SHOOTING RECONSTRUCTION WITH LASERS

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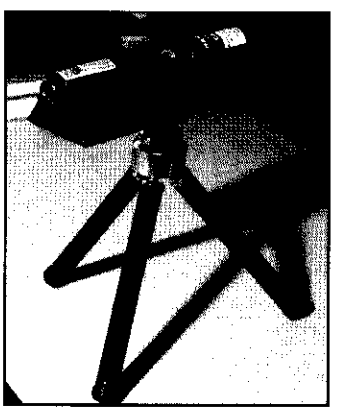
Reconstructing shooting incidents can be of immense value to investigators. Photographs of these reconstruction efforts can be of even more value to a jury. Traditionally, running string along the flight path of a fired bullet has been the technique used in reconstructing shooting incidents. Today, projecting lasers to simulate a bullet in flight is taking hold as an acceptable technique in crime scene reconstruction.

There are times when stringing is still a better alternative to lasers. When lighting conditions are too bright to use lasers, stringing is a wiser choice. Laser reconstruction is most easily done at night or in low-light conditions. In addition, indoor crime scenes with cramped conditions may be better suited for stringing efforts. When lasers can be used, they can help create a powerful image for courtroom testimony.

Using lasers for reconstructing shooting scenes does provide some advantage over stringing methods. Even though a bullet in flight travels along a ballistic arc, lasers provide a more accurate flight path representation because they do not suffer from the "droop factor." Due to the weight of the string, it will often sag or droop along the projected flight path being simulated. In addition, lasers can provide a much sharper and well-defined image on film.

Reconstructing shooting scenes is relatively simple and does not require a lot of expensive equipment. A tripod mountable camera capable of taking timed, or "bulb," exposures is of primary importance. A cable or electronic cable release is also necessary in order to keep the shutter open during the longer exposures. The photographs can be taken with a digital camera, but a point and shoot digital camera will most likely not be sufficient.

Choosing a laser does not have to be an expensive proposition. There are a number of lasers offered for sale by crime scene investigation companies which range from the hundreds of dollars to the thousands of dollars. Granted, the most expensive of these lasers can do a number of forensic services, but all that is being addressed here is the reconstruction of shooting scenes. Harbor Freight Tools offers for sale the "Op-Com" laser level for $20. This particular laser has an on/off switch and can be mounted on a tripod. Both these features make it ideal for use in reconstruction. This particular laser does record a little lighter on film than other laser pointers available on the market, but if a little extra time is taken during the exposure, excellent results can be obtained.



Laser level used by the author

The last piece of equipment that is needed is some sort of reflective material, which will be used to reflect the laser beam back toward the camera. Once again, crime scene investigation supply companies will sell expensive fogging machines and/or cans of fog spray. None of this is necessary. The only item needed to reflect the laser beam back to the camera is a white piece of paper or a large white index card out of the investigator's latent print kit.

Once at the scene, the investigator needs to determine point of origin and point of impact for the fired bullet. Witness statements most easily determine point of origin, but looking at the placement of fired cartridge cases can also develop a general idea of the firing position of the shooter. The point of impact is easier to locate, as it only requires searching for bullet strikes and bullet holes at the crime scene.

Now that the start and end points for the laser have been identified, it is time to set up the shot. First, position the laser in the approximate position of the shooter and align the laser's point with the impact spot at the opposite end of the scene. This is where a tripod mounted laser level (pen) is of immense value. Once the laser is positioned, turn it off and begin setting up the camera.

The picture is going to be a timed photograph and requires the ability to shoot the camera in manual mode. Set the shutter speed to "bulb" and attach the cable release to the camera. Choosing an appropriate aperture setting requires an evaluation of the ambient light conditions. If the scene is on the brighter side, start taking exposures with a smaller aperture setting. A darker scene may require a larger aperture, and a scene without any ambient light will require some fill flash in order to make the scene appear on film. Because of reciprocity failure, it is difficult to overexpose a photograph in low-light conditions and the investigator should not be concerned about the long exposure time. For best results, a series of photographs should be made with different apertures in order to ensure a quality photographic result. Place the tripod-mounted camera somewhere perpendicular to the laser's line of travel. Be sure to include both the start and end points of the laser in the viewfinder of the camera.

It is now time to take the picture. Open the shutter and lock it in that position. Turn on the laser. Don't worry about walking into the photograph. Just be sure not to turn on any flashlights or have any other glowing objects like cellular telephone or pager displays visible to the camera. Place a piece of paper or index card into the beam of light and angle the reflection of the laser beam toward the camera lens. Walk slowly from the point of origin to the point of impact and return. Keep the laser dot in the middle of the paper and maintain a steady gait. The laser dot will expand as the paper gets further away from its source, but it will record on film as a consistent thickness.

Remember that light is additive on film and by tracking the beam across a crime scene, the beam of light is being drawn on the film one step at a time. Upon returning to the laser pen, make sure to turn it off. If the laser dot that is striking the point of impact is left on one spot for too long, the dot will grow in the picture and be a distraction to the viewers of the photograph. Finally, close the shutter of the camera and adjust the aperture setting two f/stops up or down and prepare to take the same photograph again. By bracketing the exposures, the photographer increases the likelihood of a superior picture. Adjusting the aperture by two f/stops correlates with the fact that color print film has a general latitude of two f/stops.

It is also possible to record multiple bullet paths on film by making double or triple exposures. If the camera being used allows multiple exposures, the photographer can adjust the laser's position while the camera's shutter is closed and not consume battery power. However, if the camera being used does not have a multiple exposure feature, the photographer can simply cover the camera lens with the lens cap while the laser is being adjusted to represent the subsequent shots. Once the laser has been adjusted to represent the next fired shot, the investigator then simply traces the laser across the crime scene as before. This is where reciprocity failure actually benefits the photographer.

The process of photographing trajectories is not a difficult proposition, but it does take time and patience. Keys to a successful photograph include a steady and slow tracking of the laser's path, bracketing of exposures, and the desire to take the time and make the photograph. Practicing this technique prior to using it in the field is also a good recommendation. Practicing with the equipment the investigator will be using in the field, getting a feel as to how slow or fast to track the laser's path, and choosing an appropriate aperture setting for different lighting conditions will make it easier for the investigator when it comes time to work a real crime scene.

Should you have any further questions regarding the use of lasers to reconstruct shooting scenes, please contact the author:

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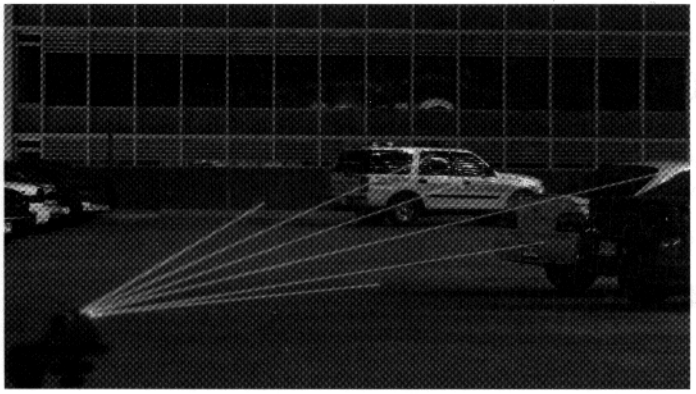

Six laser beam shot representing a 6 shot revolver
406 second exposure at f/32

Three shots
163 second exposure at f/27

Three shots from a side view
186 second exposure at f/22

One shot ricochet using a mirror
85 second exposure at f/22

All photographs for this article were taken by the author, Christopher D. Duncan