In response to an article on digital imaging that appeared in the February 2000 issue of LET, many readers asked for sample standard operating procedures (SOPs) in regard to digital photography. To meet the demand, the Institute for Forensic Imaging (IFI) wrote the procedures on Pages 59 and 60. One SOP is designed for a patrol officer, who is provided with a digital camera and asked to use it to document certain situations. The second SOP is for the photo specialist, who will process the images officers turn in.

These SOPs are merely samples and it is strongly recommended that each agency customize them to its specific circumstances. To help your department develop specific SOPs, however, it is useful to study the features built into the sample SOPs.

The digital camera

The sample SOPs (SSOPs) first specify the camera and CDs to be used. These are fundamental specifications. The camera should be one with at least 1 million pixels. It should not be a camera that resorts to high compression ratios to put several images on a floppy disk. Experience has shown that anything less than 1 megapixel will give results of questionable quality. There are several reasonably priced, high-quality cameras that exceed this minimum.

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Creating the digital image SOP

By Herb Blitzer

Diagram courtesy of the Institute for Forensic Imaging.

*These files are never opened on a device that supports image editing.

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Patrol Officer SOP

Function covered: Photography of incidents by a patrol officer.

Purpose: When a patrol officer is called to a scene or comes across an apparent incident, this procedure should guide the process of documenting the situation with a digital camera.

Equipment and materials: Each officer is issued a Kodak DCS 215 digital camera for use in such situations. There is also a kit that includes a 6-inch evidence ruler with white, grey and black patches, a battery charger, three sets of nickel-metal-hydride batteries, two 16 MB flash cards, a line-connect power source, and a download cable. Cardboard evidence envelopes are available at each district office, and it is expected that each officer will keep a few of these on hand while on patrol.

Procedures: When covering incidents such as burglaries, domestic battery, non-injury or minor injury accidents, the officer is expected to determine if the investigation will be aided by photo documentation. When in doubt, take pictures, and lots of them.

Camera settings: The camera should be set to "automatic" for exposure, flash and focus. The viewer should be in the "on" position. The storage control should be set to "best quality." The viewer can be used to look at images, but the images should not be opened up in a computer or any other device that allows image editing.

At the scene: Photos should include general scene shots to show what the situation looked like at the time. If there are broken windows, furniture, decorations, etc., that are indicators of violent action, care should be taken to show these items. If there are injuries of any sort, close-up (about 10 to 12 inches away) photos of these should be taken with an evidence ruler in the picture. When taking close-up shots, the officer should cover part of the flash window with a finger to subdue the exposure. In addition to close-ups, broader shots of any injured people should be taken, including full-length shots. Head-and-shoulders photos of all apparent victims at a scene also should be taken. If there are weapons, alcohol containers or drug-related paraphernalia at the scene, these items should be photographed too. When taking photos of paraphernalia, wounds or other items where it may be important later to know the size of the subject of the photo, two pictures should be taken: one of the item in its original condition and another with an evidence ruler laying close to the subject. If more than 10 shots are taken, the officer should keep a written record of what pictures were taken and kept. The officer will need to be prepared to describe the scene and use the photos to illustrate the verbal testimony. Any photos that are photographically faulty should be discarded at the scene. Photographically faulty images include those with problems from being out of focus, a flash failure, a blocked lens, inadvertently pushing the exposure button, blurring due to subject or camera movement, etc.

After the on-scene photography: After completing on-scene duties, the officer should place the flash card(s) used at the scene in a cardboard evidence envelope, fill out the case identification information on the envelope label, and seal the envelope. The sealed envelope should be turned in to a photo specialist at the district office, in person. The photo specialist will log case information, the officer, and time and date of the transfer on the envelope. Both the officer and the photo specialist will sign that the envelope was sealed at the time of transfer. The photo specialist will then follow the crime scene photo processing procedure to prepare the visible images and archive the records.

Prior to investigations: The officer will keep one set of batteries charging while on duty, and swap the duty batteries with those in the charger before going on call the next time. An additional set of charged batteries should be carried when on duty, in case power in excess of that deliverable by one set of batteries is required. Prior to leaving, the officer will check to see that the batteries are fully charged to ensure the batteries in the camera are always ready for use during a shift. When working with the camera, the power-line connector should be used if convenient.

Calibration: While no calibration is needed, the officer is expected to check the camera on a regular basis and make sure that it is functioning normally. If there are any indications of a malfunction, the unit should be swapped with another by contacting the photo specialist.

Limitations: Digital cameras are issued to patrol officers primarily for use at scenes where photos will help the investigation and possible prosecution, and an evidence technician probably will not be called to the scene. If it is used at major crime scenes, it will serve as a backup to the work done by the evidence technician.

Safety: There are no safety issues beyond normal precautions used when operating electrical devices. Batteries should not be heated, and if they get hot while in use or charging, they should be removed from the device. Batteries should be turned in to the photo specialist when no longer functional and exchanged for new ones. They should not be discarded in any other way except in an emergency.

Cameras with large compression ratios should be avoided.

The capacity difference between flash cards and floppy disks is more important than it might seem because a 5-inch by 7-inch print should be supported by a 4.5 MB image file. In addition, the user wants to store as many images as possible in the camera. Cameras with floppy disks have a setting that allows the user to store 20 to 24 images on a single floppy disk. But doing this requires a compression ratio of 65:1. At this level, significant amounts of information will be lost in the storage process.

And to make matters worse, the process by which information is lost is one that inserts artifacts into photos. For example, the large compression ratios actually can exaggerate wounds by placing a dark ring just inside the periphery of the dark red portion of the wound and creating a light ring just outside it. In essence, the edge of
the wound is exaggerated, making it appear worse than it really is. The process also alters colors, introducing blues and purples that may appear to be bruises or other wounds.

For these reasons, large compression ratios should be avoided. If a department selects a camera with a flash card storage device of just 8 to 16 MB, instead of a floppy disk, the effect is greatly reduced. The bottom line is to avoid the floppy disk camera and this is built into the SSOP.

**Image composition**

The next series of points in the sample Patrol Officer SOP deal with photo composition. Prosecutors have made it clear that they would like to have shots of the setting, overall shots of the victim(s), and the alleged perpetrator, especially if there is a question as to whether the incident was a fight or a battery. And if there is the appearance of drugs and/or alcohol use, shots supporting this can be useful.

Prosecutors also like having close-up shots of wounds with a measuring instrument in the photo. The SSOP specifies using an evidence ruler with patches of white, gray and black on it, which can be a big help in color-balancing the photos later.

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**Photo Specialist SOP**

**Function covered:** Processing of images submitted by a patrol officer by the photo specialist.

**Purpose:** Patrol officers are instructed to take digital photos under certain circumstances and to bring the images to the photo specialist on flash cards. This procedure covers the processing of those images.

**Equipment and materials:** A photo department image processing station, complete with peripherals and software, serial-numbered, write-once-read-many times (WORM) compact disks (CDs), nickel-metal-hydride batteries, 16 MB flash cards, zip cartridges, photo-quality inkjet printer paper, ink cartridges, cardboard evidence envelopes with appropriate labels, and an evidence transfer log book.

**Procedures:** Each officer is instructed to bring in the flash card, with images from every incident investigated and documented with their digital camera. The flash card should be sealed in a cardboard evidence envelope with a completed case information label on the outside. The officer bringing in the envelope, and the photo specialist receiving the envelope should enter the case information in the transfer log book, indicating the case description numbers, and the date and time of the transfer. The envelope should be opened and the number of disks in the envelope entered into the log. Both parties should then sign the entry. The photo specialist gives the officer a new flash card(s) and new envelopes(s). If new batteries also are required, the old ones should be swapped for new, but initially charged, batteries. The disk(s) in the envelope should be stored in the locked holding box until it is time to process the images. Then the photo specialist should duplicate image files from the flash card without opening them. After processing the images for printing, the photo specialist should save the processed image folder to the secure zip drive. When two secure zip drives are full, duplicate the unopened contents of the drives to a serial-numbered, WORM CD. (See graphic on Page 58.)

When it is time to process the images, the photo specialist should remove the disks from the holding box and insert the card into the computer. Using the appropriate file management tools, two case folders should be created and labeled with the case number. One of these folders will be on the computer's hard drive and another will be on a password-protected zip cartridge. Then two folders should be created and inserted into each case folder — one labeled, "Raw Images" and the other labeled, "Processed Images." At this point, the right-click copy tool should be used to duplicate the contents of the flash card into both of the "Raw Images" folders. These folders should not be opened until after the images have been permanently duplicated later. The contents should then be duplicated a second time but placed in the "Processed Images" folder on the computer's hard drive. At this point some of the photos in the "Processed Images" folder can be opened to check that the transfers did occur. If all is OK, the zip cartridge should be removed from the computer and secured. Once this is done, the "Primary Images" on the flash card should be erased using a disk-reformatting tool. This disk now is ready to be reused. If there are multiple disks in the case, this series of steps should be repeated until all of the images have been duplicated to the appropriate folders on both drives. The images stored in the "Raw Images" folder are now known as the "Primary Images." The images in the "Processed Images" folder should be opened and examined. All those needing adjustments for color balance, brightness or contrast should be adjusted using the software tools named. If the image needs curve-shape adjustment, this should be applied as well. No further adjustments should be made. The images then should be printed — one copy of each on photo-quality paper and another copy on plain bond paper. The photo-quality image should be viewed by the photographer at a convenient time and then sent to the prosecutor in an internal transfer envelope with appropriate seal and case information. The plain paper copy should be filed in the secure photo office file. Images should be printed six images to an 8 x 11 page. (If the prosecutor wants additional images in other sizes, they will request that afterward.)

As soon as the images are printed, the "Processed Image" files should be duplicated onto the password-protected zip drive, and the cartridge placed in the locked holding box. Any unusual information regarding the images or their processing should be noted in a text file kept in the case folder. Likewise the information found on the cardboard envelope label should be entered into a text file and inserted in the case folder. Finally, the date and time of the processing and the name of the person processing the images should be placed in a text file and stored in the case folder.

When two password-protected zip drives are filled, the contents should be transferred to a CD. To do this, the contents of the two drives are duplicated to a folder and the contents of the folder are then duplicated to a CD. The cases that have been recorded on the CD should be listed along with the CD serial number. This record is stored in the secure photo lab file. An entry also is made into the logbook to indicate which CD (by serial number) holds the contents of the disks that were originally brought in by the photographer. The images in the "Raw Images" folder on the CD now are known as the "Original Images." The operator should now open a few of the images on the CD to ensure that the duplications occurred and the files are readable. It is at this point that the "Raw Images" folders as recorded on the CD can be opened and the images inside can be viewed. (The "Raw Images" folder on the zip drive is never opened unless there is an emergency.) Once it is ascertained that the images on the CD are in fact there and readable, the zip drive should be reformatted to make it available for reuse. The images in the "Raw Images" folders are "Original Images," and all of the "Primary Images" have been erased.

**Calibration:** The image processing system should be checked by its diagnostic system every working day and the results filed in the secure photo laboratory office file.

**Limitations:** The patrol officer digital cameras are issued primarily for use at scenes where photos will help the investigation and possibly prosecution, and an evidence technician probably will not be called to the scene. If it is used at major crime scenes, the images will backup the work done by the evidence technician.

**Safety:** There are no safety issues beyond the normal precautions used when operating electrical devices. Batteries should not be heated, and if they get hot while in use or charging, they should be removed from the device. Batteries should be turned over to the district waste disposal officer when no longer viable. They should not be discarded in any other way except in an emergency.
The SSOPs detail that it is OK to discard images that are clearly of no value because of photographic technique or errors. Discarding poor photos avoids wasting disk space and does not weaken the case. However, officers should be sure to tell the prosecutor trying the case that some images were discarded and why they were destroyed.

Because digital cameras tend to have poor image quality in the brightest portions of the scene being recorded, the SSOP advises the patrol officer to weaken the flash during close-up shots. This is a simple process and results in much better photos.

Compared to 35mm film, digital cameras produce lower-quality images in areas such as resolution, dynamic range and color fidelity. For this reason, a digital camera should not serve as the primary photographic device to record a major crime. The SSOP for the photo specialist is restricted to working with images from patrol officers. If a more advanced photographer will be taking the digital images, a photo specialist can use many additional tools to extract information from the photos. In this case, such techniques should be defined in the department’s SOP.

Once the photos are taken, an SOP should indicate that the images may be reviewed on the camera’s viewing screen but may not be viewed with a device that enables editing the photos. In order to change an image, a person must be able to view the photo and have access to tools that can alter it. The camera viewing screen allows an officer to review the images but does not support editing. Strict adherence to this rule makes it impossible for an officer to alter the images.

Viewing images on a laptop computer in a squad car enables an officer to see and modify the images if he desires. For this reason, doing this should be avoided. In special cases, where immediacy is important at the scene, an investigator can view duplicates of the images on the camera’s flash card. However, the flash card files themselves should not be opened or changed in any way.

Chain of evidence

An SOP should detail fairly standard provisions for turning over evidence. Such standards ensure that the evidence will not be subjected to doubts easily should it become necessary to perform scientific or mathematical analyses of the images.
The sample Photo Specialist SOP spells out a process to retain a set of unopened images. This means the operator will be able to swear in court that the files were never opened. Since a person cannot edit images that are not visible, even if the tools are available, the integrity of the unopened images cannot have been breached. Making the standard operating procedure a strictly adhered-to process renders the operator’s testimony much more believable.

The photo specialist then places sets of images onto a serial-numbered, unalterable CD as soon as possible. This, too, makes image manipulation less likely. An officer cannot make an image show particular things if he does not know what those things are. Archiving the images before the case is well understood supports this fact, which in turn supports a position of not altering the images.

A minor point, but one that could become important should a case turn out to be more complicated than first anticipated, is to use proper nomenclature in all records. When the camera’s button is pushed, an electronic file is created inside the camera that is not visible and will soon be discarded. This file will be replicated a few times in order to ultimately make an archive version and a visible, print version. But none of these files will be kept except for the archived replica. These temporary intermediates are called “Primary Images.” They are preliminary steps toward the creation of an archived “original image.” This is slightly different from the way in which the Federal Rules of Evidence treat traditional silver-halide photography. But it is expected that these rules also will be updated to deal with features inherent in new technology in the near future. Meanwhile, it is important to keep the nomenclature consistent. An SOP should detail how images at various stages are named.

However, the SSOP omits many specific operational steps because it is assumed that an individual utilizing the process already has had training on operating the equipment and software involved. There is no need to clutter up an SOP with a number of tedious, repetitive steps.

There are several complex technical issues that one can encounter in using digital imaging technology. However, it is a relatively straightforward process to make digital imagery amenable to use in law enforcement. Rather than just hoping each officer will sort out the complexities correctly, IFI advises agencies to write SOPs that eliminate the guesswork. An SOP that anticipates most of the issues and deals with them in advance minimizes the opportunity for evidentiary challenges.

Herb Blitzer founded and now serves as executive director of the Institute for Forensic Imaging (IFI), a non-profit organization dedicated to facilitating effective use of imaging technology in the field of criminal justice. He is a member of the Scientific Working Group on Imaging Technology (SWGIT). To obtain copies of the sample SOPs, contact the IFI at 317/278-1669.