffuser will allow for softer light and nicer specular highlights on the apple, glass and water. The paper will also play a huge part in keeping your flash dry.

I also made a home reflector by taping some foil onto a piece of cardboard. Placing this on the opposite side of the glass vase to the flash added some fill light, to keep everything nice and even.

Once this is properly set up do some test shots to see how bright you need the flash. Remember that using a smaller flash output will lead to shorter flash duration and sharper photos. I found that 1/32 power worked well for my Canon 430EX II but this will depend on flash model, distance from subject and the thickness of your diffuser. Just make sure that you keep things consistent throughout your shoot.



Step 5 – Shooting and Timing

This step is the fun part. You will need to master the art of pressing the shutter with your left hand, waiting for the timer to end, then dropping the fruit with your right hand and firing the flash with your left hand (or with your hands the other way around). I'll break that up a bit for you:

- Press the shutter button on your camera (starting the timer)
- Before the timer finishes get one hand holding the fruit above the water and the other hand on the test button on your flash
- After the timer finishes and the exposure begins, drop the fruit into the water
- When the fruit splashes, trigger your flash

It is important that you are careful not to drop the fruit from too high. Water splashing onto the floor and setup is inevitable, but if your camera is far enough away, your flash is behind paper, you don't drop the fruit from too high and you have a towel handy, everyone should be happy.

I find that you get the best splash in your photos if you trigger the flash as the fruit hits the bottom, though this will take a lot of trial and error and you will probably end up with a lot of photos of your fruit hovering over the surface of the water. The key is to take a lot of photos.



Step 6 – Choosing the Best Pictures

After uploading your photos to your computer it is important to choose your favourite few, because you don't want to go to the effort of editing every single one. I find that as these pictures often differ a fair bit, batch processing is not very effective.

I chose about 5 that I wanted to take to Photoshop. Make sure the images that you are choosing are well focused and have an interesting or unique splash in them, either are really big splash, or a cool pattern.



Step 7 – Editing the RAW Files

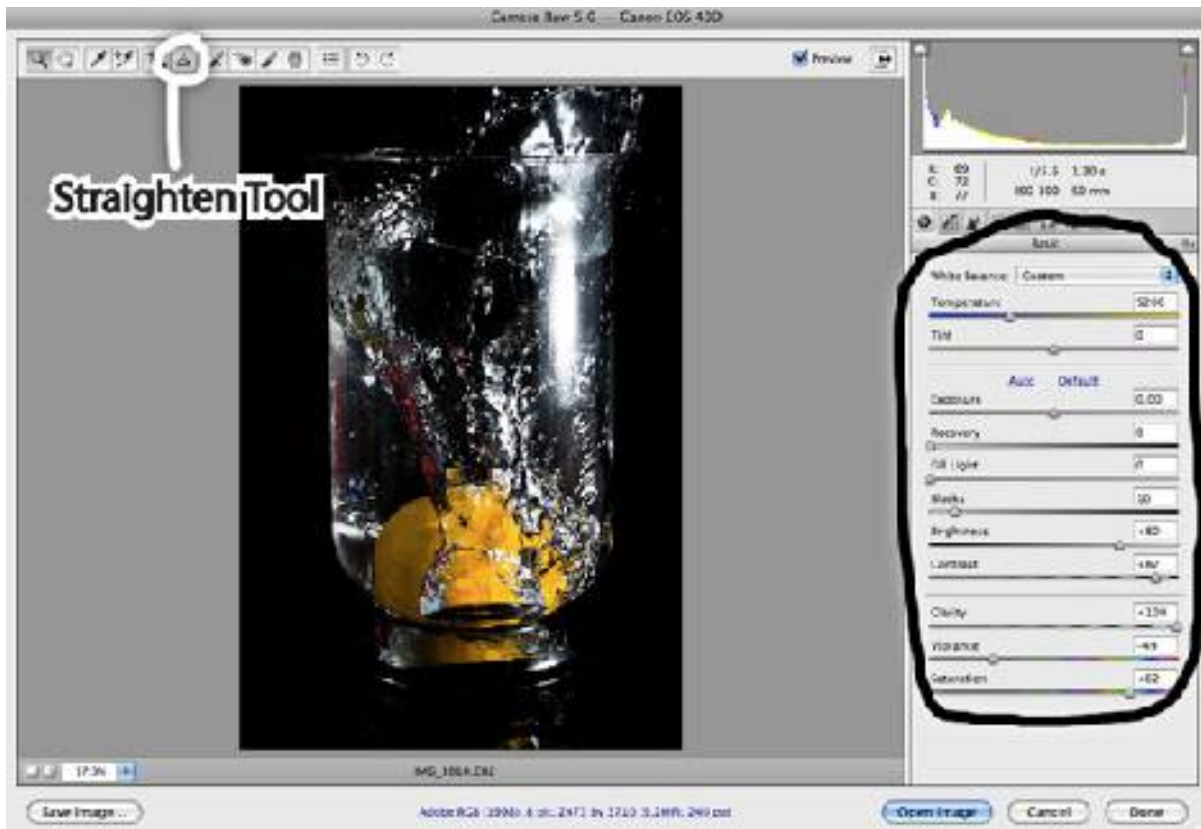
The first thing to do after choosing the best few photos is to open them up in Adobe Camera RAW. This process can vary greatly from camera to camera so you may need to research that process elsewhere, but as long as you have a relatively new version of Photoshop you will have this little application.

Once you have an image open in Adobe Camera Raw, it is good to make sure it is straight. If your tripod wasn't aligned properly (like mine) you will need to use the straighten tool to get things

looking upright.

I then made the following edits in the “Basic” tab on the right hand side. “Blacks” were increased to 10, “Brightness” to 80, “Contrast” to 87 and “Clarity” to 100. These are not exact values, but they help get the image looking nice and sharp and contrasty. I also decreased the “Vibrance” to -49 and increased the “Saturation” to 62. This helped bring out the yellow in the lemon and the red in the reflections in the water, while reducing some of the other colour slightly.

Now click “Open Image” and we’re ready to start the finishing touches.



Step 8 – More Photoshop Editing

Now that the image is in Photoshop proper, it is good to add a little more contrast. To do this, simply duplicate the layer by hitting “Command-J” on the keyboard (“Control-J” for Windows users). Now go to the layers window where the new layer should already be selected and change the blending mode from “Normal” to “Overlay”. Then to reduce this effect, drag the layer’s opacity down to 50%.

With this particular image, I found that after all of this editing, there was no detail left in the reflection on the chair. To fix this I re-opened the original RAW file in Adobe Camera RAW and then dragged the “Fill Light” slider up to 60. I then clicked “Open Image” again, selected all of this new picture in Photoshop by typing “Cmd-A” (“Ctrl-A” for Windows) and copied it by typing “Cmd-C” (“Ctrl-C” for Windows).

The next step is to return to the original Photoshop file and paste in the newer, lighter image by typing “Cmd-V” (“Ctrl-V” for Windows). Now click on the “Add Layer Mask” button, next to the fx button in the layer window. To hide this layer, invert the mask by typing “Cmd-I” (“Ctrl-I” for Windows). Now select a large, soft brush, change the foreground colour to white and paint in that lower area where the reflection is. You should see a big difference in the amount of detail as you bring back the lighter layer.



Step 9 – The Final Re-Touches

I think that these images look better when presented in landscape mode, so click “File” -> “New”. Check that the dimensions for width and height are the same as in the current image. If they are, leave the height the same and to find the new width, multiply the height by 1.5. For example, 3710 (current height) x 1.5 = 5565. Type in this new value for the width and click “OK”.

Now that you have the blank image open, make the background black by typing “Cmd-I” (“Ctrl-I” for Windows). Now head back to your original image, type “Cmd-A” (“Ctrl-A” for Windows) to select everything and then “Cmd-Shift-C” (“Ctrl-Shift-C” for Windows) to copy all layers. Head back to your new landscape file and type “Cmd-V” (“Ctrl-V” for Windows) to paste the image.

Things are looking pretty good now, but I like to take out a soft black brush and paint over some of the spots and drops that don’t seem to belong. For non-destructive editing you can do this on a new layer, but that is up to you.



Final Image and Other Examples

Now you are all finished. Make sure that you experiment a lot to make this your own. Here are a few of my examples, using the same set-up and processing.



