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STAR-TRAIL ASTROPHOTOGRAPHY

With the help of the Earth's rotation, you can create dramatic night-sky shots

IN PREVIOUS COLUMNS, I've described how you can take a pinpoint star image by using a tracking mount or by simply shooting a short exposure with a wide-angle lens. But there's another style of night-sky photography that uses the opposite approach. Instead of trying to compensate for our planet's rotation, you harness it to produce stunning star-trail photos. All you need to do is place your camera on a tripod, aim it skyward, press the shutter and let the Earth's motion do the rest.

There are two ways to create a photo like the ones shown in this article. You can either open the shutter for an extended period or record a series of shorter exposures and digitally assemble them into a single image later. Both options have their advantages and disadvantages, but no matter which you choose, some preparation is necessary.

PRELIMINARIES

Star-trail photos look best when you shoot them under dark, moonless conditions. This ensures that the sky background doesn't appear washed out, which looks unattractive and obscures faint stars. You'll also need to mount your camera on a sturdy tripod so that it remains perfectly stationary for the duration of your exposures, which could total several hours. As for camera settings, you'll be working in Manual (M) mode, but make sure you turn off the long-exposure, noise-reduction and image-stabilization features. Set your lens to manual focus and check that the camera battery is fully charged.

You can save yourself a lot of frustration by making these adjustments before going outside—it's no fun fumbling around with your camera's dials and tiny buttons in the dark. You can even pre-focus the lens during daylight by aiming at a distant object, then manually tweaking the focus later using "live view" (if your camera has that feature) or with a series of short test images.

Long exposures invite another problem: dew. Since your camera will be pointing skyward for extended periods, there's a very real chance that moisture will condense on the lens and spoil your images. To prevent this, use a lens hood, and if conditions are particularly moist, use a rubber band to attach one of those little chemical pocket hand warmers to the underside of the lens. That will keep the glass warm enough to prevent dew from forming.

KEEPING IT SIMPLE

The most straightforward approach to star-trail photography is the "one and done" method. Set your camera to Bulb (B) mode, then take an exposure lasting several minutes to a few hours. To do this, you will need a remote shutter-release cable or an intervalometer with a locking shutter button.

Try putting your camera's ISO at its lowest setting (usually ISO

STAR PARTY STAR TRAILS The main image, below, comprises sixty 30-second exposures captured last August at the Merritt Star Quest, in British Columbia. Combining the individual photos with StarStaX software produces star trails as long as those in a single half-hour exposure. To obtain this striking effect, the author used a Canon 6D DSLR at ISO 3200 and a 15mm fish-eye lens working at f/2.8. Left: Quadrupling the number of exposures captures two hours of motion and yields star trails four times longer. Stopping down the lens from f/2.8 to f/4 or f/5.6 would have thinned out the streaks for a less crowded image.

SIMPLE STAR TRAILS The image at left was taken in an urban location by setting the camera to Bulb (B) mode and exposing for 1 hour. Although simple, this approach has the drawback of producing thermal-noise artifacts, which show up as multicoloured specks in the cropped portion of the image above. The photo was captured with a Canon 80D DSLR camera at ISO 100 in combination with a 10-22mm zoom lens set to 10mm and f/7.1.

100), and stop the lens down to around f/8 to avoid overexposing the background sky. Wide-angle lenses tend to produce the most interesting results, but as with most astrophotography, experimentation is key.

While the simplicity of this approach makes it appealing, there are a couple of significant disadvantages. First, the longer the exposure, the more obvious the sensor thermal noise becomes. This shows up on your photos as unattractive multicoloured speckles. Second, if something goes wrong at any point during the exposure—such as an aircraft or a satellite crossing the field of view or your lens getting blasted by car headlights—the image will be ruined, and you'll have to start over. However, when everything works, you can bring home a fine image requiring minimal tweaking to make perfect.

ORION RISING The constellation Orion is a perfect target for star-trail photography. For a given exposure time, stars near the celestial equator (like the stars of Orion) produce longer, straighter trails than those near the poles, which are more curved but shorter. This single 4-minute exposure was captured at Pine Mountain Observatory, in Oregon, with a Canon 80D DSLR at ISO 3200 and a 10-22mm zoom lens set to 22mm and f/4.5.

STACKING THE DECK

A second technique for creating star-trail images combines a series of short exposures to create the final photo. This is the procedure that most people use, and it avoids the pitfalls of the single-shot method. Set your camera to Manual (M) mode, and select a shutter speed of 30 seconds. Set the ISO fairly high (ISO 1600 or 3200), and open up the lens to its widest aperture (f/3.5 or greater) to let in as much light as possible.

To avoid gaps in your star trails, you have to minimize the time between the end of one exposure and the start of the next exposure. To do that, turn off any features that slow down your camera's shot-to-shot speed, such as the automatic image review and long-exposure noise reduction.

Once again, you'll need a remote release or intervalometer capable of locking down the shutter release. Set your camera's drive mode to continuous shooting, then make a series of 30-second images—one right after another—until you have acquired several dozen or even several hundred individual "subframes."

After you've completed your imaging sequence, it's time to combine the subframes into a single photo. If you use Adobe Photoshop, open each exposure as a layer and select a blending mode of "lighten" to stack them. If you have no idea what any of this means, don't worry, there's an easier way.

STARSTAX MAGIC

StarStaX (www.starstax.net) is a free program that runs on both Windows and Mac computers and allows you to combine all your subframes into a single star-trail photo. (If you've shot in RAW mode, you must first convert your images into either jpeg, tiff or png files for StarStaX.)

StarStaX has some very helpful features. For example, if one of your subframes is ruined by a satellite or an airplane crossing the field of view, you can delete it and use the software's "gap-filling mode" to compensate for the missing image. And StarStaX's "comet mode" produces novel results by gradually ramping up the brightness of the subframes to make each star trail look like a comet.

Shooting individual subframes has additional advantages. One is that you can choose shorter star trails in your final image by leaving out frames at the beginning or end of the image sequence. You can also utilize the individual frames to make a short time-lapse movie with software such as iMovie or Time-Lapse from Microprojects.ca or Windows Movie Maker for PC users.

No matter which method you choose, creating star-trail photos is fun and requires only basic equipment to achieve some very dramatic results. ✦

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OBSERVATORY STAR TRAIL This star-trail image (also taken at Oregon's Pine Mountain Observatory) illustrates a compromise technique that utilizes a smaller number of slightly longer exposures. The photo was produced by combining twelve 2-minute images. Using fewer subframes for a longer duration reduces the amount of postprocessing required while still yielding less noise than a single long exposure. Each subframe was captured with a Canon 80D DSLR at ISO 3200 and a 10-22mm zoom lens set to 10mm and f/3.5.