

SANTA BARBARA COUNTY  
SHERIFF'S OFFICE  
FORENSICS UNIT

## PHOTOGRAPHY AND CAMERAS

### 1.0 SCOPE

In order to use photography to document a scene it is necessary to have a basic understanding of the principles associated with photography, including how the camera uses and gathers light to produce an image. The following provides some basic principles associated with the elements used to control the exposure of an image.

### 2.0 MATERIALS AND EQUIPMENT

- a. Digital SLR (Single Lens Reflex) cameras, such as Canon 30D, 40D, 50D, or 60D
- b. Lenses, zoom or macro (close-up lenses)
- c. Flashes for camera
- d. Video camera

### 3.0 PRINCIPLES

#### 3.1. Lenses

- a. The amount of light entering a lens is controlled by an aperture (lens opening) present within the lens housing. The aperture setting on a lens is referred to as the f-stop or sometimes the f-number.
- b. The larger the aperture, the greater the amount of light will be let into the lens. The larger aperture setting (lens opening) is designated by the small f-number. For example, f-5.6 lets in more light than f-8. In fact, with each increase in f-stop (decrease in f-number) it doubles the amount of light from the previous f-stop. Stopping up from f-8 to f-5.6 doubles the light entering into the aperture while stopping down from f-8 to f-11 will decrease the amount of light by one-half. Some lenses may be capable of half stops, which are in between the primary f-stops.
- c. The aperture setting will also control the depth of field. The depth of field is the amount of the image that will be in focus from the closest clear object to the furthest clear object. Depth of field increases as the lens aperture (f-stop) decreases. Therefore a larger f-stop number has a greater depth of field than a smaller (f-22 has a greater depth of field than f-5.6).
- d. To stop down means to use a smaller aperture to decrease the amount of light entering the lens. (Stop-down would be going from f-8 to f-11)

- e. Lenses also will have different focal lengths usually expressed in mm, e.g., 50 mm lens or 300 mm (telephoto) lens. The focal length of a lens is defined as the minimum distance between the center of the lens and the film when focused on infinity. The focal length of a lens will also affect its depth of field.
- f. In general, it is best to focus about 1/3rd of the distance into the scene so that the depth of field will be distributed approximately 1/3rd in front of the point of focus and 2/3rd beyond the point of focus.

### 3.2. Shutter Speed

- a. The camera's shutter is located in the main camera housing. The shutter controls the length of time that light is allowed to fall on the film plane. On most cameras, the shutter can be fixed and allowed to remain open for as long as needed. The shutter can also be adjusted to fractions of a second, ranging from a few seconds to 1/2000 of a second.
- b. The shutter speed, like the f-stop, will increase or decrease the amount of light allowed to saturate the film by 2. Therefore, a shutter speed set at 1 second is twice as long (lets in twice the amount of light) as the shutter speed set at 1/2 second. Likewise, a shutter speed set at 1/2000 of a second lets in half the amount of light that 1/1000 of a second does.
- c. Shutter speed can be used to stop motion. The faster the shutter speed, the greater the ability of the camera to catch motion without causing it to blur. It can also be used to allow more light to be gathered by leaving the shutter open for a longer period of time in a dark situation.

### 3.3. Controlling the Amount of Light

- a. The correct exposure can be accomplished by using different combinations of shutter speed and aperture settings. This fact is often referred to reciprocity. In fact, the same exposure can be created using different combinations of shutter speed and aperture setting, thus allowing subtle changes in depth of field that will not affect the actual exposure time.
- b. The relationship that exists between the value of the f-stops and the shutter speeds follows the law of reciprocity. The reciprocity law states that the blackening of photosensitive material is determined by the product of light intensity and time of exposure. Intensity is therefore the reciprocal of time and, if one is halved, then the other must be doubled in order to obtain the same result (blackening).
- c. Using the law of reciprocity, you can create the same exposure using different f-stops and shutter speeds, depending on your need. For example, if you use f-8 at 1/250 of a second and want to increase your depth of field but keep the same exposure, you would change the f-stop to f-11 at 1/125 of a second. You could also change the depth of field more by stopping-down by 2, which would change the f-stop to f-16 from f-8. To obtain the same exposure, you would need to decrease

the shutter speed by 2 using 1/60 of a second instead of 1/250 to get the same exposure.

- d. Using a flash is an essential skill in crime scene photography. Many scenes are during night and use of fill flash to illuminate shadows is required for many photos.

## 4.0 CRIME SCENE PHOTOGRAPHY

### 4.1 Principles

The purpose of taking photographs at a crime scene is to accurately document the scene as close to the event as possible. These photographs should be taken as soon as possible after the crime has occurred and before any items of evidence have been disturbed, removed or collected. The crime scene photographs will document the orientation of objects in relationship to other objects in the room (e.g. a body to a gun), the overall condition of the area and its surroundings, any evidence that might be associated with the crime (e.g. shoe tracks, a bloody knife, discharged cartridge cases), any injuries to the victim and/or suspect, as well as other evidence (e.g. bloodstain patterns, signs of a struggle) that might serve to reconstruct the events of the crime. These photographs can provide investigative information as well as give a jury, who are unlikely to visit the scene, an accurate representation of the scene when law enforcement arrived.

### 4.2 Materials and Equipment

#### a. Materials

1. Number stands (Photo-markers).
2. Measuring Devices (rulers).
3. Extra batteries for camera and flash unit
4. Trajectory rods
5. String
6. Flashlight(s)

#### b. Equipment

1. SLR camera, digital
2. External Flash
3. Various lenses (basic 35 to 70 mm zoom required), additional lens for wide angle, (28 mm or less), close-up (macro) and telephoto (105 to 200 mm) can also be useful.
4. Tripod capable of inversion (primarily used for shoe and tire tracks).
5. Sync cord for use with flash off camera (primarily used for impressions).
6. Shutter cable release.
7. Video camera, digital

### 4.3 Procedure

#### A. Preliminary Concerns

1. Initial crime scene photographs should be taken with an SLR digital camera. Determine if the date and time are correct on the camera. Make sure that the correct file size type is selected (should be an uncompressed
2. Videography is available upon request. Videography is useful in many scenes to show the relationship between objects. It can be especially important at major scenes and should be discussed at the outset of the major crime scene investigation.
3. The photographs that are taken will depend on the type and circumstances of the crime and the ability of areas within the crime scene to be photographed.
4. Be aware of other evidence such as impression evidence (shoe tracks and tire tracks), cartridges cases, and other evidence items (ex: trace evidence) as you approach the scene.
5. In most cases, at least 3 photographs will be taken of each area of interest. These will include an overall view of the area, an intermediate view of the area showing the item of interest and its relative position to the overall area, and a close-up. The close-up may include an identifier (number stand /photo-marker); it may also be photographed with and/or without a ruler depending on what is being photographed. Each of these may involve more than one angle.
6. Photographs at the scene should be taken such that the sequence of photographs is readily followed. In some situations, it is appropriate to use a photo log to document the sequence of photographs. This is especially the case when two photographers are at a scene or when a photographer must interrupt one series of photos to document another area of the scene and then return to the original sequence.
7. One of the main objectives of the person photographing the crime scene is to be able to reproduce with the use of photographs what they are seeing at the scene. The photographs should show the manner and cause of death, signs of struggle (if present), views of the body, injuries to the body, of various rooms surrounding the scene, potential points of entry, blood, cigarettes and any other evidence at the scene.
8. It is better to have too many photographs than not enough. Once items have been disturbed or collected from the scene, you can never go back and record the scene the way it was when it was first discovered.

## B. Taking Photographs

1. The high quality (uncompressed) JPEG format is most commonly used for photography, due to the fact that more images can be stored on the media card. Photographs to be used for comparison work (e.g., shoeprints and tire tracks) must be taken in raw format.

2. Before taking any evidentiary photographs, the analyst should become familiar with the camera by reading the manual provided by the manufacturer and by taking a number of test shots under varying conditions (e.g., flash and no flash, Program vs. Aperture priority, etc.).
3. Under most circumstances, the "P" or program mode will be the most commonly used mode on the camera. Depending on the conditions the analyst may want more control of the aperture setting or the shutter speed, and in those cases, the AV/TV/M mode will be chosen. Consult the manual for specific uses of the various modes offered by the manufacturer.
4. The ISO setting on digital cameras can be changed to allow for the documentation of scenes in low light. The sensor becomes more sensitive, but has lower resolution as the ISO setting number is higher (ex: ISO 100 for daylight, ISO 800+ for low light). The ISO value can generally be changed in the menu. Consult the camera manual for further details.
5. There is also a white balance feature on most digital cameras that allows for the capturing of images closer to their actual color, depending on the lighting conditions. Consult the camera manual for further details.
6. As with all cameras, avoid placing your fingers on the lens, on any internal sensors/mounting pads, and handling the camera by the flash.

#### 4.4. Photographing Exterior Views of the Crime Scene

1. Upon arrival at the scene, take overall photographs of the area in question. These photographs should include wide and long angle views from different angles and does not usually involve close-ups or evidence photography. Close-ups may be taken if any fragile evidence requires immediate collection to preserve its integrity. One should try to begin photos by establishing location (ex: street signs, etc.).
  - a. Include an exterior overall view, where appropriate, leading up to the crime scene.
  - b. Include within these photographs details such as an address or house number that can be used later for identification.
  - c. It may be important to take a photograph from every side of the residence and include points of entry and exit in the photographs.
  - d. Take photographs for identification purposes of cars, motorcycles or other vehicles located on the street around the crime scene or in the driveway.
  - e. These photographs can also include overalls of the immediate area around the scene, such as an adjacent field or neighboring house, which might help to substantiate the victim's recollection of the location.

- f. In some instances, overall photographs of on-lookers (the crowd) present in and around the scene should be taken in case material witnesses are present or even the perpetrator.
2. Take intermediate photographs.
    - a. Include in these photographs the entrance relative to the exterior of the residence.
    - b. Include the condition of the entrance, especially if it shows signs of a forced entry such as broken locks, broken doorjamb, shoe impressions on door. Exterior windows should also be checked for any signs of forced entry and photographed. These can also be photographed to show that no forced entry was made.
    - c. Take intermediate photographs showing individual items relative to the outdoor scene.
    - d. Place number stands/placards (photo-markers) adjacent to the evidence items to be seized and before collection, retake overall photographs showing the number stands and their relative location to one another and the crime scene from various angles. It may be necessary to collect some of the items of evidence prior to retaking the overall photographs with the number stand in place in an outdoor scene if the weather turns bad. The number stands / photo-markers can remain and the photos taken with the evidence already collected.
    - e. Due to their outside location, it is appropriate at this time to start taking close-up photographs. This will prevent loss due to weather or additional personnel moving about the scene.
      - Close-up photographs should be taken first with the number stand / photo-marker visible to indicate the item number.
      - An additional photograph should be taken without a ruler and with a ruler when appropriate.
      - When taking a close-up photo with a ruler make sure the ruler is on the same plane as the object, if possible.
      - Any identifying features or visible evidence such as blood on a knife should be photographed in its location at the scene prior to its collection. However, the evidence should be handled as little as possible at the scene in order to avoid cross contamination and loss of trace evidence.

#### 4.5. Photographing Interior Scenes

1. The entire interior of a house should be photographed in most cases whether or not the crime took place in that room.
2. When each room needs to be photographed and where possible, take a photograph from each corner of the room and be sure to include any point

of entry or exit from that room (known as the 4 corner rule). Make sure the ceiling and floor are included in the room overall photographs.

3. If one of the rooms is a small room (such as a bathroom), it may not be possible to take a photograph from every corner of the room. If this is the case, with your lens at its widest setting or with a wide-angle lens, take photographs from the doorway and from inside the room looking out. Make sure that, whenever possible, the photographs taken show every wall in the small room.
4. Take photographs to show the contents of each room and to show that things may be missing. Any signs of a struggle or a room in disarray should be photographed.
5. If a gun or other weapon was used in the room and there are bullet holes or damaged walls, ceilings or furniture, this must be documented. Take photographs of the damage and, in the case of bullet holes, take a photo of the hole showing its relative position in the wall or other object and then take a close up of the hole with and without a ruler.
6. Once it is decided which items will be seized or even processed at the scene (latent prints) a number stand /photo-marker should be placed next to that object and overall photographs with the number stands in view should be taken. This photograph may only reflect those items in that particular room. Number stands /photo-markers should not be reused during the same crime scene.
7. Take close-ups of the objects that will be collected. The close-ups should be taken without a ruler then, when appropriate, with a ruler. Any close-ups should be taken as level as possible to the item to avoid any distortion (90 degree angle straight down on item, filling the camera frame with object/item).
8. If items are moved during the investigation, photographs depicting the area should be taken. If additional evidence is found during the investigative process, then photographs should be taken to show the location of any additional evidence located within the crime scene. Again, if the item is to be collected, a number stand /photo-marker and close-up photographs should follow.

#### 4.6. Photographing a Body at the Scene

1. Photographs should be taken to show the relative position of the body, its location and relationship to other items. Make sure the photographs show the proper perspective.
2. The body itself should be photographed from all angles.

3. Take detailed photographs of wounds, abrasions and any notable features of the body prior to its removal (with and without a ruler if possible).
  4. Be sure to take intermediate and close-up photographs of the victim's hands (front and back) and feet (soles and tops). Inspect for and photograph any defensive-type injuries.
  5. Take overall and close-up photos of victim's clothing and especially pay attention to blood on the clothing. Carefully document the bloodstains prior to the body being placed into the body bag.
  6. Once the body has been removed, take additional photographs of the area that used to be under the body. Additional evidence might be present that was not visible when the body was at the scene.
- 4.7. Photographing a vehicle directly involved in a crime.
1. Take external photographs of all 4 sides of a vehicle. (Three-quarter shots are also a good idea) If certain sides of the vehicle cannot be photographed straight on, due to the location or condition of the vehicle, then photograph from each corner of the vehicle to get as much of the exterior as possible.
  2. Make sure to include both the rear and front license plates in the photographs as the license plate may be different. Take a photograph of the VIN as well as any stickers/signs/or text that may individualize the vehicle).
  3. Take photographs of the sidewall information on the tires. Depending on the situation, this might include the spare tire.
  4. Take photographs of any significant or relevant damage noted to the vehicle. Take close-up photographs of the damaged area with and without a ruler. In some instances, it may not be possible to use a ruler in the photograph. Use the ruler where appropriate.
  5. Open up each door individually and photograph the interior of the vehicle using your flash. If a door cannot be opened, then attempt to photograph through the window. The flash can be taken off the camera and put against the windshield to help illuminate the front if you have to take the photograph from the exterior front door window glass. This will help reduce that amount of flash reflection that occurs when using a flash on the exterior side of a window or you can increase your ISO setting and turn off the flash when possible.
  6. Once overall photographs have been taken, close-up photographs can be taken of pertinent objects in the car such as stains (e.g., blood, semen), bullet holes, cigarette butts, etc. When appropriate, number stands / photo-markers can be placed next to the evidence items and overall photographs taken to show the relationship of the item collected. Again, depending on what is being photographed, close-up photographs should be taken with and without a ruler.



7. In cases where stains are to be physically removed from the vehicle by cutting them out, photograph the area before and after the stain has been removed. This will show how large of an area was removed.
8. Photograph any areas where stains are to be collected prior to being swabbed as evidence (also mark and photograph those areas to be swabbed and collected as control swabs.
9. In some cases, it may be necessary to photograph the trunk and its contents, as well as under the hood/engine compartment of the vehicle.
10. In some instances, especially hit and runs, the undercarriage of the vehicle may need to be examined. Raising the vehicle on a hydraulic lift gives the best opportunity for photography, when it is possible.
11. Take close-up photographs of any damage, trace evidence, blood and tissue samples located under the vehicle. Again, when possible, place number stands (or number cards)/adhesive arrows on the locations where the evidence was found. Where possible, the close-ups should be taken with and without a ruler. (This may be difficult on the undercarriage due to the various elevations of the surface areas under the vehicle.)

#### 4.8 Storage of digital images

##### A. Procedure

1. Refer to SBSO Forensics Unit Procedures for the proper submittal of camera cards to the Forensics Unit/uploading of images by the Forensics Unit/and request for copies of images from the Forensics Unit digital imaging system.

## 5.0 REFERENCES

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