FORENSIC PHOTOGRAPHY

John E. Duckworth

Salem, Oregon

Written for students and professionals involved in forensic photography, this introductory text succinctly explains the procedures, techniques, and requirements of evidence photography, and it prepares the evidence photographer to properly pursue assignments. The book also will serve as a reference for attorneys and judges seeking information in such areas as doctored photographic evidence and valid procedures in the chain of evidence. In the first part of the book, the author discusses basic photography and equipment purchase. He then outlines photographic procedures for autopsy, assault, and child abuse; traffic fatalities and hit and run accidents; latent prints; the crime scene; fire investigation and arson; and surveillance. The concluding chapter examines court presentation and challenge. Numerous illustrations augment the text.

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By

JOHN E. DUCKWORTH

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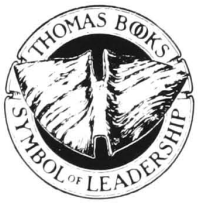

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***To my wife**, Marion, a published author in her own right, who spent countless hours editing and typing this work.*

***To my three sons**, John, Paul, and Mark, who encouraged me and lent their expertise in graphics and photography, as well as posing as photographic subjects.*

***To those investigators** willing to take the time to learn forensic photography in order to do a professional job.*

INTRODUCTION

WEBSTER defines *photography* as "the art or process of producing images of objects upon a photosensitive surface by the chemical action of light or other radiant energy."[1] Photography has become so broad a field, however, that a single approach to the subject will no longer suffice.

To some, photography is a hobby; to others, it is an art form; to still others, it is a commercial venture. But to the forensic specialist, it is a science.

I have written *Forensic Photography* from the thirty-hour college-level evidence photography course I have taught. It will not stray into other fields like portraiture or wedding photography. It is plainly written and avoids the reams of technical terms that do not apply to the normal needs of the investigator.

In many places, unfortunately, an investigator is handed a camera and told to study the manual on the way to his first assignment. Training of a forensic photographer has been limited to too few courses taught by too few professionals. When I attended the FBI Academy in 1977 to study latent print photography, the maximum class size was eight people, and there were only four classes a year. I had to write my own curriculum when I began teaching college-level forensic photography for credit because none was available. Whether you are studying in a classroom or at home, you will profit from the course in a direct ratio to how much you put into it.

"In many states, the photograph *is* the witness. A witness is carrying the photograph," the legal counsel for the FBI said in a seminar at the Academy. More is expected of evidence photography these days, and I think it's about time. Chain of evidence, for example, has almost been forgotten in forensic photography. To go into court with a handful of snapshots is to go ill-prepared and to invite challenge. A man's or woman's future may be decided by your photographic evidence; so you should do the best job possible.

[1] With permission. From *Webster's New World Dictionary*, Second College Edition. Copyright © 1982 by Simon & Schuster, Inc.

I strongly urge you not to jump around in this book because the information in each chapter progresses from the preceding ones in building-block fashion. So, begin with the foundation chapters that present the basics. Do not try to scale to the roof and begin with the latter chapters, such as "Crime Scene" or "Court Presentation and Challenge."

I have repeated key information throughout the book deliberately. Repetition is a form of teaching and learning. In this case, I feel it is more beneficial to the student, for it will help him to assimilate the information by the end of the course.

Take notes. With a camera, film, an appropriate lens, and a light source, try out the methods described in each chapter for yourself. They have been used by the author in the field, classroom, and lab. When you do, you will gain confidence, expertise and a sense of accomplishment.

We have only scratched the surface in the field of forensic photography. Much has been accomplished in the past, and we in the field today build on the information and testing of others to produce better, more accurate results. Complete this course and then go on to become investigative yourself, improving on the methods. Your work may make the science of forensic photography a more effective tool of law enforcement.

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FORENSIC PHOTOGRAPHY

CHAPTER 1 BASICS AND THE 35MM CAMERA

BASIC INFORMATION

IN this book we deal with a very specialized field of photography—forensic or evidence. Even though countless books, magazines, and manuals have already been written covering a large portion of the subject of photography, many of these are limited to a particular camera or area, such as weddings. In addition, in every class I have ever taught, some students have no background in photography, while others have fifteen or twenty years of experience. The readership of this book will also have varied backgrounds. So, it is necessary to start with the basics.

Before you proceed, *read the glossary. Return to it whenever necessary.*

Photography is over 150 years old.

Camera body + lens + film + light source – exposed film to process.

In very basic language, the film in cartridge or roll is placed inside the camera body by the photographer. A permanent lens or interchangeable lens is on the camera body, and the light reflected off the subject passes through the lens, striking the emulsion side of the film. The light, acting upon the film's chemistry, forms a latent image, to be developed in processing at a film lab.

In the *camera body*, we have the mechanical parts and/or electronic components needed to carry out the functions of the camera. The body accepts, and hopefully protects, the film.

The need to cock and release a shutter, which permits the light coming through the lens to strike the film for a specific length of time, is referred to as the shutter speed. Prior to taking a picture, we cock the shutter, which in the Instamatic® camera, 35mm camera, and twin-lens reflex camera also advances the film to the next frame.

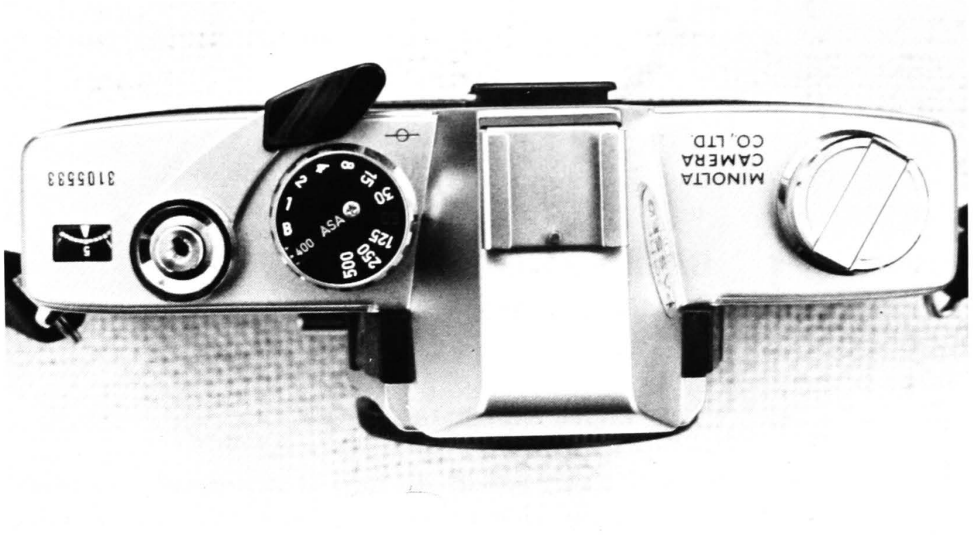

Figure 1. Top view 35mm SLR camera.

When we press the shutter release, the shutter opens and automatically closes for the length of time set on the shutter speed dial (1/1,000th of a second or 1/60th of a second, etc.). In the case of the 126 Instamatics, the speed is preset. In those cameras that have a through-the-lens light metering system, that system is located in the body of the camera. They require a battery, also located in the body of the camera, that should be replaced periodically.

35MM CAMERA

Based on my personal experience and lab and field demands, if I could have only one camera system, I would choose a 35mm for evidence photography.

1. It has reflected the greatest overall advances in cameras and film types during the past fifteen years of any system.
2. Considering what you can accomplish, it is the least expensive, if you know what to buy (*see* Chapter 6 on purchasing equipment).
3. It is portable and the accessories can be of high quality and can be reasonably priced and interchangeable. Not all are, however.
4. Manufacturers have provided the greatest choice of film and 35mm equipment, not solely due to concern for forensic photography but because of the cash incentive. The list of film and equipment is constantly expanding.

The 35mm versus the 4 × 5 view camera is not the question here. I am not

claiming that the film's resolution or detail will be equal. When properly exposed, the 35mm camera can meet almost every normal need in evidence photography. A trained evidence photographer should have no problem in making an 11 x 14 print from a properly exposed 35mm negative. On occasion, you might be able to enlarge your negative to 16 x 20. There is a tendency to blame equipment for the photographer's limitations. Of course, poor equipment can hinder any photographer.

Many basic aspects of photography will be touched upon when dealing with the 35mm SLR camera.

The term *35mm* denotes the film size and the camera in which it is compatible.

SLR means single-lens reflex (seeing through the lens via a mirror system).

The 35mm cameras that do not have a through-the-lens viewing capacity but rather a view finder can be found in older 35mm cameras and certain inexpensive models.

With your 35mm camera in front of you, take your manual and open to the section on the camera body. Locate the following on the camera body (if you have a different type of camera, many of the basics are the same):

- ASA setting for the light meter
- Back cover release
- Battery compartment
- Eyepiece
- Film advance lever
- Film advance release
- Frame counter
- Hot shoe
- Rewind crank
- Self timer
- Shutter release
- Shutter speed dial
- Tripod socket

Making sure you have no film in the camera before you open it, take the camera body and carefully release the back, which should reveal the interior of your camera. Locate the following in the back of your camera body:

1. Film well for cassette
2. Pressure plate
3. Shutter (cloth or metal, vertical or horizontal)

A horizontal shutter usually requires 1/60 sec. shutter speed when using a strobe.

A vertical shutter usually requires 1 125 sec. shutter speed when using a strobe.

Figure 2. Front view 35mm SLR with winder.

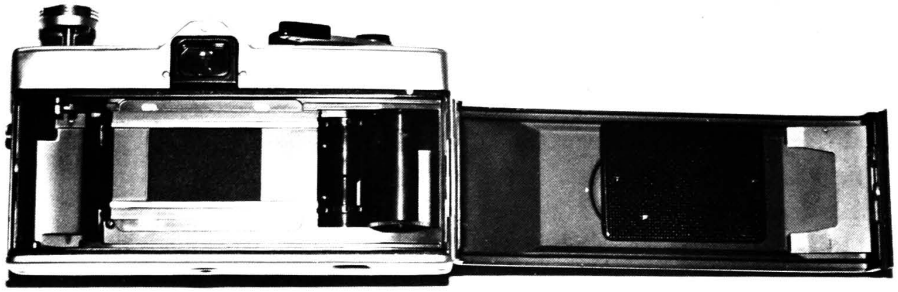

Figure 3. Back view 35mm SLR opened.

Loading film can be a problem if not done correctly. Normally (there is an exception) the 35mm cartridge will lie in a film reservoir on the left side of the camera—looking at the back—directly below the rewind crank. The film is pulled out to the right sufficiently to engage the sprockets in the camera and the sprocket holes in the film. In models that load automatically or otherwise, I place my thumb on the sprocket holes initially to feel the sprockets protruding through the film. Advance the film until it has made one turn. Do not touch the advance release button located in the bottom of the camera body. If you do, all your photography will be on the first frame of film. The advance will not be engaged and the film end goes around and around.

To check after you have loaded and closed the body carefully, turn the rewind crank to take up the slack. Now as you advance two or three frames prior to taking your first picture, the rewind crank should turn partially each time you advance the film. After a while, you will be able to tell by feel if you are advancing air or film. I've seen too many blank rolls of film that never came out of the cassette. The counter on your camera usually indicates the number of advances rather than how much film actually has been forwarded.

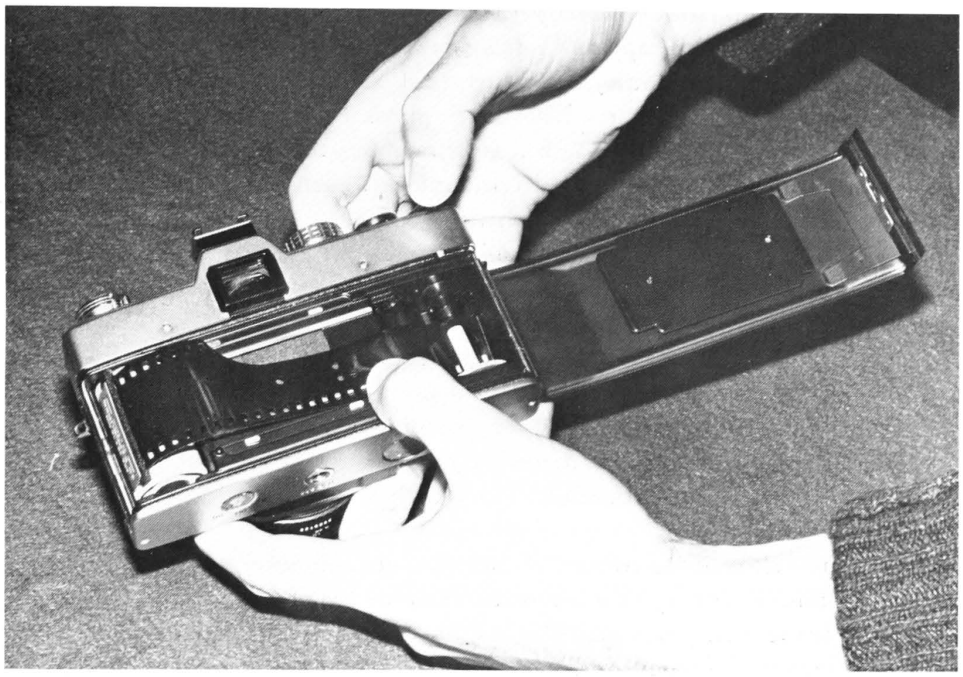

Figure 4. Back opened 35mm SLR threading film.

We must assume that you have the lens best suited for the assignment on the camera body. Wide-angle, normal, telephoto, close-up, and zoom lenses are the choices available.

Before we proceed with the lens, it is necessary to inform our equipment what the ASA or speed of the film is that we have in the camera. The through-the-lens light metering system must know to provide an accurate reading. Your strobe must know to provide adequate light. You should also have a record of the speed and film type on or in your case or on your camera. Do not go on the assumption that the ASA will tell you. ASA 400 can be black and white, color negative, or slide film.

Some years ago, I picked up one of my cameras and noted *ASA 400*, but I couldn't recall what type of film I had used. The fact that it was on exposure 11 also complicated the situation. Only because I had made notes could I find the

film type.

Your lens will have a focusing ring and an aperture or *f*-stop ring. Normally, the focusing ring is toward the front of the lens and the aperture ring is closer to the camera body. When focusing, we are moving the lens elements inside the lens casing to achieve sharp focus at a particular distance.

The light reflected on or through your subject and back to the lens now has two conditions to be met before it can reach the film to create an image.

How big an opening or hole will it travel through (aperture) and for how long can it be open (shutter speed)?

A very nontechnical approach has made this understandable to my students. Light we treat as water, the aperture the size of a pipe, and the shutter speed how long the water runs. My film requires a certain amount of light (water) to be properly exposed. With a smaller pipe, I need to let it run longer. With a larger pipe, it will not have to run as long to achieve the same results (*see* Chapter 5 for more information on this subject).

Due to the vast variety of cameras, lenses, and accessories and with constant changes—additions and subtractions—taking place, you will have to *depend on your manual.*

Four models of the same make camera show radical differences. Each camera is a step in improvement and sophistication.

Of the four cameras in front of me, one has no hot shoe or light metering system. The second has a light metering system but a cold shoe. The third has a metering system and a hot shoe. The fourth has both and a winder for fast advance.

In the first class of the course, all students are requested to bring their cameras and manuals. It may be a borrowed camera. More important, it should be empty for inspection purposes. The students note the differences between the units and then exchange information as to what they know about their camera. You do not want to be surprised by differences between a strange camera and your own when in the field at the scene of a homicide.

In very simple language, when you look into the eyepiece of a 35mm SLR, you are looking at a mirror. Below that mirror is a second mirror that moves out of the way when the picture is being taken. Immediately after this action, it pops up or down to its original position. You are now free once again to view through the lens to focus and compose your next picture. I must leave any more detail about basics to you to find in your own manual.

CHAPTER 2 CAMERAS OTHER THAN THE 35MM SLR

Cameras	*Recommendation for Evidence Work*
Disc Camera	Not recommended; too small a format
110 Instamatic	Use if nothing else available
126 Instamatic	Underrated; good second choice at low cost
35mm Single-Lens Reflex	*All around choice*
Twin Lens Reflex	More expensive; cannot see through taking lens
$2\frac{1}{4}$ Single Lens Reflex	Excellent, but much more expensive; simple accessories high in comparison to a 35mm
6 × 7 Single Lens Reflex	Has $2\frac{1}{4} \times 2\frac{3}{4}$ format and the same objections as the $2\frac{1}{4}$ single lens reflex
4 × 5 View or Press Camera 5 × 7 View or Press Camera 8 × 10 View or Press Camera	Although I have one, I can't afford to take thirty six sheets of 4 × 5 color film to compete with a single roll of 35mm color. Camera size is a problem at times.

When I make equipment recommendations in my class and as a consultant, I do it based on my own experience and lab reports I have studied. Manufacturers as well as those who consider themselves purists and use a large camera format may raise their voices in objection to this section. Even disc camera enthusiasts may cry "foul." The disc camera is fine for vacations, but not for evidence photography.

In an advertisement, one manufacturer recommended a large camera for fieldwork in evidence photography. It would be fine for use in a lab or studio, but is not my choice in the field where your first concern must be to acquire the best photographic coverage. Excessively heavy equipment is too cumbersome and is a burden (*see* Chapter 6 for additional information).

More can be accomplished with the 126 Instamatic than many evidence photographers think. (Some, however, attempt to accomplish too much with it.) In many agencies, nearly all patrol cars carry the 126 Instamatic. They

Figure 5. Front of a twin-lens reflex camera.

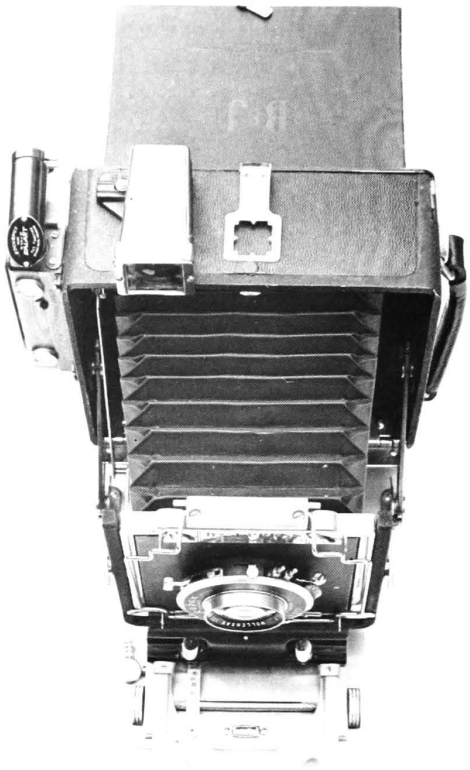

Figure 6. View of press camera using 4 × 5 sheet film.

must use these cameras for traffic, homicide, etc.

I have had experiences in which film came into the lab from the same traffic and crime scenes, and one officer used a 126 Instamatic and the other a 35mm SLR. The film done properly with the Instamatic was better than the poorly done work with the 35mm.

126 INSTAMATIC

The 126 Instamatic is the inexpensive workhorse of the patrol car force almost nationwide. Although I have never heard of a good explanation for going from flashcube to flash bar, we do have three basic 126 units in circulation:

1. Flashcube
2. Magicube requiring no battery
3. Flash bar

This camera has a fixed lens and a fixed aperture and is prefocused and affordable. The viewing lens is usually plastic and is located to the photogra-

pher's left of the actual lens. To view through this little window can create a problem if you think you are actually seeing what will be on the film, and not just an approximation.

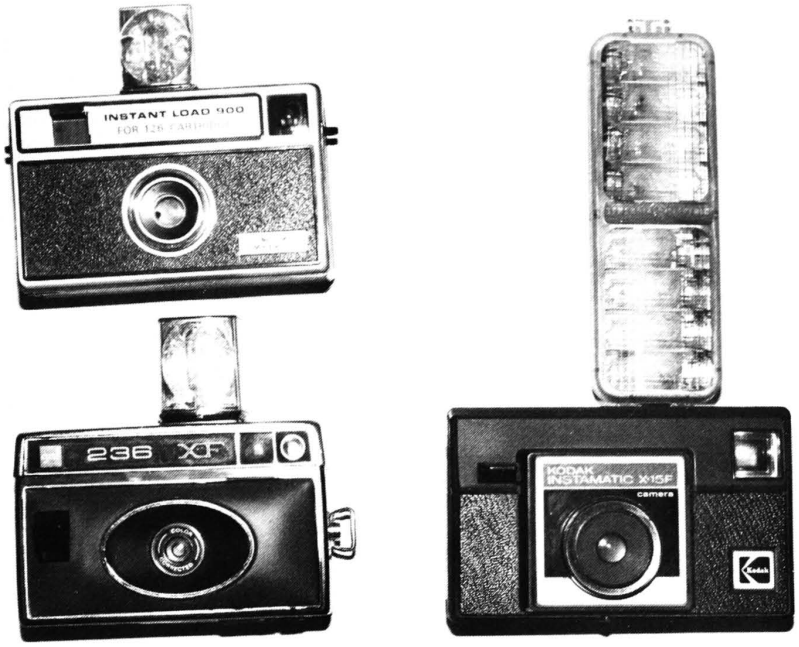

Figure 7. Three Instamatics with flashcube, Magicube, and flash bar.

The film comes in a cartridge that drops or fits into the camera when the back is opened. It only fits in one way. The normal black and white film used is Verichrome® ASA 125 film. Color negative 100 and 400 and slide film 100 are also available in a 126 size. It is a square negative, and of course the full frame prints and slides will be square.

Tri-X® black and white film is available, but must be specially ordered by your dealer from Kodak usually in twenty cartridge lots. The advantage of Tri-X film will be covered shortly. A few years ago, Pennsylvania State Police used only Tri-X in their 126 Instamatics.

Fixed focus means that it has no variables. The manual will give you the closest point in focus. Everything beyond is treated as infinity or as in focus.

1. Daylight: I would not go closer than 3 feet.
2. Nighttime with flash: 5 feet.
3. With a dark subject: 4 feet. Although the flashcube and flash bar can wash out your subject when too close, the light intensity drops off rapidly.

Exposure range is usually nonexistent with a preset aperture. However, by using the following methods, you can come up with a range of exposures and

Figure 8. Light drop-off using flashcube.

still not change the aperture:

1. The camera, daylight, no extra light
2. The camera, daylight, flashcube or flash bar
3. The camera, daylight, a dead flashcube or flash bar that slows down the shutter speed of your Instamatic

4. The camera, using a handkerchief or tissue over the flashcube or flash bar (not the lens), gives you still another exposure with which to work
5. Using Tri-X film and the aforementioned lighting methods provide still more combinations

One of the principal problems with a cube or bar is that you may be in an area where there is limited light, like traffic or homicide, too large for even illumination. The normal range with a cube or bar is 12 to 14 feet. By using Tri-X film, increasing development time 50 percent in the lab, and using a flashcube or flash bar, your range increases to 35 to 40 feet.

When you are using Tri-X film in your Instamatic for increased light in night photography, remember that you cannot use it in bright daylight. Tri-X *can* be used during daylight by decreasing the development time by one-third. When used at night, increase the development time 50 percent.

Warning: Do not remove the cartridge from your Instamatic after taking a photograph until you have advanced and cleared out the film into the other side of the cartridge. Prior to loading the cartridge, you will notice that the film is open in the center. If you do not advance two or three frames beyond your last picture, a part of that frame will be destroyed by light striking it.

By taking a magnifying glass or magnifying lens and placing it over the regular Instamatic lens, you have a close-up capacity. Since you are not looking through the lens itself, you will have to use a measuring device from the lens to the subject in order to have it centered and set at the correct distance. It isn't easy, but I've photographed latent prints with an Instamatic. In order to know the correct distance with a particular magnifier, look through it and move in and out until focused. This is the distance the magnifier and Instamatic should be from the subject.

I tend to fear the trend to make the 35mm cameras automatic to the point that you have to do little and know nothing. The so-called fully automatic camera can be compared to frozen dinners and a microwave oven. They have never produced a cook. You do not learn photography if you do not have to know anything about camera function.

The automatic camera can also void your evidence in certain situations. An officer came into my lab and told me that he had taken several pictures of a situation involving light that a certain driver claimed caused him not to see a train. I asked the officer if he had the camera on automatic, compensating for the amount of light present. Had he shut down the *f* stop?

"Yes," he told me.

"Then the film is wasted."

I enjoy certain automatic features of photographic equipment, but I would not want a camera that did not have a manual override system.

Before we go further, let me say that because of the number of cameras and camera styles, generalizations about the way they function are hazardous. The

Figure 9. Portion of frame lost because Instamatic opened before completed.

Figure 10. Instamatic with close-up lens.

Figure 11. Into the sun using a polarizer.

Figure 12. Without a polarizer or stopping down the aperture.

only way you can understand your particular camera is to read the manual that came with it. If the original is not available, send for a duplicate. The placement of a preview button or the location of a battery may differ from other models.

TWIN-LENS REFLEX

This camera has two matching lenses. One is for viewing and the other is the taking lens. They are usually mounted on the same lens mount. When one moves, the other does too.

The basic problem with this system is parallax distortion, since the lens you look through is located above the lens used to take the picture. You may not realize that it *is* a problem until you try to do close-up photography. The close-