

Night Photography 101

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Recommended tools for night photography:

- Sturdy tripod
- Cable release or timer cable release (timer ones are highly recommended)
- Battery grip
- Fully charged batteries (at least 2)
- Calculator (most cell phones have them) if you don't like doing math in your head
- Warm clothes
- Headlamp/Flashlight
- Patience

There are two primary methods for taking long exposures at night, single and stacked long exposures. Here I will outline their pros and cons and how to choose which method to use.

Single long exposures have been the standard in night photography for a long time and will be the method you choose most of the time.

Pros:

- Can get a properly exposed image with VERY little ambient light
- Takes up little space on a memory card
- Faster post processing (no stacking involved)
- Used for most night images

Cons:

- Will over expose quickly with too much ambient light (cities/full moon)
- More **long exposure noise** to be subtracted from image
- Takes twice as long to process with long exposure noise reduction on (a must)
- Eats battery life. Risk losing the image if the battery dies in the middle of processing

The stacked long exposure method, on the other hand, is a relatively new technique developed after the introduction of digital cameras. It's definitely a good option to know about if you are shooting in an area with lots of ambient light.

Pros:

- Great for startrails around cities or when there is a relatively full moon.
- No long exposure noise reduction necessary
- Can use a higher ISO since **ISO noise** and **long exposure noise** will be averaged out
- Easier on battery life. Can shoot till you run out of battery or memory card space if you want

Cons:

- Doesn't handle clouds well
- Takes up a lot of memory card space
- Takes much longer (and more work) in post processing since stacking is involved
- Only useful for startrails

TEST SHOTS:

The most useful technique I've found for shooting night shots is first finding the proper exposure by taking **test shots**. I've met quite a few photographers who will set up their camera for a long exposure and fire away only to find that they have either under- or overexposed their shot. Taking test shots should be the first thing you do after you find a composition that you like. In general your test shot will be with the aperture wide open (or around f/4) and at a high ISO. I have dedicated C3 on my mode dial as a general starting point for long exposures. The settings I have for this mode are:

- Shutter Speed: 30 seconds
- Aperture: f/4
- ISO: 1600
- Delay: 2 seconds
- Long exposure noise reduction: OFF

After taking the first test shot I make adjustments to the ISO as necessary to find the proper exposure. Make a note of these exposure settings, either in your head or on paper.

SINGLE LONG EXPOSURES:

First start with the test shot procedure outlined above. Once you have the proper exposure at a high ISO you are ready to translate this exposure into the actual shot settings. Change your mode dial to the proper mode (Manual or Bulb depending on the camera) and turn on long exposure noise reduction. If you are shooting startrails I would suggest only changing the ISO and keeping the aperture around f/4 in order to pick up the light from the stars. Otherwise change the aperture to get the desired depth of field and then adjust your ISO to the desired noise level. This leaves shutter speed, here's where the math comes in and you have to recall the light doubling (or halving) rules.

- Aperture & ISO: Each move to the right halves the amount of light reaching the sensor. So to keep the same exposure you'd have to double the shutter speed with each step.
 - f/1.4 - f/2 - f/2.8 - f/4 - f/5.6 - f/8 - f/11 - f/16 - f/22
 - 25600 - 12800 - 6400 - 3200 - 1600 - 800 - 400 - 200 - 100 - 50

Example:

Test shot settings:

- Shutter speed: 30 seconds
- Aperture: f/4
- ISO: 3200

If I knew that I wanted to use f/8 and ISO 100 here's the math:

- Going from f/4 to f/8 is **2 halvings**
- Going from ISO 3200 to 100 is **5 halvings**
- I need to **double the shutter speed 7 times**, starting at 30 seconds I get:
 - 1min - 2min - 4min - 8min - 16min - 32min - **64min**

So the proper exposure is:

- Shutter speed: 64 minutes
- Aperture: f/8
- ISO: 100

Dial in the proper settings (if you have a timer cable release you can actually dial in the exact shutter speed, otherwise check your watch), and fire away!

STACKED LONG EXPOSURES:

The procedure for stacked long exposures is very similar to single long exposures above. There are a few differences though first of which is to make sure that you have **long exposure noise reduction turned off**. If you leave this on then there will be gaps between each image and the star trails will look like dashed lines instead of solid lines. Next you will note from above that a lot of the noise from using a higher ISO will be averaged out during the stacking process so feel free to use a higher ISO. Keep in mind, however, that doing this will reduce the sharpness and saturation of the overall image.

If you have a cable release (as opposed to a timer shutter release) then you will be limited to stacking 30-second images. Make sure that you change your shooting mode from single shot to **continuous**, this way when the cable release is locked down it will fire one 30-second shot after another.

If you have a timer cable release then you have the freedom to choose the length of each exposure. This is nice for a couple of reasons; you can choose a lower ISO and regain some saturation and sharpness back, and it doesn't take up as much memory or time during post processing since you will have fewer shots if each shot is longer. One note--I would advise against setting the exposure for too long as the fewer shots you have, the less averaging occurs, so more noise may creep into your image. I usually try to get at least 10 shots to average together.

Now you are ready to dial in the proper exposure and fire away!

A note on post processing stacked images: feel free to change colors, white balance, etc. and apply to all images before stacking, but leave the sharpness, clarity, and structure changes for the single image you get out of stacking.

Stacking software:

For Microsoft Windows users:

<http://www.startrails.de/html/software.html>

For Mac & Photoshop users:

<http://www.schurstrophotography.com/software/photoshop/startrails.html>