

Contents

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6 Introduction

CAMERAS



- 18 How cameras work
- 20 Compact cameras
- 23 Single lens reflex cameras
- 26 Camera handling and care
- 28 Using the viewfinder
- 30 Using focus control
- 33 Aperture and depth of field
- 39 Using shutter control
- 42 Using exposure controls
- 46 Film loading and unloading
- 48 Good camera habits

FILM



- 50 How films differ
- 52 Color film
- 54 Choosing the right film
- 57 Identifying film faults
- 62 Manipulating film speed
- 64 Film economy and care

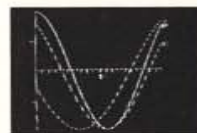
SOLVING PICTURE PROBLEMS



- 66 Utilizing the picture shape
- 68 Using foreground and background
- 70 Isolating the main subject
- 73 Working in confined spaces
- 74 Photographing distant subjects
- 75 Coping with bad weather
- 77 Working in extreme climates

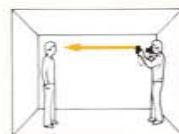
- 78 Intensifying colors
- 80 Showing colors as tones
- 82 Avoiding inaccurate colors
- 84 Controlling contrast
- 86 Dealing with reflections
- 88 Shooting against the light
- 90 Photographing the sun and sky
- 93 Photographing at night
- 96 Making the most of subject detail
- 98 Creating a sense of movement
- 100 Using window light
- 103 Mixing different light sources
- 104 Lighting for dramatic effect
- 106 Recording surface texture
- 108 Lighting small objects
- 110 Photographing through glass
- 111 Copying techniques

TACKLING SPECIAL PROJECTS



- 114 Portraits
- 118 Children
- 121 Animals
- 124 Special events
- 126 Sports
- 128 Landscapes and seascapes
- 132 Candid
- 134 Travel
- 136 Still-life
- 138 Architecture
- 140 Nudes
- 142 Natural history
- 144 Recording electronic images

FLASH



- 146 Flash equipment
- 148 Calculating flash exposure
- 151 Identifying flash faults

- 152 Using on-camera flash
- 154 Using off-camera flash
- 156 Flash with other light sources
- 160 Studio flash

ACCESSORIES



- 162 Interchangeable lenses
- 164 Telephoto lenses
- 166 Wide-angle lenses
- 168 Zoom and special lenses
- 170 Close-up equipment
- 172 Choosing your outfit
- 173 Filters
- 176 Supports and general items
- 179 Specialized items
- 180 Presentation and storage

SPECIAL EFFECTS



- 184 Lens attachments
- 187 Sandwiching
- 188 Creating false colors
- 189 Double exposure
- 191 Using line film
- 192 Projected images
- 194 Multi-image techniques
- 195 3D devices
- 196 Unusual camera types

REFERENCE CHARTS

- 212 Glossary
- 218 Index
- 224 Acknowledgments

Introduction

This book is a concise, practical guide for anyone with a 35 mm single lens reflex or compact camera, or thinking of buying one. The contents concentrate on advice and tips to improve your camera expertise, expand your range of picture taking, and help you obtain greater enjoyment from this fascinating subject. Use this book as a "pocket wisdom" – broader and less biased than an instruction manual, a source of teaching and reference, but most of all as a collection of commonsense ideas that you can pick out easily and quickly.

Cameras are under-utilized

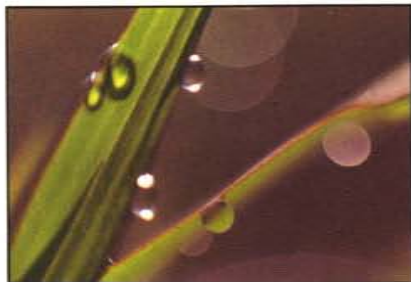
One of the problems with photography is that people simply do not use their cameras enough. Modern equipment allows results

under such wide-ranging conditions, it deserves much greater use. No one would agree that owning a car and driving it only three or four times a year is getting good use from it. Yet this is the average number of times most family cameras are utilized. The less you use something the less sure you become about its controls and possibilities, and so it becomes more effort. The opposite is also true – experience makes you less preoccupied with the mechanics of the camera, and more able to look through it and relate to the scene and the final picture.

Give yourself the chance to experiment with the full range of controls offered by your camera. For example, slow shutter speeds and time exposures are a way of introducing movement and abstraction



Interpretative approach The type of picture above can be taken with a quite basic camera, provided it will give a shutter speed of 1/30 or longer. Streaks and blurs, caused by moving the camera to follow the action while shooting, add greatly to the atmosphere.



Close-ups Larger-than-life images and restricted focus (left) are possible with a simple close-up lens.

Night conditions Modern equipment allows you to photograph whatever the eye can see, as in this time exposure shot (facing page).



into photographs. A close-up lens or extension tube opens up an entire world of close-up subject matter.

The quality of light

One of the great plus factors in taking photographs is that you notice and enjoy more the visual effects of light. Light becomes more than just something to see by—it noticeably transforms textures, colors, depth, and the emphasis of one thing over another. These are things you must consider closely if you are aiming for exceptional photographs. Sometimes it will mean revisiting a spot at different times of the day or under different weather conditions. Sometimes you can add or substitute lighting of your own. These are all personal choices, subject to the way the scene looks to you at the time. Many of the subject and picture problem topics in this book show

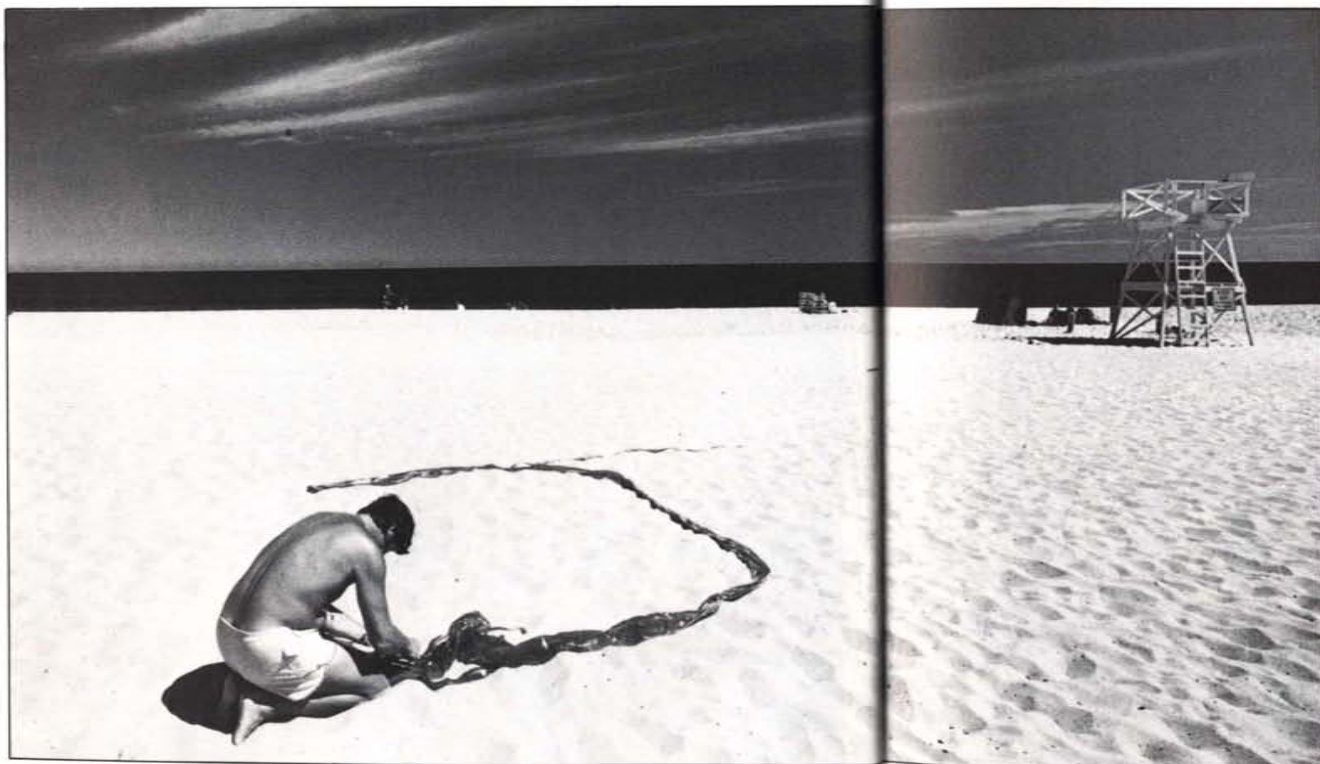
examples where lighting has made all the difference to the final result.

In time, your growing awareness of lighting—its direction, quality, and contrast—not only improves your photography but seems to enrich ordinary observation, too. It is possible to obtain great enjoyment from the diverse moods of light simply for its own sake.

Picture composition

Some people cannot be bothered about composition. After all, it sounds complicated, and seems to be concerned with rules that have more to do with painting than photography. And yet basically you compose each and every time you look through the camera and aim it to include some elements and leave out others.

Composition as such is not mentioned often in this book. But it shows in practical



Beach scene Harsh lighting and an extremely clear atmosphere give the picture on the left strong graphic qualities. The effect is one of openness and space. Every item here counts, contributing to a balanced composition. The blue sky was darkened with a polarizing filter to help emphasize the clouds. Their long shapes compliment the sweep of sand, picked out by sidelighting.

Low-key effects The picture, top, uses large areas of shadow to help give brilliance to the sunlit path. Backlighting throws figures and other objects into silhouette. For this effect measure exposure from the lightest areas only.

Urban landscape Low evening light and cast shadows reduce the roofs and buildings (above) to simplified shapes.



Enclosing structure Sometimes you can structure a picture by picking a strong simple shape, like the arch on the left. It helps to draw together various interesting but unrelated figures.



Overall pattern In contrast, this telephoto shot (left) succeeds by forming a tapestry of colors, texture, and pattern.

Reflective foregrounds Both landscapes (below and right) make use of a water foreground to reflect colored light. The night shot below shows distant street lights spread out like flares across the sea. The scene on the right was taken just after sunset as sea mist rolled into gloomy valleys. A few moments later color had gone and mist blocked the entire view.



ways how to use foregrounds and backgrounds, avoid distracting elements, emphasize the main feature, and add a sense of drama, movement or humor. In other words, it helps you to show things in the strongest, most interesting way possible. You could call this photographic composition, or just suggestions that give better, more direct images. The point is that they seem to work and can be applied to a wide range of subjects, from portraits to landscapes and natural history to architecture. In fact, structuring of pictures can become one of the most rewarding aspects of photography.

Color or black and white

Most people prefer to shoot in color. Color gives more information and helps to add

atmosphere. The orangey glow of indoor light, the blue tint of snow, strident color mixtures or harmonious blends can all be used constructively. Black and white on the other hand can be a welcome change. It has deceptive simplicity and is growing as an advanced area of photography – something you now graduate to as an enthusiast, after mastering color. This book, therefore, pays due regard to black and white, especially considering the recent introduction of instant picture 35 mm films.

The fact remains that over 95 per cent of all films sold are color types. You need to know how to use them with greatest control when a photograph has to be factual and accurate, or at other times how to produce interpretative and atmospheric effects. One of the challenges of photography is to

Family subjects One of the most important subjects for photography is your own family. The shot shown right, with its accent on relationships, is the kind of natural document you must not miss. Pick a simple setting, work close, and be patient.

Extending your range Often, photography combines well with other interests, such as natural history. A shot such as the swan (facing page) is not difficult with a telephoto. It forms a timeless picture that can sell and do well in competitions.



know when to relax accuracy and make good use of false color effects. These can be achieved in many ways and at minimal cost – through the use of mismatched film and light source, or simple lens filter attachments, for example.

Choice of subjects

Surveys have shown that the most popular and generally rated most rewarding subjects for photography are people – especially younger members of the immediate family. The subject section of this book therefore starts with this area before moving on to other topics popular with the vast majority of camera users – travel, sport, animals, still-life, nudes, and natural history, for example. You will find thirteen such subject topics, each giving a breakdown in terms of types of approach, equipment, problems to avoid, and practical tips. Perhaps you see photography mostly as a way of recording your family over the years. But if you have hobbies other than photography, these too can be fruitful subjects for your camera. More specialized areas of photography demand extra special knowledge, and the results might well have commercial value. One hobby can therefore

help offset the cost of the other. You will find advice on selling your photographs in the back reference section. The important thing is to try a wide range of subjects, especially as a beginner. Certainly all the subjects featured here should be within your scope. Leave specialization until later when you find one area most absorbing.

Planning your equipment needs

Photographic equipment itself is a mixed blessing. Cameras and their accessories are such ingenious, attractive items of technology that there is always the temptation to collect them for their own sake. Without going this far, extra items do allow you to extend and, above all, personalize your camera outfit. The SLR in particular is designed to form the nucleus of a system, which includes lenses and attachments, supports, flash gear, and much more. One of the functions of this book is to show and compare these items impartially. You find that some simple accessories such as an extension tube or polarizing filter can have many uses, whereas other complex pieces are strictly for special tasks.

Much the same applies to special effects attachments – devices to tint images





Unusual effects The picture facing page is tinted by a pink graduated half-filter covering the lower part of the lens. It works best with pictures like this with a central division. Both pictures at the top of the page were shot using existing light. One version, taken with a starburst filter,

has flared the lights into the shadow areas – adding drama and reducing contrast. To produce the macabre profile above, a slide of trees was projected on a man's face in a darkened room. A small lamp gave some additional rim lighting.

selectively, split, spread, and diffuse them, or create rainbow effects around bright lights. One or two of these are worthwhile, but many are too assertive for more than very occasional use. Most of the special effects in this book are surprisingly simple – it is the ideas behind them that count.

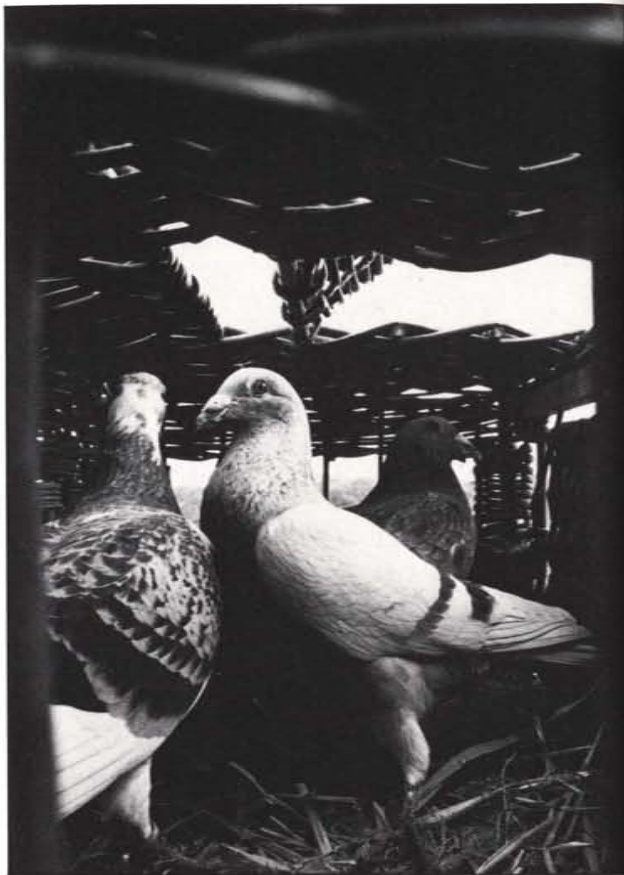
How to use this book

This handbook is intended to offer concentrated practical advice in a compact form. It is divided into eight sections, each identified for quick reference by a color or tint at the page edges. The first section is concerned with the different types of compact and SLR cameras. It looks at what the main types offer and how their features can help your photography. For the beginner this section will teach you all the basics you require. More experienced photographers will find that it brings them up to date on modern camera advances. Make use too of the "Hints and tips" boxes spread throughout the text. They distil extra advice, and can be used as a quick checklist.

Section two takes you over the range of films available for 35 mm cameras. It discusses the points that make one film a better choice than another for particular subject conditions. It also helps you identify faults if your results are not correct.

The next sections are concerned with picture shooting problems. Section three picks out more than twenty common situations that can cause problems – either

The importance of viewpoint Of all the factors affecting successful photographs, choice of viewpoint is the most important. This picture uses an unusual viewpoint to frame the birds within the structure of the basket. Lighting also helps to contrast the bird shapes against the angular wickerwork background, so that curves and lines work in together without confusion.



technically or from a picture-structuring point of view. These include shooting at night or against the light, avoiding inaccurate colors, and working in confined spaces to name but a few. Section four solves problems in the context of different subjects—people, places, events, and many more. Use these topics as a quick reminder guide before tackling such subjects.

Sections five and six take your equipment further, into the areas of flash and other accessories such as lenses. Here, equipment is described in practical detail so that you can see what is involved and what the market offers. Special effects, section seven, is a mixture of accessories

and techniques designed to challenge your ability to produce striking pictures and to help to sharpen your technical skills.

The final reference section helps to fill in more detail. Rather than congest the main text with lists of brands and figures, they all appear here.

In all, this is a book to answer questions and encourage you to do more. It should increase the quantity and quality of your pictures so you make fuller use of your equipment and skills. Exploiting a resource such as a camera is not only enjoyable and creative, it accumulates memories, too. These tend to grow more precious with the passing of time.

CAMERAS

This first section of the book introduces the 35 mm camera and its main controls. A look at the features needed in any 35 mm camera leads on to the differences between the compact and the single lens reflex (SLR) – the two most popular camera designs today. You will see how models range from the totally automatic to types that bristle with controls all requiring user attention. Each camera type has its advantages and limitations, and choice is not simply a matter of price.

The first control discussed in detail is the viewfinder. The next, and related, control is lens focusing, from fixed focus to cameras that have the latest electronic focusing aids. This introduces the important consideration of just how much of your picture you want sharp at any one time.

A similar factor applies to your choice of shutter speed, and this, together with lens aperture, determines the amount of exposure to light the film receives. Depending on the type of camera you use, exposure can be either fully automatic or completely manual with several semi-automatic options, too.

Lastly, and bearing in mind that cameras are tools for picture making, there are suggested checks and working methods designed to give you the highest success rate with your photographs.

How cameras work

All cameras have certain basic features. These include the lens, film, and shutter. But it is the viewfinding device that separates 35 mm cameras into two basic easily recognizable types.

The first type has a viewfinder close to, but quite separate from, the taking lens. These cameras are commonly referred to as "compacts". The second type has a mirror that allows you to look through the actual camera lens, up to the moment of shooting. These are known as "single lens reflex" (SLR) cameras.

Camera versatility

Manufacturers design both 35 mm compacts and SLRs in models ranging from those offering an extensive choice of lens and shutter controls, to others with only a few settings, ready for simple "point-and-shoot" photography. In general, the more controls offered the greater the versatility of the camera, but to use this added flexibility you must understand more technical aspects of photography.

Cameras requiring fewest settings are either economy models, which have their controls fixed for "typical" light conditions, or cameras where adjustments are performed by sophisticated circuits, which are capable of a high average success rate under most subject conditions. These fully-automatic cameras usually have a manual override facility for difficult situations.

35 MM v OTHER FORMATS

- 1 In relation to cameras for other picture sizes, the 35 mm format gives the best compromise between image quality and equipment that is versatile and light in weight.
- 2 In terms of cost per frame, 35 mm film is cheaper than all other formats—either smaller or larger.
- 3 35 mm film is made in the greatest variety of types. Lengths range from 12-exposure cassettes to bulk film for 750-exposure special film backs.
- 4 35 mm film is standard for audio-visual shows, and is universally accepted for illustrations in magazines and books.
- 5 Darkroom work is easy. The widest range of user processing and enlargement equipment is made.

Five basic features

Every camera must have a *lens* to collect and focus the light reflecting back from the subject, and a light-sensitive *film surface* to record it. If the lens-film distance is variable, then you have a choice of focus settings for close or distant subjects. A *viewfinder* is essential as it allows you to aim

Lens The lens forms an image—like a magnifying glass projects a tiny picture of a scene on to shaded paper. All images are formed upside down.

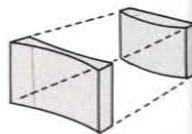
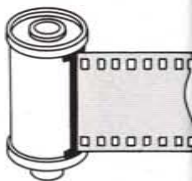
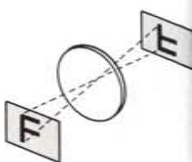
Film 35 mm film is housed within the camera so that it will only receive light through the lens. Film is wound into a light-tight cassette at loading and unloading.

Viewfinder The viewfinder may be a direct optical sight (right), giving a separate view of the scene, or a reflex system using a mirror found in SLR designs.

Shutter In a compact, the shutter is a series of blades that pivot open within or near the lens (right). An SLR has a moving, blind-type shutter just in front of the film.

Aperture The lens aperture or diaphragm is set between the glass elements of the lens. Here, it can open or close in order to brighten or dim the whole image evenly.

the camera and shows accurately the limits of your image. The *shutter* controls the precise moment you take the picture—most cameras give a choice of timed settings to help control exposure. Finally, an adjustable lens *aperture* alters image brightness, linking with the shutter to help control exposure.

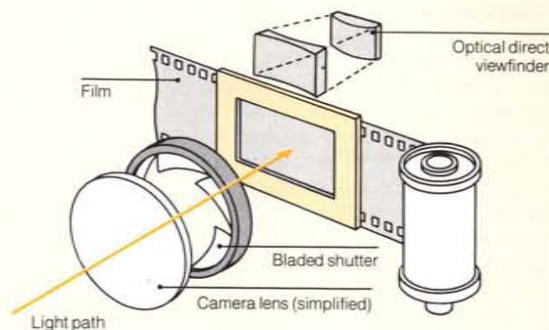


COMPACTS AND SLRs – THE BASIC DIFFERENCES

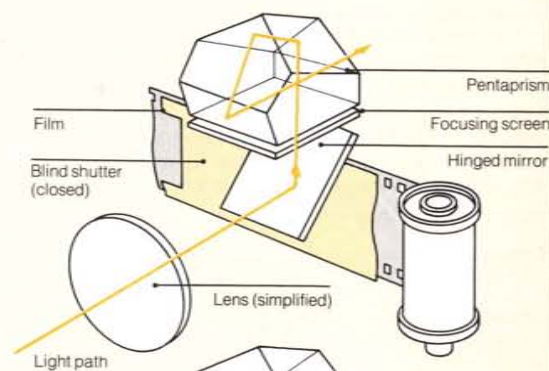
The diagrams below pick out the basic differences between the two most popular kinds of 35 mm camera design. Single lens reflex cameras offer the most accurate picture composition, and allow you to change lenses. But internally they are more complex

and bulky than the average compact. Features such as the lens diaphragm, shutter release, and film wind-on mechanism are omitted here because they are basically the same for both types of design. (See also pp. 20–2 and pp. 23–5.)

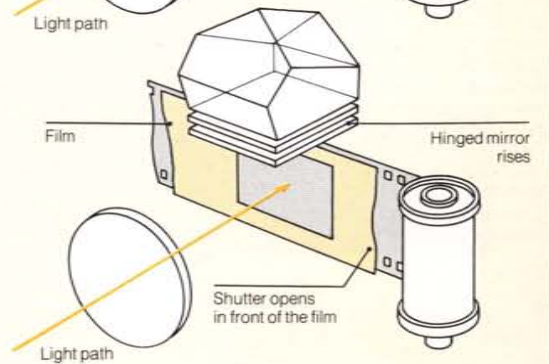
Compact layout Compact cameras have a separate optical viewfinder, recognizable by its window on the front of the body near the lens. Your subject appears clear and sharp, even when the camera lens is not focused. The picture is recorded when the shutter fires.



SLR (viewing) SLR cameras have a mirror between the lens and film. This reflects the image so that it appears the right way up on a translucent focusing screen. You then compose and focus by referring to the screen image seen through an eyepiece behind the camera. The characteristic pentaprism glass block reflects the image and corrects the reversed left-to-right view produced by the reflex mirror.



SLR (shooting) Pressing the release button causes the mirror to lift, allowing the image to reach the back of the camera. The blind shutter then opens and exposes the film. Distances from lens to film and lens to screen (via the mirror) are identical. An image, if sharply focused on the screen, will also be sharp when exposed on the film.



The main feature of this particular camera design is, as the name implies, its inconspicuous size. Yet, despite this, it still takes pictures filling the full 24 x 36 mm size of the 35 mm frame. A compact camera is a complete package, often with everything built in – flash, exposure meter, and autofocusing.

Range and scope

Originally, compacts were only very simple cameras, designed basically for beginners. Due to advances in miniaturized circuitry, however, compacts now range from low-cost basic cameras to advanced models offering every type of automation (see p. 22). Compacts are ideal if you want a minimum of controls to adjust and yet expect a high success rate in a wide range of subject conditions. They are excellent for subjects beyond about 4 ft (1.5 m) and in scenes where you want generous sharp detail rather than objects singled out through the use of localized focus, pre-visualized before shooting (see pp. 33–8).

The direct vision viewfinder of the compact is often clearer to use than the viewfinder of an SLR (see pp. 23–5), especially in dim subject lighting. And if you have eyesight problems, many compacts (even low-cost models) offer an autofocus facility. The viewfinder design is also suited to action photography – moving subjects can

Comparative sizes

The cameras, right, in scale, show the size difference between a typical 35 mm compact and SLR model. The compact also contains built-in flash. Some elaborate compacts, however, are larger than some SLRs, but these are usually the few models available that will accept interchangeable lenses (see pp. 162–3).



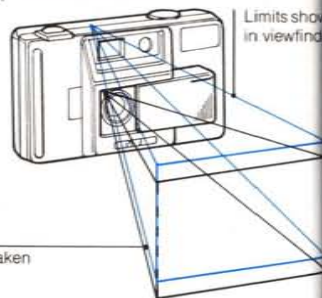
Compact Width 4½ ins (115 mm), Height 2½ ins (66 mm), Depth 1½ ins (46 mm), Weight 6 oz (170 g).



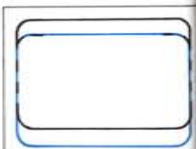
SLR Width 5½ ins (143 mm), Height 3½ ins (90 mm), Depth 2½ ins (60 mm), Weight without lens 19 oz (540 g).

TYPICAL FEATURES

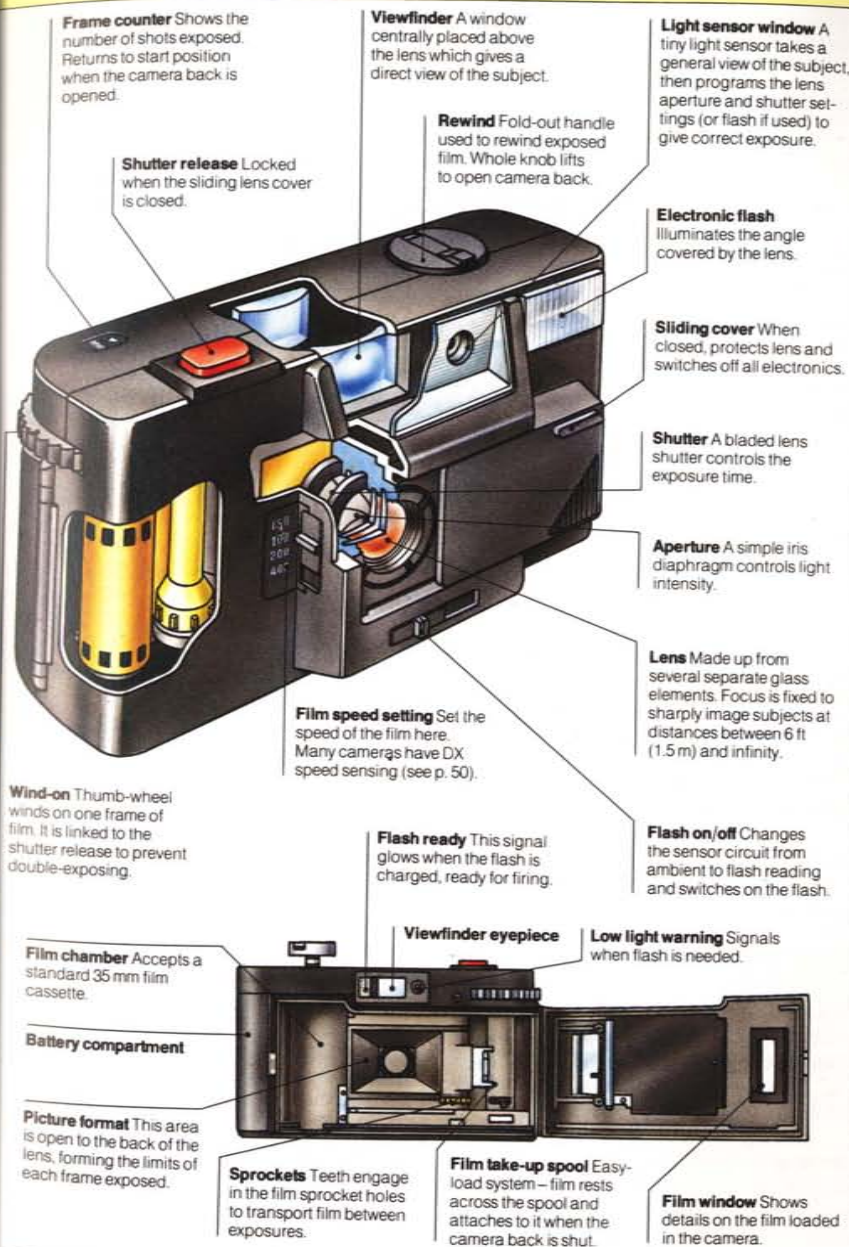
The camera shown on the right incorporates many features found in modestly priced, non-autofocus 35 mm compacts. These features include built-in flash and a built-in exposure meter that automatically programs aperture and shutter speed settings. After loading the camera (see pp. 46–7) you must set the film speed on a scale. (Many cameras read film speed directly from the cassette through sensing studs in the film compartment, see p. 51.) Setting film speed alters the sensitivity range of the light sensor. The lens is fixed to focus subjects about 12 ft (3 m) away, but it also gives tolerably sharp results from about 6 ft (1.5 m) to the horizon ("infinity"). Other cameras offer you a choice of subject distance focus settings. The longest shutter speed available is 1/125 sec. When the meter programs widest lens aperture (at this shutter setting), because of dim light, a signal warns you to switch on the flash. The built-in flash illuminates subjects adequately up to about 13 ft (4 m) from the camera.



Parallax error The viewfinder shows the scene superimposed with bright corner marks or a complete rectangular frame line. These represent the limits of your picture area when subjects are distant. The viewfinder window, however, is slightly above the camera lens – enough viewpoint difference to create errors with pictures taken of close-up subjects. This viewpoint difference is known as *parallax error*, and gives pic-



tures with less image at the top and more at the bottom than you composed in the viewfinder. To help correct this, two additional lines on the viewfinder screen (above) show the offset limits when working at the camera's closest focusing setting.



Additional features of advanced compacts

The camera has few external controls, and

no wind-on lever. Once you have loaded the cassette correctly, a motor transports film

between each exposure, and then rewinds. The lens automatically shifts to focus subjects

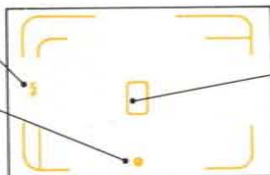
in the center of the viewfinder. "Low light" and other warnings are signaled here, too.

Shutter release Depress halfway to trigger and lock lens autofocus. Depress fully to take picture.

Internal electronics Film speed is sensed from cassette. Motor transports film after each exposure, rewinds it after last frame.

Red symbol Pulsates when flash is needed. Steady when flash is switched on and ready to use.

Green signal Steady when the subject is within autofocus range and sharp, flashes when it is too close.



Self-timer Delays shutter release by 8 sec, giving you time to include yourself in the picture.

Lens Its wide aperture (f2.8) and shutter speed range (1/6 to 1/500 sec) allows photography under various light conditions.

Autofocusing Two windows compute and set focus for any subject center frame, down to 12 ins (0.5 m) (see p. 32).

Measurement zone The camera automatically focuses on detail in marked oval area. Position main subject here.

be seen before they enter the marked-out picture zone. Compacts, however, allow you little or no change of lens focal length, due to viewfinding problems. This, and inaccuracies when working at close subject distances, severely limit the compact's use with subjects such as natural history (see pp. 134-5).

Advanced compacts

A sophisticated compact can cost more than a good SLR. Its features are intended not so much for advanced photography, but more to extend the camera's success rate without introducing more controls that require adjusting by the user. These compacts are quicker to use – the lens focuses itself, the film sets its own speed, and is loaded, wound on and rewound by motor when finished. The system is "self-monitoring" and warns you when conditions will not allow technically good results.

Limits of automation

No camera is totally foolproof and automatic. Even with the most advanced compacts you must be able to recognize situations when exposure measurement

(see pp. 42-5) and autofocus (see p. 32) are being misled. "Fail safe" devices, which lock the camera if pictures will be underexposed and dark, or exposed at speeds producing blur, can actually work against you, stopping you from taking more interpretative images. Unfortunately, very few compacts allow full manual use of controls in the same way as many auto SLR cameras do.

- Make sure your fingers do not obstruct the lens, light-sensing or autofocus window.
- If your compact gives audible warnings, make sure these are not likely to disturb your subject.
- An automatic compact is ideally suited to situations where you have little time for fine adjustments.
- Do not try to use a compact for most night photography.

Often the longest shutter speed available is only 1/8 – too brief for all but twilight shots or shots of strongly illuminated scenes.

● Pick a model with a shutter release lock. This prevents accidental triggering during handling and carrying. Also, accidental half-pressure can activate the autofocus.

HINTS AND TIPS

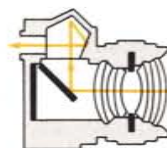
Single lens reflex cameras

Single lens reflex (SLR) cameras have a very distinctive shape. First, they do not have the separate front viewfinder window found on compact cameras (see pp. 20-2). Their second main distinguishing feature is the centrally placed dome, which houses a glass pentaprism. This pentaprism allows you to see the image formed by the lens when you look through the eyepiece at the back of the camera. Seeing the actual image formed by the lens is important both in terms of extremely accurate viewfinding and focusing, as well as allowing you to preview the precise effect of the vast range of accessories available.

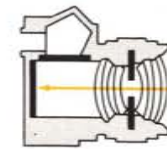
Basic models

Some SLRs are controlled automatically (apart from focusing), while others offer several manual controls. All cameras have interchangeable lenses and built-in light metering. Each manufacturer's lenses fit most of their bodies, so image quality with a basic camera body is as good as one at the top of the same range. Extras are mostly electronic.

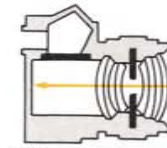
Basic SLRs allow you to check image sharpness visually, and since there is no parallax error with SLRs you can frame and



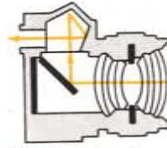
1 Viewing and focusing



2 Mirror rises, aperture reduces



3 Shutter opens to expose the film



4 Camera returns to viewing mode

How the picture is taken

SLRs differ in detail, but they all use the same mechanical sequence to take pictures. With the mirror at 45° you can compose and focus the image on the screen. The lens aperture is fully open, giving the brightest possible image. Pressing the release causes the mirror to rise, reduces the aperture to the one selected for correct exposure, and fires the shutter blind. The mirror then immediately returns and the aperture opens wide again, allowing you to resume viewing.

RANGE OF MODEL TYPES AVAILABLE	
Typical body features	Comments
<p>Basic Offers up to ten shutter speeds. You must adjust the shutter or aperture manually until the meter signals correct exposure. May not have aperture preview button (see p. 36).</p>	Budget model. Only about one-quarter the price of some advanced cameras, but accepts the same range of lenses. Good starter camera if you are prepared to learn the controls.
<p>Automatic Designed to minimize user adjustments. You simply focus visually and the camera makes all exposure settings. It may not indicate shutter speed. Accepts dedicated flash (see p. 148).</p>	Medium price. Ideal for casual and non-technically-minded photographers. Focus metering (see p. 32) may be offered – helpful for those with poor eyesight. Quick and easy to use.
<p>Dual mode Gives you the choice of setting all the controls manually or switching to an automatic mode (or some form of semiautomatic mode – see pp. 42-5).</p>	More expensive than auto only. Very popular – you can select automatic for non-technical members of the family to use or for quick candid, and then change to manual for more considered shots.
<p>Advanced (multimode) May offer autofocus. Widest range of shutter speeds. Choice of light reading methods, and semi- or fully-automated exposure programs.</p>	Most expensive model. Intended for advanced amateurs and professionals who want maximum flexibility and control. Often forms the core of a comprehensive system capable of any application.

TYPICAL FEATURES

Wind-on lever Thumb-operated lever transports the film and sets the shutter. Move it a few degrees to its preset "stand-off" position—to switch on the meter.

Shutter release With locking collar. The threaded button accepts a cable release—essential for long exposures.

Film ASA setting window Programs the exposure meter circuit. Set by lifting dial and turning.

Shutter speed control Speeds are marked in fractions of a sec, plus B setting for longer exposures.

Hot shoe Holds flash (or other accessories). Contains contacts which transfer information between flashgun and camera (see pp. 146–7).

Film rewind knob Push upward to open camera back.

Aperture setting ring Scaled in f numbers. Adjacent depth of field scale (see p. 33).

Focusing ring Scaled in feet and meters.

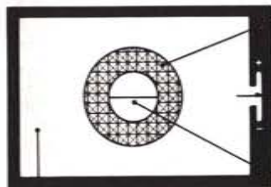
Frame counter Shows the number of frames exposed. Resets each time the back is opened.

Focal plane shutter Acts as a curtain just in front of film—covers film from light even when changing lenses.

Lens aperture Remains fully open until exposure made, or preview button (not shown) is pressed.

Lens This one has a regular 50 mm focal length and widest aperture of f 1.4. The whole lens unit detaches from camera and interchanges with dozens of other types (see p. 162).

The center of a typical SLR viewfinder screen will have a ring of micropisms as an aid to focusing. Some also include a split-image zone. At one side of the screen you will find some form of exposure signaling device.



Matte screen You can see the picture go in or out of focus over the whole of this etched surface as you focus the lens.

Micropism ring In this area unsharp detail has a shimmering, broken-up appearance.

Exposure signaling Controlled by meter circuit. When the needle is central the camera settings made will give correct exposure.

Split-image zone Here image detail appears split and offset when unsharp (see p. 31).

The camera, left, is a typical manual SLR. You can use it to focus on subjects as close as about 2 ft (0.6 m)—or even closer using extension tubes (see p. 170). You must first load the film and set its ASA speed (see p. 46). Look through the eyepiece and turn the focus control until your main subject appears sharp. Then, by altering shutter speed or aperture, center the exposure meter needle seen alongside the focusing screen. Some models have light signals instead. After taking each picture, advance the wind-on lever. This transports the film and resets the shutter.

Pentaprism The pentaprism allows you to see the focusing screen from eye level. It also corrects the screen's laterally reversed mirror image. Without this correction you would find it difficult to relate the picture to the scene in front of you, or pan moving subjects.



Advanced SLR

Advanced cameras contain all the basic SLR features, plus extra options that greatly extend the

camera's versatility. With this type of camera you can choose the modes and controls that best suit your way of working. Some

features may only be rarely used, and others only when you add special accessories such as remote shutter releases.

LCD display panel Shows all settings, and number of frames exposed.

Shutter speed Ranges from 1/2000–30 sec, permitting shooting in widely differing lighting conditions.

Exposure modes Choose from eight automatic or semi-automatic methods by which the light reading sets exposure, or set controls manually.



Choice of backs Removable camera back is interchangeable with special-purpose backs (see p. 179).

Lens Select from a range of interchangeable lenses, all autofocused by a motor within the camera body.

Film drive Film is wound on (at up to two frames per sec) and rewound by motor.

focus close-ups accurately. The effects of changing lenses or adding lens attachments are visible immediately on the focusing screen.

Advanced models

Advanced SLRs offer in-body autofocus (see p. 201), which can be used with a range of interchangeable lenses. Detectors sense the film speed direct from the cassette. With these models, you can choose the way in which the light reading of the subject is made. Readings are internally computed and you may select automatic setting of the shutter and aperture, following one of a choice of programs to best suit different lenses and subjects. Or you can pre-set the shutter or aperture and allow the metering system to set the other control. Most models have built-in motor drive and accept a wide range of "add-ons" such as interchangeable backs and dedicated flash.

- HINTS AND TIPS**
- A basic SLR will cope with a wider range of situations than a basic compact.
 - Avoid buying an SLR that does not have an aperture preview button.
 - If your eyesight makes it difficult for you to focus images on the screen, consider an SLR with focus metering.
 - Before committing yourself to a camera system, investigate the extent and cost of its lenses and other accessories.



Camera handling and care

Your camera is a precision picture-taking instrument, and as such deserves to be handled with care. There are really only two basic requirements for trouble-free photography: the first is to hold the camera comfortably and steadily when shooting, and the second is to carry out sensible, routine maintenance.

Holding the camera still

Avoiding camera shake when shooting does not always mean supporting the cam-

Supporting your camera There are many techniques for holding the camera steady when shooting. Most people hand-hold the camera while standing, bracing their body. If you can, carry a monopod, tripod, or rifle grip (see p. 176). If this is not possible, you can utilize a cable release or the camera's delayed action release.



Hands and arms Press the camera against your face, giving most support with one hand. Use the fingers of the other hand to squeeze the release gently. Keep elbows tucked in.



Bracing your feet Place your feet slightly apart, one foot forward. Breathe out gently when firing the shutter. If you are left handed, try using the camera upside down, but do not use flash.



Kneeling This is much steadier than standing. Rest one elbow on your knee to give exposures up to about 1/30 or 1/15.

era in the same way or at the same height. Your first consideration is the viewpoint required to give the picture effect you want. Then choose the best way to keep the camera steady in this spot. Often, this will be a convenient standing height, or you may have a monopod or tripod (see p. 176). Sometimes, though, it will mean lying on the floor or balancing the camera on a table.

The degree of steadiness required for a particular shot depends on the shutter speed you select (see pp. 39-41) and the

Side bracing Exposures of about 1 sec should be safe if you brace yourself against a wall or door frame. Position the whole camera base hard against the flat surface, pressing firmly with both hands.



Tripod A good-quality tripod with a tilt head and a cable release allow you to use any length exposure.



Lying down If you lie flat, taking all the weight on both elbows, you should be steady enough for exposures of about 1/15. Better still, support the camera on a pocket mini-tripod in this position. As an alternative, you can rest a long focus lens on a camera bag.



Overhead If your SLR has a removable pentaprism, you can compose and take pictures over the heads of crowds and other obstructions. Hold the camera inverted at arms' length above your head. Avoid shutter speeds slower than 1/125.



weight and type of lens. Speeds slower than 1/60 require particular care.

Avoiding damage

All mechanical parts of the camera are subject to wear, but you can cause excessive damage through unintentional mishandling. The best advice is never to force any of the controls.

You should take special care when mounting your camera on a tripod. Overtightening the screw can cause the base-

plate to buckle, jamming the shutter. More routinely, never carry your camera with the body and lens unprotected. Use the everyday case supplied with most cameras and fit a lens cap whenever possible. Damp is especially damaging to the glass and electronic components of your camera. Avoid excessive humidity and protect the camera completely in the rain or when near the sea. Even more damaging than damp is battery neglect. Leaving old and leaking batteries in the camera can result in corrosion.

POTENTIAL PROBLEM AREAS

The areas of the camera picked out here tend to be prone to the most damage and abuse. Most of the examples apply equally to SLRs and compacts. Ironically, often the best way to

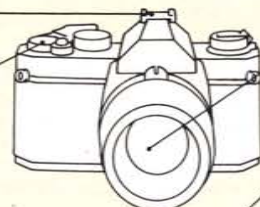
protect a camera is to use it. A camera stored for long periods with the shutter tensioned, or with old batteries, or subject to damp, can end up more damaged than if used everyday.

Hot shoe This attachment can be distorted if wrenched or forced.

Film advance lever Forcing this, especially at the end of a film, strains film transport and shutter.

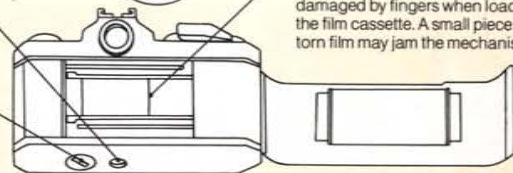
Tripod socket Overtightening a tripod screw can warp the base-plate, damaging the shutter.

Battery If this is left for an excessively long time in the camera it will start leaking.

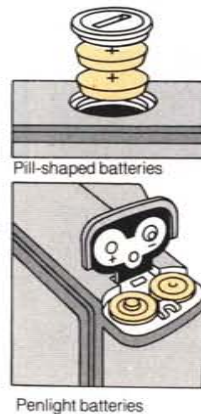


Lens surfaces These collect fingerprints and scratches. Use a lens cap or clear filter.

Shutter blinds These are easily damaged by fingers when loading the film cassette. A small piece of torn film may jam the mechanism.



Battery care Most cameras use pill-shaped batteries, or penlight cylindrical types (required for models with built-in flash or motorwind). Batteries last about a year (some types up to five years). Make sure contacts are clean, and that the battery is correctly inserted. Always replace batteries as a set. Remove batteries if the camera is to be stored for a long period.



- If your camera has a test button, check battery condition before every shooting session.
- One or two small specks of dust on the lens are far less serious than grease or scratches. Do not clean lens glass surfaces obsessively.
- If you must use your camera in the rain or in dusty conditions enclose it in a clear plastic bag. Make a hole in the

- bag just large enough for a clear UV filter attached to the lens. Seal the edges with tape.
- In your camera bag always have a blower brush, lens tissues, a small can of compressed air, and spare batteries.
- Regularly inspect your camera for any signs of wear, especially internal surfaces.

HINTS AND TIPS



Using the viewfinder

The viewfinder is the most important control on the camera. At a basic level, it is there to ensure that you include all the important subject elements. At a more advanced level you can think of it as your working area for picture making. If you are going to produce photographs that are strong in design and imaginative, begin by choosing a camera with a viewfinder that will be comfortable to work through, and not form a barrier between you and your subject.

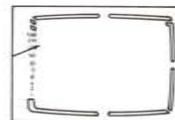
Framing your picture accurately

To make sure you aim the camera correctly, you must see all four corners of your picture area at one time when looking through the viewfinder. With some compact cameras

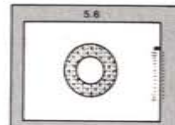
you may not see the "suspended" white frame line at all unless your eye is centered and close to the eyepiece. When using an SLR you must also see clearly any exposure signals or focusing aids on the screen. If you wear glasses, it may be better to take them off and use an optical glass, eyesight-correction lens element over the eyepiece. Some advanced cameras have focusable eyepieces. They also allow you to change focusing screen (see p. 31) and, occasionally, the viewfinder itself (see p. 178), so that you can pick combinations that best suit you. When shooting with a compact, make sure you use the parallax marks, but the separate positions of viewfinder and lens may upset very precise alignments of near and distant subjects.

Information display

Some compacts use a moving needle against symbols or figures. With some SLRs, figures and words are presented as a liquid crystal display located below the focusing screen, so that they aren't confused with image detail. Often, the viewfinder only shows about 95 per cent of the final picture area.



Compact



SLR



- A rubber, viewfinder eyecup is a cheap and worthwhile accessory for an SLR viewfinder. It prevents side light from entering the eyepiece.
- Practice picture composition without taking pictures. You can learn a lot just by looking through the viewfinder and observing what happens when you change angle and viewpoint.
- Do not stick rigidly to vertical or horizontal

- format, full-frame pictures. Some shots will be improved with square framing. Ignore the part of the frame to be cropped at the printing stage.
- When you are taking zoom shots of a fast-moving subject, try using the camera with both eyes open. One takes a wider view of the scene, and the other sees the part that will appear in the picture.

HINTS AND TIPS

VIEWFINDING ERRORS AND IMPROVEMENTS

One of the most common viewfinding errors is not including important parts of the subject. The opposite problem to this is standing too far back, making everything too small and also including a mass of unwanted detail.

Provided you are using the eyepiece of the viewfinder correctly – and allowing for parallax

if necessary – it is a good idea to fill up the frame as much as possible. Look out for unimportant but assertive items in the foreground or background of your pictures. Some of these may be "hidden" out of focus when you view the scene through an SLR with the lens fully open, but they may record clearly when the



Filling the frame In the top picture of this pair the main element (the stone figure) is overwhelmed by the assertive surrounding shapes. A closer viewpoint and simpler use of one shape to frame the figure has a stronger effect, as in the version above.

Positioning the horizon It is generally a weakness to divide your picture exactly in half with the horizon (top). A high or low horizon (above), with the main element in the larger part, is often a more interesting composition.

Shifting viewpoint The top picture has an awkward background, with assertive light patches. Moving the camera to the left changes this to plain foliage (above). It also gives a different angle on the figures. A movable subject could rotate with the camera.

aperture closes down for the actual exposure. Always look closely at the edges of the viewfinder, and make sure that you do not create any ugly shapes by cutting objects off awkwardly. This can occur easily when parts of buildings or parts of people are cropped off against the sky. Include surrounding shapes

and detail that add to rather than compete with your subject.

Although some "faults" look bad in the viewfinder, they will not appear on your final picture. Specks of dust, for example, on a focusing screen or compact viewfinder window are annoying but unimportant.



Converging vertical lines In the pair of pictures above, the left-hand version has some unattractive features – vertical lines just slightly converging and excessively tight cropping at the top of the frame. For the right-hand shot the photographer exchanged the 50mm lens

for a 28mm lens, moved closer to the building, and angled the camera upward. If you have to tilt the camera, it is often better to work closer in and so make convergence a dynamic feature.

Viewfinder accuracy The top version was taken with a compact, ignoring parallax marks. Even if correctly framed the viewfinder would not show mirror contents (including the hand) as seen by the camera lens. An SLR gives complete close-up accuracy (above).



Using focus control

Your camera lens must be the correct distance from the film to produce a sharply focused image. The nearer the subject is, however, the more you have to increase this lens-to-film distance. On very basic compact cameras, the lens may be permanently fixed at a compromise setting to accommodate both near and far subjects. Other compacts have adjustable focusing with settings shown as symbols. All SLRs and some compacts have adjustable focusing with a scale of actual distances. Adjustable cameras often allow you to focus visually through the viewfinder, with the help of various aids. Some cameras have mechanisms that automatically focus for whatever part of the scene is central in the frame.

Advantages of focusing

A fixed-focus camera is inexpensive and easy to use. In most cases, the lens is set to record sharply everything from the far horizon down to about 6 ft (2 m) from the camera. With these cameras the lens has a small maximum aperture and short focal length lens to maximize depth of field (see pp. 33–8). But there will be times when you want important foreground parts of the photograph to be clearer than more distant detail. A background can become too assertive if it is as sharp as everything else. The background may also be inappropriate and therefore needs suppressing. Selective, or "differential", focus is an effective way of

emphasizing one chosen element in a scene at the expense of another (see p. 70). Only an adjustable focusing lens gives you this control, and it also allows you to focus on subjects at closer minimum distances than a fixed lens.

Manual focusing

The most basic focusing system uses a subject distance or symbol scale. Settings appear on the outside of the camera and



Distance scale Subject distance scales, are uniform on all SLR lenses. Typical closest focusing distance is 1.5 ft (0.45 m). Some compacts show focusing distances.



Symbol scale On a typical compact head-and-shoulders denotes 4 ft (1.2 m), a half-length figure 6 ft (1.8 m), a full-length figure 9 ft (3 m), and a mountain infinity (∞).



Fixed focus lens A fixed focus lens shows far away detail more sharply than objects in the immediate foreground. To make the

roses sharp in the scene above you must photograph from further back. (The house will not become out of focus.)



Adjustable lens Using a camera with adjustable focus allows you to concentrate attention on the foreground. For the result above

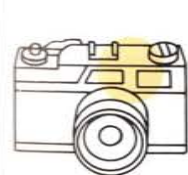
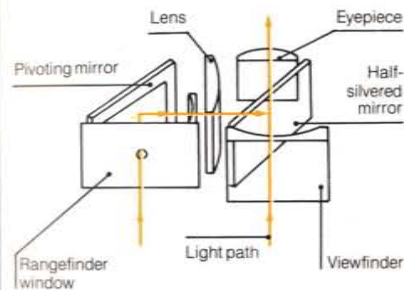
the lens was set to 4 ft (1.2 m) — "head-and-shoulders" on a symbol camera. The differential focus gives a strong effect of depth.

VISUAL FOCUSING AIDS

Focusing is more precise if the picture in the viewfinder looks clear only when the lens is correctly set. This can be achieved using a system of mirrors and lenses called a rangefinder. Older model advanced compacts have built-in rangefinders that project a double image in part of the viewfinder if the lens is not

Rangefinder Compact cameras with rangefinders give you two views of the subject. You see one view directly through the viewfinder. The other, showing the center of the scene only, is reflected by a pivoting mirror from a window farther along the

camera body. The mirror pivots as you focus the lens. As you look through the eyepiece, you see the two views as a split or double image. One image moves as you turn the focus ring — when it coincides with the other, that part of the scene is in focus.



Viewing system

Typically the rangefinder forms part of the viewfinder. The second image is often tinted. Rangefinders are ideal in dim lighting.

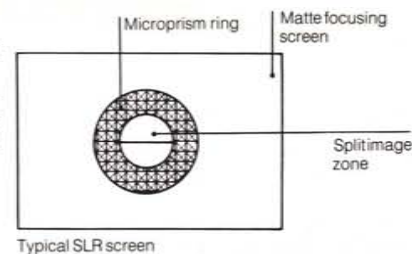


Image out of focus

properly focused. On modern compacts, this system has been largely replaced by autofocus (see p. 32). Single lens reflex cameras allow you to see focusing adjustments as changes of detail over the whole focusing screen. For extra clarity, central prisms break up the picture if the lens is not properly set.

Focusing screen You can use the whole of a (standard) SLR focusing screen to see subjects at different distances coming into sharp focus as you turn the focus ring. For extra clarity, align the ringed, split zone with the main

picture is out of focus (bottom) this center zone shows vertical lines offset, and detail shimmers in the surrounding microprism ring. Both effects disappear when you accurately focus. Part of these focus aids black out at small lens apertures.



Typical SLR screen



Image in focus



Image out of focus

LIMITATIONS OF AUTOFOCUS SYSTEMS

No autofocus system is foolproof. You must make sure that the main subject is lined up in the focus measuring area. Most, but not all, cameras allow you to lock focus at this particular point and then recompose your picture without the subject being dead center.

Contrast-comparing autofocus can be fooled by repetitive pattern and low-contrast subjects. The system also needs bright lighting conditions. Infrared works even in darkness and is excellent for flash work, but the beam can reflect off glass and so give faulty settings.



The off-center sculpture in this shot might cause problems with ultrasonic and infrared autofocus systems.

Pronounced areas of light and shade would probably confuse contrast-comparing autofocus.

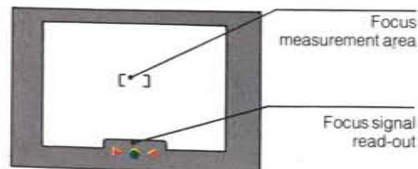
Infrared and ultrasonic systems would probably focus on the fence.

sometimes inside the viewfinder, too. With practice and care, you can judge settings sufficiently accurately, but at closest distances there is little room for error. More advanced cameras, including all single lens reflex cameras, allow visual focusing. The image in the viewfinder changes as you alter the lens setting, making focusing more positive and accurate.

Electronic focusing aids

Electronic aids for focusing are of two types. "Focus indicators" signal in the viewfinder to confirm that focus is correct. This is useful if your eyesight is poor. Fully "auto-

focus" systems, though, go further, and actually alter the lens setting for you. These are built into compact and SLR cameras. Some autofocus systems compare electronically two views of the same scene, and shift the lens until they match both in pattern and contrast. Another system projects an infrared beam from the camera. When the strongest signal reflected back from the subject is registered, the lens stops. All focus-aided cameras have a small area marked in the viewfinder or on the screen. Position your main subject element within this area for focusing, and then recompose before shooting.



Electronic focus indicator This device is found in all SLRs and works with most lenses. A sensor signals when the image in the measuring area is at maximum con-

trast (unsharp images are less contrasty than sharp ones). A focused image lights a green signal. When the image is out of focus, a red arrow indicates the direction to refocus.

- If your camera focuses by zone or distance scale, practice judging and pacing out distances. Learn how large a head looks in the viewfinder at set distances.
- A split-image focusing screen dividing the image horizontally helps you focus vertical lines. For horizontal sub-

- jects, twist the camera briefly.
- Take care with autofocus that you position the main subject correctly for focusing.
- Do not confuse focus error in your pictures with camera shake or subject movement.

HINTS AND TIPS

Aperture and depth of field

The lens aperture on your camera exercises two very important controls over picture appearance. First, it gives you variable control of image brightness. This is one method of altering exposure (the other being shutter speed – see pp. 39-41). Second, reducing the size of the aperture has a unique optical effect – it increases the range of objects at different distances from the camera that will appear sharp at one focus setting. This band of sharpness is called *depth of field*.



f number scale Most lenses have the aperture ring marked in f numbers. Each change to the next highest number halves the light entering the camera.

Aperture and exposure

Most cameras have an adjustable aperture formed by an iris diaphragm positioned between or near the glass elements making up the lens. On a compact camera, the diaphragm is often directly behind the shutter blades. Automatic-exposure compacts, however, often have no diaphragm – the shutter blades themselves open to form a circular aperture of the required diameter at the moment you press the release.

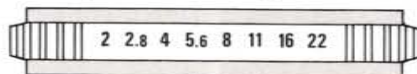


Weather symbol scale A few simple cameras use symbols. The "bright sun" symbol selects the smallest aperture, and "cloudy" gives the widest aperture available.

"STOPPING DOWN" THE LENS

The f number itself is effectively the number of times aperture diameter will divide into the lens focal length. For example, at f 4 aperture diameter is one-quarter the focal length. All lenses set to the same aperture will transmit the same amount of light. The scale below is universal, but some lenses "stop down"

further, to f 22 or more. A more expensive, "fast" lens may open as wide as f 1.4 or f 1.2. Sometimes, the maximum aperture departs from the regular series – f 1.2 for example is only half a setting wider than f 1.4, but it may be the fastest aperture setting that your lens can give.



Changes in image appearance As you stop the aperture down, the image produced dims. But notice how objects in



the foreground and background also grow sharper. Use the dimming effect to compensate for brightly lit subjects – or

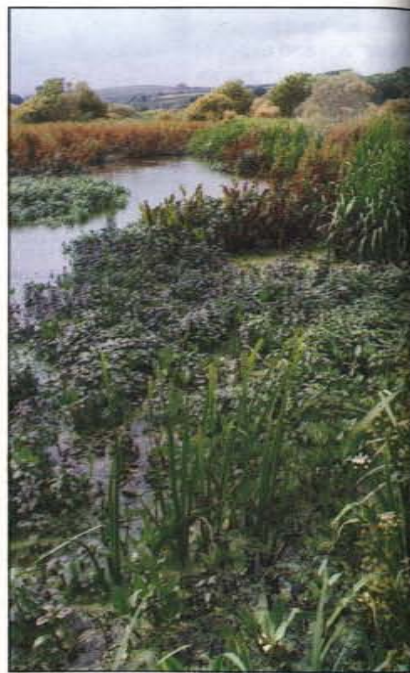


stop down purely to change depth of field (countering the change in image brightness by using a longer shutter speed).

On an SLR you can watch the diaphragm change as you turn the aperture control, provided you keep the preview button depressed or remove the lens from the camera body.

The aperture control is scaled in "f numbers" or, sometimes, weather symbols (see p. 33). If the camera has no aperture scale at all, this may mean that exposure is totally automatic or that it is a simple, fixed-aperture camera with exposure al-

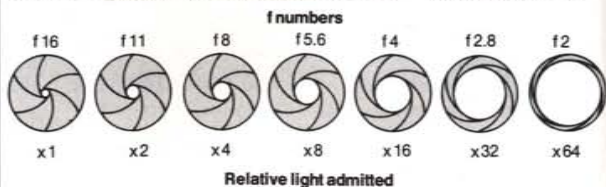
tered by change of shutter speed alone. Every SLR camera lens has an aperture ring marked in the internationally agreed f number series of f 2, f 2.8, f 4, f 5.6, f 8, f 11, f 16, f 22. The widest aperture (lowest f number) offered by your lens is also engraved on its rim. This often appears as a ratio, for example 1:2.8. A few cameras have the letter "A" one setting beyond the smallest aperture. When you set the camera to "A" the most suitable aperture size is automat-



Choosing depth of field In the photographs above the lens was focused for the near middle distance. The left hand image was shot at widest aperture, limiting sharpness to the point of focus. For the landscape above right, the photographer set f 22 to make everything equally sharp.

WHAT F NUMBERS DO

Each f number shown below doubles the amount of light let in by the previous setting or "stop". As the diameter of the circle is doubled (change of two f numbers) its area increases fourfold.



ically chosen by the camera's exposure meter (see pp. 42-5).

Aperture and depth of field

Aperture affects depth of field, the distance between the nearest and farthest parts of a scene that appear sharp at one focus setting. For example, a lens set at f 2.8 focused for a subject 10 ft (3 m) away may record sharply everything from about 9.5 ft (3 m) to 12 ft (3.5 m). But change to f 16 and depth of

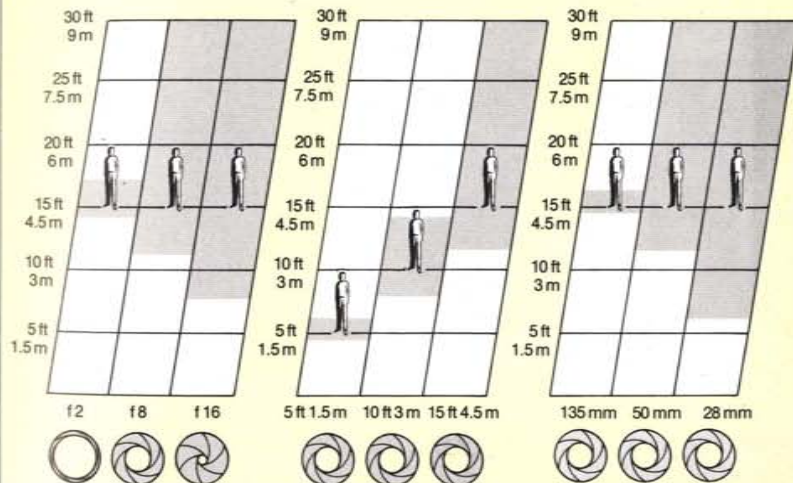
field will extend from 6 ft (2 m) to 18 ft (5.5 m). So by choice of aperture – and care over your focus setting – you can either localize detail, picking out objects at one distance only, or make everything equally detailed from the near foreground to the far distance.

Each time you change aperture you will have to compensate for the extra brightness or darkness of the image by setting shorter or longer times on the shutter. Sometimes there is conflict between the

CONDITIONS WHICH ALTER DEPTH OF FIELD

There are three main ways to alter the depth of sharp detail in pictures. You can increase depth of field by using a smaller aperture, or by moving further away from the subject, or changing to a wide-angle lens (see pp. 162-7). Changing aperture is usually most convenient,

but if the light is dim or you have a slow film it may be easier to make one of the other two changes (both of which produce a smaller image). Even though you may later need a bigger enlargement from the film, the result will still show increased depth of field.



CHANGING APERTURE

The diagram above represents a sharply focused subject 15 ft (4.5 m) from a camera with a 50 mm lens. Working at f 2, depth of field extends from about 14 ft (4.2 m) to 16½ ft (5 m), a distance of 2½ ft (0.7 m). At f 8, depth of field is 11–33 ft (3.3–10 m), a total of 22 ft (6.7 m). At f 16 depth is from 8 ft (2.4 m) to infinity.

CHANGING DISTANCE

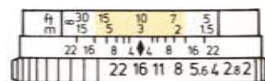
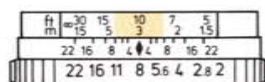
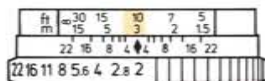
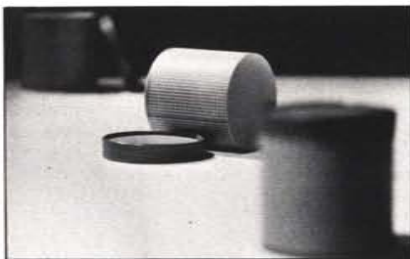
This diagram shows the result of changing subject distance with a 50 mm lens set at f 8. With a subject 5 ft (1.5 m) away, depth of field is 4½–6 ft (1.3–1.8 m), giving 1½ ft (0.4 m) in sharp focus. At 10 ft (3 m), depth becomes 7½–14 ft (2.2–4.2 m) – a total of 6½ ft (2 m). And at 15 ft (4.5 m) depth is 11–33 ft (3.3–10 m), giving 22 ft (6.7 m).

CHANGING LENS

Using different lenses, aperture is set at f 8 and subject distance is 15 ft (4.5 m). A 135 mm telephoto is in sharp focus from 14½–16 ft (4.3–4.8 m) – only 1½ ft (0.4 m). A 50 mm lens gives 11–33 ft (3.3–10 m), a sharp field of 22 ft (6.7 m). And with a 28 mm lens the sharp field is from 6 ft (1.8 m) to infinity.

Reading depth of field The depth of field scale on a typical SLR lens is located under the distance scale. The diamond indicates the distance actually focused, and f num-

bers left and right show you the limits of depth of field at each aperture. The depth expands from a few inches at f 2 (top) to several feet at f 16 (bottom).



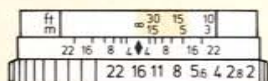
brightness conditions and depth of field — such as a dark interior shot that must be sharp throughout. Here, use a fast film (see pp. 54–6), or very long exposure, or flash. For most conditions, however, you will be able to choose from a reasonably large range of f numbers.

Previewing depth of field

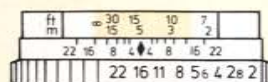
Lenses with focus adjustment and variable apertures usually show depth of field on a scale. Bear in mind that with an SLR you view the image with the lens at widest aperture. Setting a smaller aperture has no effect until you press the shutter release, so your picture may have more depth of field

HYPERFOCAL DISTANCE

There is a method of maximizing depth of field at any aperture for distant subjects such as landscapes. If you set your focusing for infinity (∞) and then shoot at, say, f 16, depth of field extends from the horizon to about 16 ft (5 m) away (see below). This near point is the *hyperfocal distance* for your lens at f 16. If you then refocus for the hyperfocal distance (see bottom), the landscape will still be sharp at the horizon, but now the nearest sharp object is at only half the hyperfocal distance, 8 ft (2.5 m).



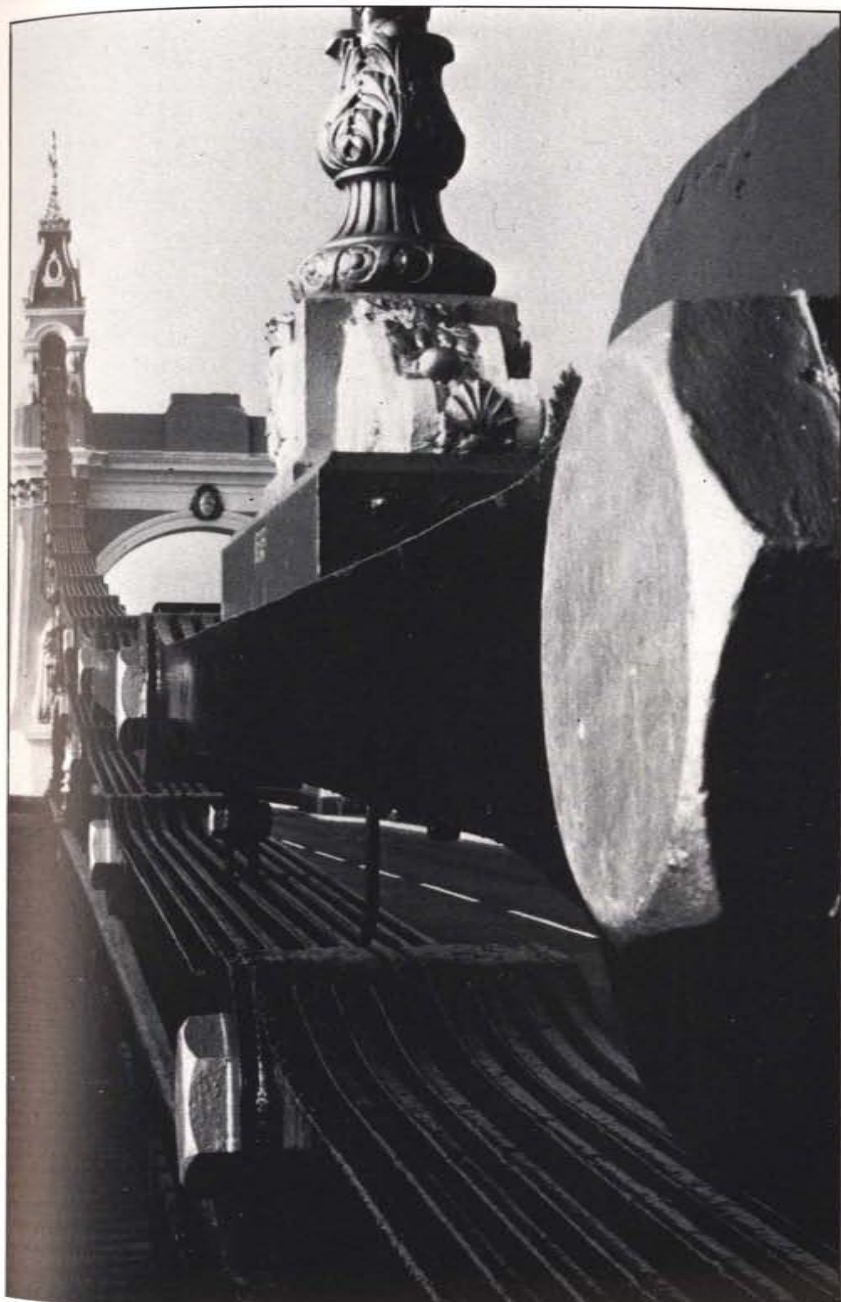
Set for infinity



Set for hyperfocal distance

Maximizing depth of field This shot (facing page) uses depth of field to give sharp detail from the far distance to within 3 ft (0.8 m) of the lens. The photographer used a wide-angle lens at f 22. He set focus so that f 22 on the depth of field scale just read infinity. (Setting the lens at its

hyperfocal distance for f 22.) In bright lighting you can also set depth of field visually. Focus one-third inside the zone you want sharp (the nearest post here). Then depress the preview button and watch the depth of field expand as you reduce the aperture.



**Depth of field choices**

Focusing technique depends on subject and lighting. This boldly lit shot gains detail from extreme depth

of field. But in flat, over-cast lighting, limiting the zone of sharpness to the distant village may be the best way to imply distance.

than you expect or want. You can see this before shooting using the preview button. The other major factor determining depth of field is the focal length of your lens – the longer the lens the shallower the depth of field that it gives.

Aperture and compact cameras

Simpler compact cameras with non-adjustable focusing have a fixed aperture, often about $f/4$ or $f/5.6$. This means that the camera's lens can be factory set for about 12–15 ft (3.5–4.5 m). This type of aperture and focus setting, coupled with the quite short lens found on this type of camera, will produce depth of field covering objects between 6 ft (2 m) and the far horizon. Everything in the average picture will therefore be sharp, and there are no adjustments to make.

● Close subjects always have shallowest depth of field, but sometimes you can change your position to make important picture elements more equal in their distance from the camera.

● Depth of field normally extends farther behind where you focus than in front of it. This is worth remembering when prefocusing for candid.

● Using an SLR, adopt the routine of checking picture composition at your chosen aperture (using preview button) if time permits.

● It is hard to create shallow depth of field shooting in bright light or using fast film, because of the

small aperture required to avoid over-exposure. Using a gray neutral density or polarizing filter will reduce light and allow you to use a wider aperture.

● Cameras with programmed exposure settings give greater depth of field the brighter the subject. If your camera has an automatic shutter-priority system, to increase depth of field select a slow speed. This will force the camera to set a smaller aperture.

● Depth of field viewed on an SLR focusing screen always looks slightly greater than on the final enlargement.

HINTS AND TIPS

Using shutter control

You use your camera's shutter to control both the moment of exposure and its duration. The best choice of shutter speed setting depends on the degree of camera or subject movement – whether or not you want the subject to look blurred or frozen. The time set also affects the amount of light reaching the film, so subject brightness, film sensitivity, and lens aperture are important factors, too.

Types and settings

There are two main types of shutter – focal plane, found mostly in SLR cameras, and bladed, used in compacts. The actual period the shutter allows light from the subject to act on the film is, in most cases, timed electronically. This makes it easier to integrate changes in shutter speed into an electronic circuit, controlled by the camera's exposure meter.

Most automatic cameras, especially compacts, have no external shutter speed scale. The camera itself selects a fast speed for bright light conditions, or in response to the user choosing a wide aperture, and a slow speed in the opposite circumstances.

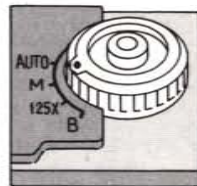
Manual setting On a manual SLR, shutter speeds (in fractions of a second) appear on a setting ring normally located on the top of the body. Times double or halve, and so easily relate to aperture changes. Sometimes, the letter "A" appears



on the dial. On this setting the camera's meter determines the speed.

Automatic setting

Often, on an automatic-only SLR, the speeds setting dial is replaced by a simpler switch. On the one shown right, "B" is used when you want to give an exposure longer than the camera's timing mechanism will allow. 125X is the setting for flash. Most of the time, the switch is set to Auto, which gives a range of



speeds from 1/2000 to 4 sec, chosen by the camera's metering system. Most models signal the speed in the viewfinder.

On an advanced camera, speeds may vary continuously from 1/1000 to several full seconds, but basic cameras are limited to 1/60, 1/125, and 1/250, or perhaps to even one speed, typically 1/125. A few simple compacts change shutter speed when you set the film ASA on the camera or alter a weather symbol scale.

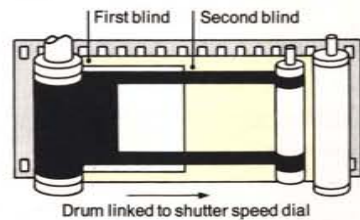
Most SLR cameras have a scale of shutter speeds for manual setting. You can select 1/1000 (1/2000 or 1/4000 on some models) down to at least 1 full second. For longer exposures you may have to use the

HOW SHUTTERS WORK

The shutter opens just in front of the image focal plane (the plane where the image comes into focus), or consists of thin blades that open in the lens. Both are tensioned by the film wind-on lever and fired by a release button. The open period is timed electronically. One speed usually works mechanically in case of battery failure.

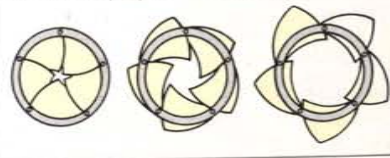
Focal plane This type of shutter (below) is larger than a lens type, but essential in SLR design as it allows you to view the image via a mirror and also to change lenses. Two

blinds pass in sequence in front of the film. The gap between them is narrow for fast speeds, full-picture width for slow speeds. Some blinds travel vertically.



Lens (bladed) A leaf or bladed shutter is found in or near the lens. Its set of thin, opaque

blades open from center when a spring or magnet rotates an outer ring.



1/8 sec This photograph of a fast-moving fairground ride (below) was shot at 1/8 at f22, using a tripod. At this slow speed, every part of the subject is blurred, and smaller elements such as some of the chains have disappeared completely.



1/60 sec This picture, taken at 1/60 at f8, is a mixture of blurred and sharp detail. The amount of blur depends on the angle and direction of movement of the subject relative to the direction of the shutter blinds. Movement in relation to camera position is also important to the final result.



1/1000 sec A speed of 1/1000 at f2 has frozen all the subject detail. The result now consists of silhouetted shapes. The stepped diagonals still give a dynamic image, even though all blur is lost.



"B" setting, which holds the shutter open for as long as you keep the release depressed. Focal plane shutters have either 1/60 or 1/125 colored prominently to indicate the fastest speed for electronic flash. Recent models signal a warning in the viewfinder when you select speeds slower than 1/60 – this reminds you to support the camera firmly in order to avoid camera shake, or to use flash instead.

Speeds and blur

Choosing the best shutter speed depends on how much the subject or camera will be moving, and whether you want maximum

detail or a more "impressionistic" result. Lens aperture, lighting conditions, and film sensitivity will all tend to limit your choice. Generally, 1/125 is the slowest setting that will avoid camera shake when using a hand-held camera and standard type lens. Often, though, you will need a briefer setting to freeze subjects that are very fast moving, such as sports events, or very close, such as close-ups of swaying flowers. If conditions are right, use slower speeds to convey the flowing movement of a dancer, or the bustle of traffic. Keep the camera still, pan, shift or zoom to produce different forms of blur (see pp. 98–9).

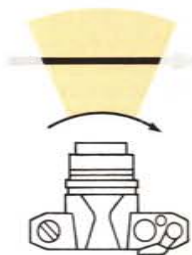
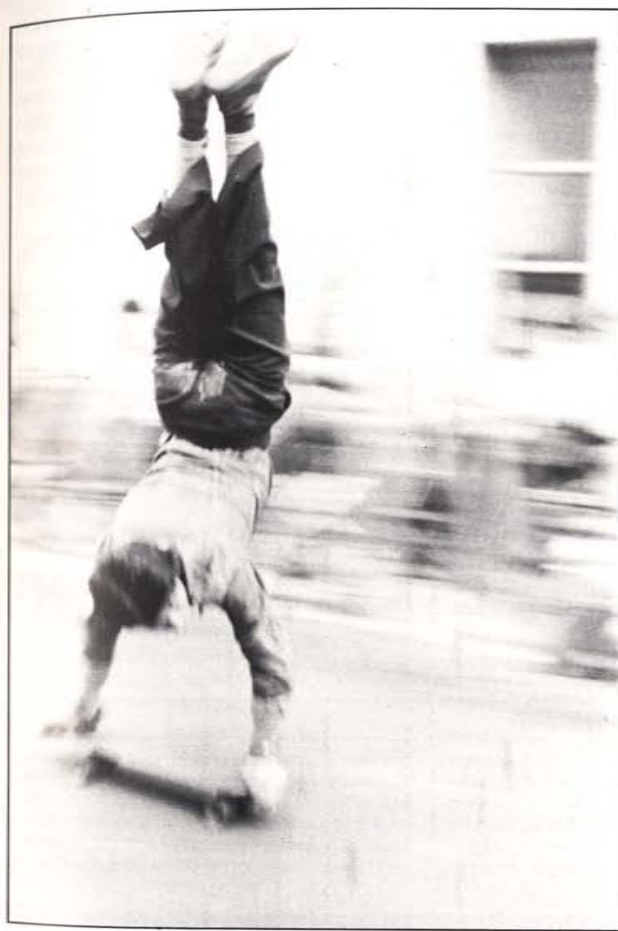
CHOICE OF SUITABLE SHUTTER SPEED SETTINGS

Shutter speed

1/250 or less	Use as standard with telephoto lenses over 200 mm. Safest choice when shooting (normal lens) from a moving boat or slow moving car. Will freeze cycle traffic and running figures, full length. Close action shots of auto racing and golf require at least 1/1000. These speeds often call for strong light, wide aperture lens, and fast film.
1/125	Good general purpose shutter speed – set your camera to this for most outdoor candid with a normal lens. On some SLRs it is the fastest speed suitable for flash.
1/60	Select this or any slower speeds when using flash on SLR. (The flash itself gives an effective speed of 1/1000–1/10,000.) For existing-light work, this may be the slowest speed you can hand-hold a camera without support.
1/30–1 sec	Regard some form of support as essential for static work. Necessary speeds for dim-light situations where a small aperture for depth of field is also required. Use the middle of this speed range for panning, zooming, and for hand-held, semi-abstract effects.
Longer than 1 sec	Using the B setting you may need a locking cable release and a watch to time these speeds. Suitable for fireworks, patterns from moving car lights, and night shots generally. Film may lose sensitivity and colors be distorted.

Moving the camera

For the picture left, a shutter speed of 1/15 was used with the camera panned sideways to follow the action (see diagram below). This gives a mixture of blur and sharp detail on the boy himself, and also separates him from the crowd behind. Panning at slow shutter speeds (see p. 98) allows you to convert backgrounds or foregrounds into blurred lines. This also increases the sense of movement.



● Even slow-moving subjects may require a fast shutter setting if they are very close, moving at right-angles to your position, or taken with a telephoto lens.

● To freeze action where poor light will not allow fast shutter speeds, change to a wide-angle lens, or move back from the action, or adopt a more head-on

position.

● To allow slow speeds in bright light, or with fast film without unwanted depth of field or overexposure, use a neutral density or polarizing filter.

● If your camera has aperture-priority metering use fast film and set the widest aperture for briefest shutter

speeds. Attach an ND filter and select the smallest aperture for slowest exposures.

● In some cameras with manual exposure meter systems, the meter switches off when you select shutter speeds of 1 sec as well as B.

● The compact camera's direct vision viewfinder is ideal for slow speeds

and long exposures – unlike an SLR you can still see the subject while exposing the film.

● Even when you are using fast shutter speeds, make a habit of squeezing, not jabbing, the shutter release so that your pictures are always sharp.

HINTS AND TIPS



Using exposure controls

Exposure is a term used to describe the amount of light falling on the film. To determine "correct" exposure, you must assess the brightness of a scene, relate this information to the sensitivity of the film, and then set some combination of aperture and shutter speed which ensures that the film receives neither too little nor too much light. These exposure controls alter the brightness of your picture - its lightness or darkness. Most modern cameras contain a meter that measures the light reflecting back from the subject, and then some models make all aperture and shutter adjustments.

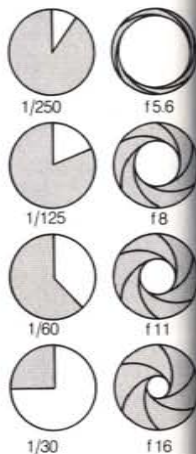
Determining correct exposure

You most often measure exposure using a battery-powered, light-sensitive cell in the camera (see facing page). With cameras without built-in meters, follow the suggested settings for general subjects packed with the film, or use a separate hand-held exposure meter (see p. 178).

You must first program any light-measuring meter for your film by transferring its ASA number to a scale on the

camera or hand meter. Your read-out from the meter (or data sheet) gives a range of aperture and shutter combinations for correct exposure. Dim lighting, for example, with least sensitive film, will require a slow speed and wide aperture. A bright scene with fast film may need the fastest shutter and smallest aperture. Usually, however,

Choosing the right setting The meter (or data sheet) will indicate shutter and aperture settings for correct exposure. Each shutter speed and f number either doubles or halves the light reaching the film - so you can alter one as long as you compensate exposure with the other. Each of the exposure pairs (right) will produce the same exposure. You can pick 1/30 at f16 for maximum depth of field, or 1/250 at f5.6 to stop fast action.



BRACKETING EXPOSURE

Correct exposure, as indicated by the camera meter, may not produce the exact effect you want. You may, for example, want a lighter or darker result to suit the mood of your particular subject. Also, scenes that contain bright highlights and deep shadow areas can lead

to the meter to indicate underexposure or overexposure. For these reasons, it is a good idea to bracket your exposures - taking three versions, one at the exposure indicated by the meter, one underexposed by one stop and one overexposed by the same amount.



Underexposure 1/125 at f11 gives dense shadows. Only brightly lit parts show detail. On prints, dark areas often appear flat greenish-gray.

Correct exposure 1/125 at f5.6 has produced the best compromise between detail in light and dark areas. The subject was harshly lit.

Overexposure This slide was given 1/125 at f2.8, two stops more than correct exposure. The dark areas show detail but bright areas are bleached.



EXPOSURE CONTROL ASSESSMENT	
Type of system	Comments
Fully automatic or "programmed" Depending on scene brightness, this system adjusts shutter and aperture following a preset program. No indication of the settings made may be given (see p. 202).	Typical range is from 1/1000 at f16 to 1 sec at f1.4. Warning light at 1/60 or longer. Effortless, but you cannot select combinations outside the program. Many models offer manual control option.
Aperture priority (semi-automatic) You preselect the f number and the meter then selects the shutter speed required to suit the brightness of the scene.	Consistent depth of field, but can result in blur. Shutter speeds selected are shown in the viewfinder. You can use this system in reverse by turning the aperture control until the required speed is shown.
Shutter priority (semi-automatic) You preselect the shutter speed and the meter then selects the f number required.	Control over blur, but depth of field varies. To use this system in reverse, turn the shutter control until the required f number is signaled.
Manual You can change either the shutter speed or aperture controls until "correct exposure" is signaled in the viewfinder.	Slowest system to use but lowest cost. It allows full control of depth of field and subject blur. Settings may not be visible in the viewfinder.

settings fall between these extremes. With adjustable cameras, this choice of settings allows you to vary depth of field (see pp. 33-8) and subject blur (see pp. 39-41).

Using the camera meter

Modern built-in exposure meters use tiny photodiodes. As shown below, most compact cameras have this diode alongside the lens. On SLRs it is found inside the body, reading light transmitted "through the lens" (TTL). Having measured the light,

Where cells are located

Cell location on a compact is usually close to the lens. Any filter used covers the cell, too. Do not obstruct the cell with your finger. Most SLRs have diodes near the pentaprism, reading the focusing screen image. Others use cells in the base, measuring light passed through a semi-silvered reflex mirror and reflected off a patterned shutter blind. During exposure the cell reads light off the film and is capable of controlling flash.



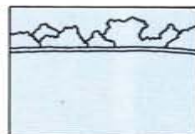
External



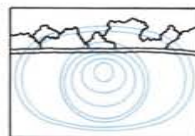
Pentaprism



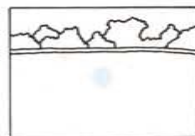
Film plane



Overall External meters measure the overall scene, giving all parts equal weight. They may also include areas outside the frame, too.



Center weighted Most TTL meters read predominantly from the center and lower parts of the frame, and less from the top and frame corners.



Spot A minority of TTL meters read exposure from only a small area of the scene. This area will be marked on the focusing screen.

Meter types Most compact cameras have a meter giving an overall reading. This can lead to inaccurate exposures if large, unimportant areas of bright or dark subject matter are included in the scene. When taking a reading with this type of meter, tilt the camera downward for landscapes (to exclude most of the sky), or ground areas may be underexposed. With center-weighted meters, keep the most important elements fairly central when taking a reading. Spot meters are the most accurate, as you can measure exposure for any small detail.

PROBLEMS WHEN MEASURING EXPOSURE

Given average subject conditions, exposure reading with a typical center-weighted camera meter gives a high percentage of successful pictures. "Average conditions" mean that the scene contains roughly equal areas of light and dark detail and is lit mainly from behind the

camera. But some scenes will fool the meter if you only take a standard reading. The scene may, for example, have extreme contrast, or very dim light generally, or small but important areas much brighter or darker than the general surroundings. The best general advice when



Excessive background influence Both the subjects above will cause problems if your camera has an overall or center-weighted reading. The flower's large, dark background (top) will affect the reading, so that plant detail will overexpose. Take your reading close up, so that the petals fill the frame. In the shot above the background of sky will make the meter underexpose. Measure from ground detail that matches the glider in tone. If your camera offers a spot reading align the measuring zone with important subject areas.



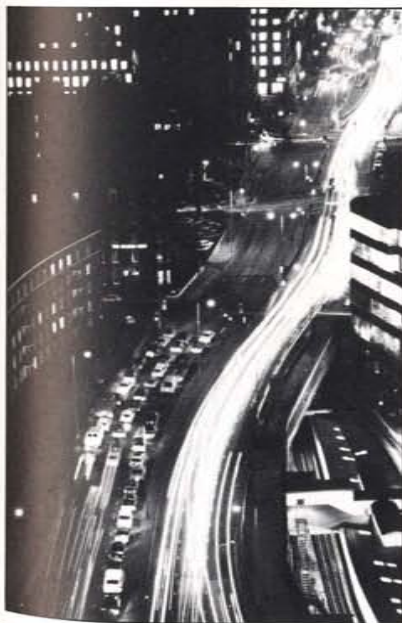
Backlighting Backlit subjects can cause several problems. Sometimes light spills directly into the lens, affecting the meter and resulting in overexposure. To avoid this, use a lens hood or shade the camera. Backlighting creates extreme differences in brightness between

subject and background. If you cannot read your main subject, take a general reading and modify your setting. When the surroundings are much brighter than the subject increase exposure by 1–2 stops, and for darker surroundings reduce camera settings.

reading a difficult subject is to decide which part you want to record as midway between dark and light. Temporarily fill the whole frame with this part (or a convenient substitute that matches its tone) and take your reading. Then recompose your picture before shooting.

Dusk and night shots In dimly lit settings like the bridge scene below your meter may fail to respond. Set a much higher ASA rating until it reads, then extend exposure in

ratio with the false and correct ASA. For night traffic shots (bottom) take a similar general reading, then bracket downward. A long exposure records traffic lights in trails.



electronic circuits program the aperture and shutter (fully automatic), or link with some form of manual control. Fully automatic cameras work through a program ranging from widest aperture and slowest shutter speed, to smallest aperture and fastest speed. Many SLR cameras allow you to select "Program" and a semi-automatic mode, while advanced models offer up to five modes.

Which system is best?

Having such a variety of exposure control systems available can be confusing, but each has advantages for certain conditions. A fully automatic system is so versatile that it can produce correctly exposed film even when lighting conditions are fluctuating rapidly. It is excellent for fast, candid photography (see pp. 124–5) as well as for general use by those new to photography. A totally manual system allows you individual choice of shutter and aperture settings. But it is slower to use and more complicated.

Of the two semi-automatic systems, aperture priority is the most common. It allows you to decide and maintain depth of field. This mode also provides a wider range of automatic settings than shutter-priority models because quality cameras offer more shutter speeds than lens apertures. Shutter-priority systems have advantages when you want a particular degree of blurred or frozen action.

- As a general guide to exposure, divide your film's ASA figure into one second. Use this shutter speed at f 16 for frontally lit subjects lit by direct sunlight.
- To see how a scene will look if underexposed, view it through an SLR at smallest aperture with the preview button pressed.
- Take special care when metering diffi-

- cult subjects such as snow scenes, sunsets, cityscapes at night, and backlit reflective surfaces.
- Always switch off a battery-powered meter before putting the camera away or you will drain the battery. (Some meters switch off automatically after a set period or when capped.)

HINTS AND TIPS

Film loading and unloading

Film loading and unloading errors account for some of the most common mistakes in 35 mm photography. Cassettes of 35 mm film are more awkward to handle than drop-in cartridges and disks of other formats. Mistakes are easy to make, especially when you are working in a hurry or if you only occasionally use the camera.

Common errors

The method of using film is practically unchanged since the first 35 mm cameras of the 1920s. 35 mm perforated film is drawn out of its cassette through a slot with a velvet light trap. It then passes along guides at the back of the camera and winds on to

an open take-up spool. It is vital not to open the back of the camera after you have taken the last exposure until all the film has been rewound back into its light-tight cassette. Only then can you unload the cassette of film safely.

A very common loading mistake is not making sure that the film is properly attached to the take-up spool. With many camera models it is possible for the cassette to sit out-of-square within its compartment, with the result that after three or four frames the film jams. Forcing the film wind-on lever for this, or any other reason, can rip the film in half, or tear the perforations so that you cannot advance it any further – or rewind it. If this happens you

will have to remove the film in the dark and send it for processing.

Motorized advance and rewind

Most motorized cameras provide a semi-automatic form of film load/rewind. Usually, you insert the film and line up the end with a mark near the take-up spool. Then close the body and just depress the shutter release until "1" appears on the frame counter. After the last exposure the camera signals, and you simply turn a catch to make the motor rapidly rewind the entire film back into its cassette. One model is completely automated – drop in the cassette, shut the back and the camera winds on to frame 1. It also rewinds automatically.

● You can always tell if the camera is loaded or a finished film not yet rewound, by gently turning the rewind knob in the direction of the arrow (but do not touch the rewind button). If you feel resistance, the camera contains threaded film.

● If you forget to rewind and open the camera, immediately reclose it and rewind. Several of your last pictures

will be ruined, but most of the others may be saved.

● If a film tears, or becomes detached from its cassette, open the camera in total darkness or use a changing bag (see p. 177). Transfer the coil of loose film to a light-proof container. Seal this and send it for processing, with a note giving the film type and length.

HINTS AND TIPS

FILM HANDLING AND LOADING PROCEDURES

The sequences below are typical for both compacts and SLRs, but may differ in detail according to the camera model. First, always read your instruction manual, and load and unload the camera out of direct sunlight or

harsh, bright artificial light. When you are out in the open, crouch over the camera to provide some shade. If you forget to wind on after loading, your first two or three shots will be made on fogged film. Most cameras have

a frame counter that will advance even if the film is not winding on – perhaps because it has become detached from the take-up spool or has torn perforations. To make sure your film is winding on properly, all you need do is

watch the rewind knob. After the first few exposures have taken up the slack, you should see it turn slightly every time you advance the film. Motor-wind cameras have an indicator to tell you that the film is advancing.



Loading 1 Open the back of the empty camera by pulling up on the rewind knob. The frame counter will return to its start position as the back opens.



2 Place a cassette of film in the left-hand compartment. The film slot of the cassette must be facing the take-up spool, with the paler side of the film toward the lens.



3 Secure the cassette by pressing home the rewind knob. Draw out enough film to insert the end into the slot in the take-up spool. You can rotate this spool with your thumb.



4 Gently advance the film (you may have to fire the shutter) until both rows of perforations engage with the film transport sprockets. Make certain that the film is straight.



5 Close the back. Press the shutter and advance the film until the frame counter registers "1". If you wish, take up any slack by turning the rewind knob clockwise.



6 Set your film's speed (unless your camera reads DX-coding). Clip the box end to the camera back as a reminder of the type and length of film loaded.



Unloading 1 After taking the last exposure on your film, the wind-on lever will jam or only partly advance. Do not force it to try to obtain an extra shot.



2 Press and hold in the film release stud located in the camera base. Some models have a release button near the camera top. Both release the film sprockets.



3 Fold out the handle from the rewind knob. Wind the handle in the direction of the marked arrow. You will feel the slight tension of the rewinding film.



4 When the film has completely disengaged, the tension is released and the handle turns freely. Find a shaded place before opening the camera back to retrieve the film.



5 With the rewind knob raised, tip the film cassette into your palm. If the film end still protrudes, bend it to avoid confusing it with an unexposed film cassette.



6 Store your exposed cassette of film in its original container until it can be processed. Keep the film container away from extremes of heat or cold.



Good camera habits

With practice, you can soon develop working habits which not only save time but also money by minimizing wasted film. These habits will help preserve your camera in good working order. Photographic equipment should be

Deciding priorities

For every subject make a decision about which factors are most important. If depth of field is a priority, for example, be prepared to use a shutter speed that requires a camera support. If frozen action and freedom from camera shake are essential, you may have to sacrifice depth of field.

Exposure measurement

Decide which exposure measurement system gives you the best results generally. Keep to this method for all but exceptional subjects. With these, shoot bracketed exposures to make sure of a good result.

Film stock When you are shooting a lot of film in a short time, keep exposed cassettes in one pocket or camera case compartment, and unexposed cassettes in another. This avoids the possibility of confusion. Remove unexposed film stock from their cardboard cartons to save time.



Loading procedure

Each time you load a new film into the camera, briefly inspect the back of the camera for any grit or dust. Also, make sure that the ASA setting on the meter is still correct for the new film.

Lens cleaning

At all times avoid touching the glass surfaces of your camera lens. Clean it when necessary using an anti-static brush, jet of compressed air, lens tissue, or camel hair brush. In extreme cases, wipe the glass with a clean cotton cloth moistened with denatured alcohol.



Obstructions Even with an SLR camera, obstructions very close to the lens may not be visible in the viewfinder when shooting at full aperture. When you are focusing, the tip of the little finger of your focusing hand

can easily appear in the picture. If you are using a compact camera, make sure there is not a finger, strap or lock of hair just in front of the lens. You won't see such an obstruction through the viewfinder window, but it will result in a wrongly exposed or unsharp image.

Partly-exposed film

A partly exposed film can be removed from the camera at any time. You may want to do this to change from black and white to color, for example. Note the number of exposures you have already made and then rewind the film. When you later return this film to the camera, cap the lens and fire off the same number of exposures, plus at least one more for any difference in film threading.

Using two bodies

If you are taking a lot of pictures quickly, it is much easier to work with two SLR camera bodies. You are less likely to run out of film at the wrong moment. You can also take the same shots in both black and white and color, or on negative as well as slide film. If you have two different focal length lenses in use, you will waste no time by having to change lenses.



Storage hazards

Do not place your camera near a strong magnetic field — on a television set or close to hi-fi speakers, for example. This may upset its electronic metering. Also, do not store the camera near a source of chemical fumes if you have left film inside it. Color balance may be affected.

X-rays

Always empty your camera before submitting it to X-ray inspection. Even films in a lead-foil envelope are not really safe. Carry them in a separate bag and request a hand search or non-X ray inspection. Exposed fast film is more vulnerable to fogging than unexposed or slow material.

Rewind discipline

Develop the habit of rewinding immediately after you have taken the last exposure — even if there is no time. Just then to remove the cassette. If ever you are in doubt about whether a film has fully rewound, give plenty of additional turns of the rewind handle.

FILM

Many photographers have experience of only one or two films, either because they do not want to risk using other types or are simply bewildered by the huge range available for the 35 mm camera. Even if you finally settle with a limited range of favorite films, it is best to reach this number by experimenting with different types.

First, this section looks at the practical possibilities of different black and white and color films, for prints or slides. It discusses what each type is best for and where it would be the wrong choice. Sensitivity to light, response to colors, and special characteristics are compared as they affect your picture results.

You will also find in this section a visual guide to the types of things that can go wrong. This concentrates on errors due to subject conditions, mistaken camera settings, and mechanical problems with the film or camera itself. The examples given will help you decide whether any unexpected results are due to your mishandling or faulty material and equipment, or bad printing or processing by the laboratory. The section goes on to show you how to use the additional services offered by some laboratories to increase the speed of your film, or change its characteristics in other ways.

How films differ

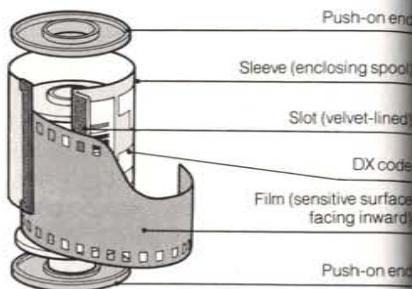
You can choose from a wide range of films to use with your 35 mm camera. The first decisions to make are whether you want color or black and white, negative or slide. Most film types come in a variety of speeds (from slow to fast, depending on their sensitivity to light) and lengths (giving different numbers of exposures). Both of these factors affect price – cost per frame increases with film speed and the shortness of the roll. More unusual films are also available – these include films with an extreme contrast response, sensitivity to infrared light, as well as films allowing instant processing.

Film specifications

Most manufacturers make color and black and white films, either under their own or store brand names. A few manufacturers, such as Kodak or Agfa, make the more specialized types, and these are less widely available. In general, differences between

Cassettes 35 mm cassettes are of uniform size and can accommodate from 12–36 full-frame exposure lengths of film. As shown below, film is wound on a single spool, and then enclosed in a light-tight metal or plastic sleeve with end caps. The

sleeve has a slot (light-trapped by black velvet), through which the film is drawn while in the camera. You rewind the film into the cassette before removal for processing. Most plastic and some metal cassettes can be refilled (see p. 64).



Film box information

- 1 Film type code
- 2 Size code
- 3 Number of (24 x 36 mm) exposures
- 4 Film speed
- 5 Expiry date
- 6 Batch number

①/②/③



brands are less obvious in black and white than in color films (see p. 52).

Every 35 mm film comes in a standard size cassette, packed in a box showing its size, length, speed and expiry date.

Until recently, film speeds were marked in either ASA or DIN, but these two systems have now been standardized to ISO. Two ISO figures are marked: the first one doubles for each doubling of sensitivity, while the second increases by three (see p. 202). You may have to set the first figure on the camera's ISO (or ASA) scale, unless your camera reads DX codes, when the speed will be set automatically from the checkerboard pattern printed on the metal cassette. In general, you will want films of ISO 400 or higher for dim light or rapidly moving subjects (see p. 54). A limiting factor may be that faster films begin to show a grainy pattern, especially on large prints.

BLACK AND WHITE FILMS

Nearly all black and white films are panchromatic (responsive to all colors, in shades of gray) and designed to give negatives for printing. They can be divided into slow, medium, and fast types. As the x20 enlargements show (below), grain is coarsest in the faster-speed films. You can gauge the size of the original images from the contact print below.

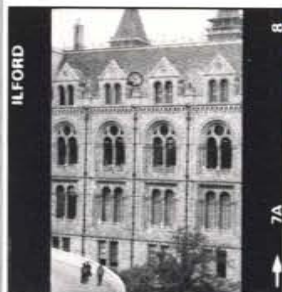
Slow film Films less sensitive than ASA 64, such as the two ASA 32 brands below, are relatively slow and slightly more contrasty than the other types here. The detail enlargement reveals obvious fine grain and, therefore, better image detail. Slow film is ideal in situations where you must reveal the more delicate qualities in subjects such as portraits or still life. You will need high light levels or slow shutter speeds.

Medium film Films in this category range from about ASA 125 to ASA 400 and represent a good compromise between finer grain but slower types, and the more sensitive but grainier types. The ASA 125 grain structure (shown below) is unobtrusive for most subjects up to a full-frame enlargement size of about 8 x 10 ins (20 x 25 cm). More photographs are taken on this type of film than any other.

Fast film With this type of film, speeds of up to ASA 1200 are possible. You can either buy film especially designed for this type of speed, or shoot on ASA 400 film and then have a laboratory push process it (see p. 62). The granular appearance of the print breaks up fine detail, but with some subjects you can use this to advantage. Fast films are invaluable for combining dim light and moving subjects.

Special film The range of special films is wide, and two of the most popular are infrared (see p. 188) and high-contrast types (see p. 191). The two special films below use color film chemistry to produce images in dye instead of silver. Although nominally rated at ASA 400, you can expose them at any setting between ASA 125 and ASA 1600 and still produce good, usable negatives.

Black and white slides One type of 35 mm film, shown below, forms black and white slides instead of negatives for printing. The enlarged detail has been taken directly from the film and not a paper print. To form a slide from the film, special "reversal" processing must be given. Films of this type are very slow (about ASA 32) and fine grained. Apart from their use in straight photography, they are ideal in lectures or slide shows.



Color film

You have the widest choice of film when working in color. Apart from negative and slide differences, color films also differ in their speed and suitability for use in daylight or tungsten light. Dye variations also exist between different brands.

Negatives or slides?

Films for color negatives and for slides differ in their structure and, therefore, the processing required to produce a film image.

Daylight-balanced film Films designed for daylight or flash will record scenes lit by tungsten (either domestic or photolamp) sources with a warm orange cast. Use a blue lens filter to shoot slides and, preferably, for negative film, too.



Correct Incorrect

Tungsten-balanced film A few slide films are balanced for tungsten photolamp lighting. Pictures taken on this type of film with daylight or flash will have a strong blue color cast, unless you use an orange correction filter over the camera lens.



Correct Incorrect

With slides, the original film is returned, each frame mounted ready for projection. Color negatives are only intermediates for the final paper print, and show the subject in negative tones and complementary colors, as well as having an overall yellowish-pink appearance. This warm tint helps reduce contrast and improves color accuracy when enlargements are produced. It is possible, however, to make slides and black and white prints from these color

GRAIN RESPONSE

COLOR NEGATIVE FILM Although color negative films are sold under many different brand names, they are all made by only a handful of manufacturers. The vast majority of films are either ASA 100 or 400. The faster films can be push-processed (see p. 62) to ASA 800 if color accuracy is not critical. Kodacolor VR film has a normal speed of ASA 1000. It is best to use film and paper from the same manufacturer. For the grain comparisons (right) a small image area (ringed in the full-frame print below) has been enlarged x10.



Slow film Films of about ASA 100 produce images with little grain. Slow speed film is adequate for all well-lit situations as well as for flash. Subject colors are generally rich.



Fast film ASA 400 films have, just perceptibly, more grain and less sharpness. This shows up more with films over 1000 ASA. But fast films tolerate errors of lighting color or exposure more readily than slower types.



negatives, and color prints from slides. Sometimes, though, quality will suffer as a result of these mis-matched processes.

Color balance and speed

Most color films are designed to give correct colors with daylight or flash. Other types of subject lighting – fluorescent or tungsten, for example, tend to produce green or orange results. Matching light source to film type is critical with slides. You

may need correcting filters (see p. 82) over the lens. Color negative films are more tolerant as you can make color corrections during the printing stage, but it is still best to use a suitable filter for light sources other than daylight or flash. As you can see from the examples below, the faster the film speed the more grainy the results – although this is less marked than in black and white materials. Most films incorporate the film speed in the product name.

COLOR SLIDE FILM Slide films are made in a wide range of speeds. Because there is (usually) no printing stage, slide films are balanced for daylight illumination or for tungsten. For these comparisons enlargement was x20.



Fast film ASA 400 films and faster tend to be grainy, but are excellent in poor lighting conditions. You can push many to two or three times the normal speed. Scotch film is balanced for tungsten lighting.



Slow film Films slower than ASA 100 are extremely fine grained, but need ample light. Kodachrome 25 is less contrasty and has more exposure latitude than the slightly faster Kodachrome 64.



Special film There are several special slide films. Infrared Ektachrome is intended for aerial surveillance, but you can also use it for "fantasy" effects (see p. 188). Photomicrography film, used with microscopes, is

contrasty, slow (ASA 16), and has extreme resolution. Polaroid slide film gives immediate results. The color image consists of a screen composed of red, green, and blue color lines, combined to create white.



Choosing the right film

No one film type suits all kinds of photography. But changing film too often means that you never become familiar with any one type. Always choose the best film for the end result you want (prints or slides), taking into account the lighting and type of subject. Even then, unless you use all the film for one scene, your film may have to meet the needs of many different situations.

Types of results

The first decision you must make is whether you want color or black and white, prints or slides. Black and white can give a simplified, graphic result – the subject being shown in a less realistic, more interpretative form. For large prints, black and white is cheaper

than color, and for certain publications, such as most newspapers, only black and white pictures can be used.

In order to cover yourself for every type of result it is best to shoot on color negative film. From this, prints and slides, in color and black and white can all be made. But for the highest quality color slides, and pictures for color reproduction (for books and magazines, for example), you should shoot on color slide film.

It is possible to reduce costs when you need color prints by shooting on color slide film – especially when you have taken several bracketed exposures, or you are trying many versions of a difficult technique. Then, instead of paying to have prints made from every negative, all you need do is



Contrasty subjects

Films vary in their ability to record light extremes present in the same scene. The picture above was shot on Kodachrome 25 (less contrasty than the ASA 64 type). For negatives try ASA 400 materials. Contrast makes exposure critical, so bracket shots.



Mixed lighting Mixed light sources are more obvious in a color photograph than they appear to the eye. The picture left was shot on daylight type slide film. Mercury vapor station lights appear green and tungsten train lighting records as yellow.

MATCHING FILM AND SUBJECT

Type of subject or situation	Suggested choice of film
Sports and action, Candida of animals and children	A fast film with good latitude. Dye image film for black and white. Color film of ASA 200 or above, but avoid extreme ASA speeds.
Formal portraits, nudes, and babies	To preserve delicate subject qualities use slow film. Avoid Kodachrome 64 for skin tones. For a very different effect use a grainy black and white film of over ASA 1000.
Still-life subjects in dim light, requiring long exposure times	Exposures longer than 1 sec can cause color distortion. Agfachrome 50L, Ektachrome 50 (tungsten), and Kodacolor II are most adaptable.
Mixed lighting. Color shots in rooms partly lit by daylight, partly by tungsten lamps	Use color negative rather than slide film. (Areas of the print can then be locally corrected during color printing.) You can also use daylight slide film and add flash, or tungsten type film and try to curtain off most of the daylight. If it is possible, try to preview the result using instant picture color film.
Contrasty lighting. Situations where you must try to record detail in both brightest and dimmest parts	Use ASA 400 black and white film. If necessary, downrate the film and then have the film specially processed. For best color results, use ASA 200 or 400 negative film such as Kodacolor 400.

Matched and unmatched color You do not have to match color film to lighting. The picture below was shot on tungsten film. The tungsten lamps on the Christmas tree are fairly neutral, while the more powerful flood-

lights on the buildings have a bluish cast. In the shot right, daylight color film has made the tungsten-lit fountains record orange. This warm look can be more effective than the coldness of the correct result (see p. 82).



Speed for subject Try to relate the speed of your film to subject conditions, and take into account any interpretation you want to give. For example, the picture right was shot on ASA 25 film. A small (f16) aperture made it possible to give a 1 sec shutter speed without overexposing. The long

exposure time transformed fast moving water into flowing, mist-like shapes. Always carry a fast film too for dim light, flash failure, or subjects that need fast shutter speeds. If necessary, you can use this film with a gray neutral density filter (see p. 173) to give slow exposures.





Using false color film

You can use false color infrared Ektachrome slide film for fantasy effects. It works best with subjects like sunlit growing vegetation which reflects infrared strongly (see also p. 188). The picture on the top right was taken on I-R Ektachrome through the recommended deep yellow filter. For the richer result shown right, a deep green filter was used. The same scene taken on regular Ektachrome film is shown above.



select pictures for printing from the easily judged, and relatively low-cost slides.

Film for subject and lighting

For most pictures you will need daylight-balanced film, but for a series of slides of interiors in tungsten light, or studio shots with photolamps, use tungsten-balanced film. Film speed depends on lighting levels and whether or not the subject is moving. Always aim for as many exposure setting options as possible, so avoid combinations of bright light and fast film as much as dim light and slow film. A fast film is a good choice when moving subjects are too distant to freeze with flash. Slow film is ideal where subject detail and texture must be recorded faithfully. Finally, there are your own brand preferences – whether you prefer the colder tints produced by Ektachrome or the slightly warmer colors of Agfa films.

● Film choice for some basic compact cameras is limited by the speed range of their meters.

● Do not mix brands when shooting a subject in color. Alternating between, say, Ektachrome and Kodachrome in the same slide series, exaggerates their color differences. Prints from Kodak, Agfa, and Fuji negatives all require different filtration.

● To shoot the same subject on two types of film, use an extra body and share the lens. But bear in mind that shooting

in color requires a different visual approach to shooting in black and white.

● Fast films can cost up to 50 per cent more than slow ones. Color negative and black and white films are, however, similar in price.

● As a precaution against flash failure or particularly difficult lighting conditions, it is a good idea to keep one fast "pushable" film in your camera case at all times. This should be at least ASA 400.

HINTS AND TIPS

Identifying film faults

Sometimes, your film results returned from processing have strange and unexpected features. It is important to identify these faults, first in order to rule out equipment failure, and second so that you can avoid making the same mistake. Errors can be caused by difficult subject or lighting conditions. More often, though, they are due to lens and camera setting faults, or connected with film and film loading. Occasionally the fault lies with the processing laboratory.

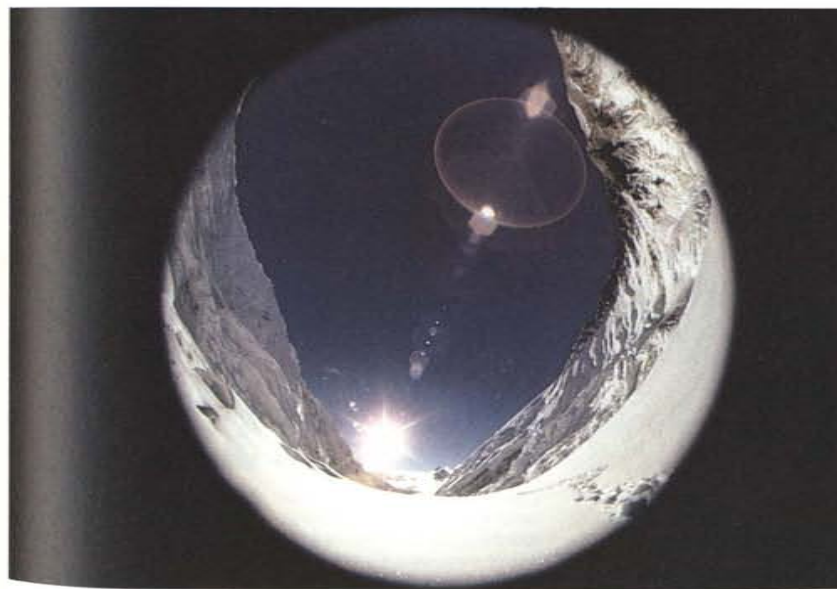
Film error or print error?

If you receive prints, you must first decide if any errors present occurred during the printing stage. Compare carefully the original film images with the resulting prints. Take special note of any dark or light areas, parts out of focus, or detail cropped off the the image. Look to see how much detail you can see in the shadows and highlights on the film in relation to the same areas on the

print. If your film image seems free from any error, return it for reprinting.

What to look for

Handle the film carefully. Hold it by its two edges, pressed gently between thumb and finger. Do not touch the emulsion (less shiny) surface. Gaps between pictures, and the perforated edges, can give as many clues as the images themselves. Slight overall tints in negatives can be ignored. The orange/yellow mask in color negatives varies from brand to brand and some black and white negatives also have a pale blue tinge. The following four pages show a selection of faults, along with suggested causes and prevention. (For errors involving flash, see p. 151.) All photographers make mistakes sometimes, but while you should track down the causes, you should also look out for "faults" that are interesting in themselves. Some of these may lead you on to more interpretative pictures.



Turning faults to advantage Always look for ways of exploiting technical faults. This mountain

landscape, taken with a fisheye lens, shows a series of light patches across the sky – the result of flare. They add a

strange and dramatic element to an already unusual photograph. You must carefully control this effect

through the choice of viewpoint, placing the sun well off center in the frame.

FAULTS—SUBJECT CONDITIONS AND CAMERA SETTINGS

The kind of faults shown below are most often caused by influences such as lighting conditions, and the careless handling of lens and exposure controls. They are common to all camera types, although problems such as obstruction of the lens and unintentional filtering

are more common with compacts because you are not looking through the actual picture-taking lens.

The most important errors to recognize are over- and underexposure. At first these look very different on each type of film, but they do

have certain features in common. The other faults here are illustrated on a mixture of films—the same symptoms will appear in different colors and reversed tones on other materials. In all cases, the best policy is to avoid making the same mistake next time, because little can

usually be done to salvage good pictures at this stage. Exposure errors can sometimes be corrected if sent for skilful (and expensive) hand printing. Keep all your overexposed slides for possible use in photographic montages.

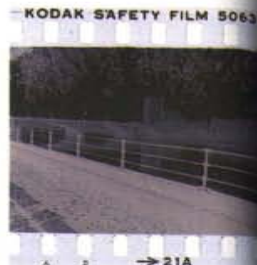
OVEREXPOSURE



Cause The images here received too much light. This was caused by a shutter setting too slow or lens aperture too large. If the whole film is faulty, perhaps you set the camera's meter incorrectly, or your batteries may be running down.
Identification Overexposure mostly affects lighter parts of



the subject. Image detail here becomes difficult to see—either because it is bleached (slides) or very dense (negatives). Color negatives print highlight areas flat and with pale, degraded hues. Prints from overexposed black and white negatives show light subjects as featureless white paper or flat gray



tone. Enlargements often have exaggerated grain and appear less sharp than normal.
Remedy A few laboratories offer chemical reduction of black and white negatives, but grain still remains exaggerated. You can improve results by asking for development to be "held back" (see p. 62).

UNDEREXPOSURE



Cause The three images above have not received sufficient light—shutter speed was too short or lens aperture too small for the subject conditions and film. If only some frames are underexposed your meter reading technique is probably faulty. If, however, the entire film is affected, your meter may



need attention or you may have set the wrong ASA speed.
Identification Each frame differs in appearance because processed negatives (left and right) look lighter the less light they receive, but slides (center) become darker. In all cases subject shadows suffer most. Details are largely missing—



areas of clear film on negatives or dense tone on slides.
Remedy A few laboratories offer chemical reduction for dense slides. Underexposed color negatives may give an acceptable print on black and white paper. A whole film that is underexposed can be given push processing (see p. 62).

CAMERA SHAKE



Cause Moving the camera during exposure, giving minute but equal streaking of every picture detail. Often caused by selecting too long an exposure time.
Prevention Practice bracing yourself for hand-held shooting (see pp. 26–7). Make more use of firm supports, especially with telephoto lenses.

RAINDROPS



Cause Droplets of water on the lens or lens filter resulting in blurred patches of image detail.
Prevention In rain always use a lens hood. Cover the lens surface with an easy-to-clean clear glass UV filter.

FLARE



Cause Harsh, direct light shining into the lens. Gives an overall lowering of contrast or forms a series of aperture-shaped patches across the picture.
Prevention Use an effective lens hood, or shade the lens with your hand. Change camera position.

OBSTRUCTION



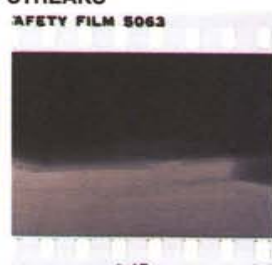
Cause Fingers, camera strap or similar just in front of the lens. Corners of the image can be vignetted by a lens hood or filters that are too deep. More common on compact cameras.
Prevention Make sure you keep things away from the lens, and that lens attachments are of the right size.

OVERALL COLOR



Cause Accidentally leaving a color filter over the lens producing an overall color cast.
Prevention Remove any color or special effects filters as soon as you have finished using them.

STREAKS



Cause Moving the film with the shutter open occurs when a slow speed is combined with a motor drive, or by winding on during a prolonged exposure.
Prevention Make sure the shutter has closed before winding on or rewinding the film.

FAULTS—FILM AND FILM LOADING

Faults illustrated below and on the facing page are due to mishaps with the film itself. They show how careless loading and handling result in totally ruined photographs. Bear in mind that the same error gives different looking results on negative and slide films. Fogging

film to light, for example, makes slides turn clear and negatives turn black.

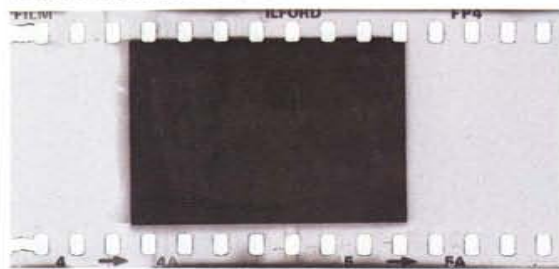
If you suspect that your camera has a light leak or it is physically damaging the film, match the fault to its source by replacing a few frames of the processed film in the camera

back. Locate the film where it was originally exposed, its duller, emulsion, surface toward the lens and the image upside down.

Other faults, not shown here, include various kinds of colored patches and abrasions. Colored spots and water marks are

signs of bad processing. Long scratches running the length of the film are most often caused by rough handling during or after processing. Scratches are also caused by grit, either lodged inside the camera back or caught in the velvet slot of the film cassette.

FILM NOT TRANSPORTING



Cause The film has become detached from the take-up spool shortly after loading. As the film remained stationary, all the pictures were taken on top of each other, giving one totally overexposed frame. Often, a nearby perforation is torn by the sprocket wheel.

Prevention This is a simple

loading error anyone can make, especially if you are in a hurry when loading the camera. The best method of prevention is always to wind sufficient film on to the take-up spool, and make sure that the rewind knob turns as you wind the film on after each exposure.

FILM END



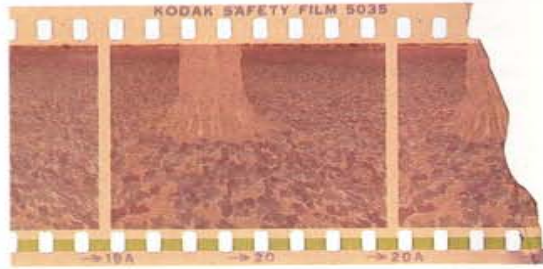
Cause Part of the last frame missing, damaged, or fogged. This occurs when you squeeze in an extra frame. But during processing the laboratory needs the last inch to clip or tape films together, thereby spoiling your bonus picture. **Prevention** Nothing can be done.

FOGGED FILM



Cause This negative film has been heavily fogged. Possibly the camera back opened with the film inside unprotected. Storing film near chemical fumes or exposing it to X rays can also produce this result. **Prevention** Make sure the camera back is secure and store film away from chemicals.

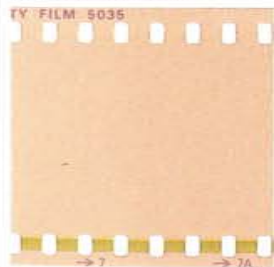
TORN FILM



Cause Modern film is extremely tough and it is unusual for it to tear in half. This is almost always caused by forcing the camera's wind-on mechanism—perhaps at the end of a film or when the film has jammed for some reason. It can also be caused by a faulty motor drive unit. Tearing is more common

in very cold conditions when film does become brittle. **Prevention** Never force the film. If it jams open the camera in total darkness and release the film. Carefully coil the torn lengths of film into a light-tight container and send it for processing.

FILM UNEXPOSED



Cause A color negative film that looks like this has not been exposed. Perhaps you sent an unused film for processing, or the camera shutter is jammed, or you forgot to remove the lens cap on a compact camera.

Prevention If it is the shutter, look through the camera back while firing the shutter.

DOUBLE EXPOSURE



Cause If the whole film shows overlapping images and frame lines as shown above, it was probably put through the camera twice. This happens if you load an already exposed film in mistake for a new one. It can also occur if you change film in mid roll. In this case, you may have replaced the part-

exposed film and wound it to the number of the last unexposed frame, forgetting to cover the lens.

Prevention Either mark used cassettes or wind in the film leader on all exposed cassettes. If you make mid-roll changes cover the lens and leave 1–2 frames blank in case of error.

FRAME DEBRIS



Cause Sharply defined curved lines, specks, or an irregular picture edge can be caused by debris in the camera. Typically, a hair caught in front of the film casts a shadow on every shot. **Prevention** Open the empty camera, holding the shutter open on "B". Thoroughly clean the space between lens and film.

BANDS OF FOG



Cause The slide film above has several bands of fog, decreasing in severity, across the width of the film. This effect can be caused by opening the camera back very briefly in the light at the end of a film (perhaps because you forgot to rewind). Similar looking fog marks occur if the camera back leaks light

along its hinge or catch. Degree of fogging depends on brightness of the light, length of exposure, and speed of the film. **Prevention** Make sure that you always rewind the film completely before opening the back. If you suspect your camera does leak light, take it to a professional repair shop.

The ASA rating given to your film assumes that you give it the standard, recommended processing. Sometimes, shooting conditions such as dim lighting force you to use a film as if it had a higher rating. Similarly, you can use film as if it had a lower speed. In both cases you must tell the laboratory to give special processing to compensate. These speed manipulations are useful in difficult lighting, but they do produce side effects.

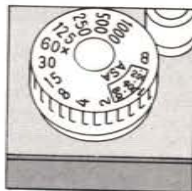
Upgrading and downgrading film

Upgrading film speed (underexposing) and extending development means that the film performs as if faster, more grainy and more contrasty. Upgrading is useful when you need a faster shutter speed or smaller aperture in poor light, or to extend the effective range of your flash. You can also use upgrading to brighten contrast in a scene. Downgrading (overexposing) and holding back development gives all the opposite effects. It is useful with contrasty subjects such as room interiors with bright window light.

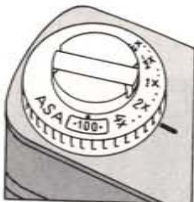
You have to treat all pictures on a film the same way when you manipulate the speed rating. You must, therefore, plan what you are doing and adjust the camera's meter to the appropriate new setting. The amount by which you can change the ASA setting and still obtain acceptable results depends on the film type. Greatest manipulation is possible with black and white film, least with color negative film. In general, fast film has wider limits than slow film, and it is usually possible to take upgrading further than downgrading.

Adjusting the camera

To uprate film all you have to do is turn the ASA setting control on your camera meter or separate hand meter to a higher figure. If you double the film's stated ASA you are in fact going to expose the film as if it were one stop faster. Three times normal speed equals a one and a half stop increase. SLR cameras often have a special compensation dial for different degrees of upgrading or downgrading. A warning appears when the dial is not set to normal.



Simple ASA setting



Compensation dial

- Do not uprate slow and medium film when you could use normally processed fast film instead.
- E-6 process films (Ektachrome) tend to give warmer colors pushed beyond $1\frac{1}{2}$ stops and colder colors if held back beyond 1 stop.
- Use compensation processing to help correct exposure

mistakes caused by misreading film speed.

- If in doubt about processing make a "clip test". Cut the first few frames and have it processed. Then adjust processing for the rest of the film according to the test results.
- Color negative film that has received heavily compen-

sated processing may produce acceptable looking negatives, but these prove impossible to print.

- Cities have professional laboratories that offer a wider range of compensated processing than the average laboratory.

HINTS
AND TIPS

THE EFFECTS

Upgraded films require extra development or "pushing". Downrated films need the opposite treatment and this is called "holding back". Many processing laboratories offer this modified development service. Avoid confusion by marking the film end or cassette with its revised ASA rating immediately you remove it from the camera. There are limits to the degree film speed can be changed before contrast and colors become unacceptable. With black and white film this is about a x4 upgrading and for color negatives about x2. Downrating limits are about $x\frac{1}{2}$ ASA for black and white and only half a stop for color. With variable speed black and white film you can have a mixture of frames exposed at ratings between ASA 125 and 1600. The film is then developed for the time suggested for the fastest setting used.

COMPENSATION PROCESSING

NORMALLY RATED AND CORRECTLY PROCESSED



Black and white negative The print above was made from a correctly exposed and processed negative. It was printed on normal paper, designed to match the negative's contrast characteristics.



Color negative This print was made from a normally rated and processed negative. Printed on regular negative/positive color paper, color balance is consistent from highlights to shadows.



Color slide This image shows Ektachrome slide film exposed at the published ASA rating and given normal processing. Subtle shades of color can be picked out in the bright chrome and dark paintwork.

UPGRADED AND PUSH PROCESSED



Rated x4 normal ASA Underexposure and extended development (above) has brightened image contrast, improving the dull lighting. However, this improvement is at the expense of shadow detail – the hull is now dark and featureless.



Rated x2 normal ASA and push processed This print is brighter than the print top, but delicate color is lost in light areas like the sky. Shadows are less colorful too, and colors generally have a coarsened appearance.



Rated x2 normal ASA and push processed Contrast is increased. The chrome trim looks bleached, and shadows have become magenta. Graduations of color are missing – the slide begins to look like a copy.

DOWNRATED AND HELD BACK



Rated $x\frac{1}{2}$ normal ASA, followed by held-back processing This treatment gives a flat negative that produces a low contrast black and white print. Shadows have ample detail, but the general effect is gray and lifeless.



Rated $x\frac{1}{2}$ normal ASA, followed by held-back processing The negative produced by this effect has flatter color. The resulting print colors are richer in the highlight and shadow areas, but show different casts (like the blue sky and pink shadows in the version above, for example).



Rated $x\frac{1}{2}$ normal ASA, followed by held-back processing This treatment gives unacceptable results. The white parts have grayed-over, and show a distinct color cast. And other areas of the slide are almost colorless, dark and flat.

Film economy and care

Films are delicate and expensive, so do not let them deteriorate through bad storage or handling. You can cut your costs by methods such as loading your own cassettes using a daylight bulk film loader. But most important of all, you must protect your finished negatives and slides – they become more important with the passing of time.

Cutting your costs

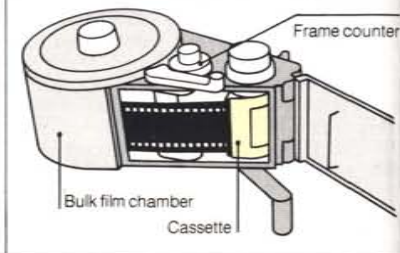
The most direct way to reduce costs is to buy a can of bulk 35 mm film and load your own cassettes. You will soon make up the cost of the loader (see right) as 100 ft (30 m) of film will produce about 19 half-price 36-exposure cassettes. One problem – if your camera uses DX-coding (see p. 51) each cassette should have the correct checkerboard pattern as blank cassettes are set at 100 ASA by such cameras. Other disadvantages – you may damage film by careless handling when loading, and fewer types are available in bulk rolls.

Storage and handling

Film emulsions are sensitive to gasses and X rays, as well as light. Keep new films away from motor exhausts, solvents, paints, and pesticides. At airports, do not allow your unprocessed film to be X rayed. Avoid high

USING A FILM LOADER

A loader holds a bulk length of film in a circular light-tight chamber. The film end protrudes through a light trap so that you can attach it to the spool of a cassette. (Either buy a special cassette or re-use an ordinary type – if suitable.) Closing the light-tight lid opens the internal film chamber, and then you can wind the film into your cassette. A counter indicates the number of exposures.



temperatures and excessive humidity as in these conditions the film's gelatin coating may start to decompose. Ideally, store your film in the main compartment of an ordinary refrigerator, or in a cool box on location. Protect processed film in paper sleeves, albums, or glass-fronted slide mounts. You must also take care when projecting your processed slides – prolonged projection may bleach the image.

STORAGE CONDITIONS AND FILM LIFE

Film type	Storage temperature			
	Below 75°F (24°C)	Below 60°F (16°C)	Below 50°F (10°C)	Below 0°F to -9°F (-18°C to -23°C)
Unprocessed in original pack	Up to 2 months	Up to 6 months	Up to 12 months	Expiry date extended several years
Safe storage time				
Warm-up time (from refrigerator)*				
Cassette	—	¾ hour	1 hour	1½ hours
Can	—	2 hours	3 hours	5 hours
Processed (dye) images (life extended by)	—	x3	x8	x100

*Period required between removal from storage and opening of pack (to avoid condensation).

Notes Infrared films should be stored between 0°F and -9°F (-18°C and -23°C). Amateur film expiry dates are based on storage in or out of the camera at room temperature - 75°F (24°C). Professional color films are designed to be stored at below 55°F (13°C).

HINTS AND TIPS

- Bulk loaders are notorious for marking film unless kept scrupulously clean. Use a blower brush and anti-static cloth.
- Unprocessed film is more sensitive to light or chemical fogging.
- The effects of X rays have a cumulative effect on unprocessed film. Several exposures at airport baggage checks may cause fogging.

SOLVING PICTURE PROBLEMS

This, the largest section of the book, concentrates specifically on problem solving. It brings together equipment and materials, techniques and ideas, to help you meet particular picture-taking challenges that could arise.

The problems are not specific to any one subject and are more often linked to actual shooting conditions. In the same way, there is seldom just one solution, but rather a range of answers depending on the kind of effect you prefer. In some cases special equipment may be necessary. More often, though, knowledge of a few simple routines leads to successful results.

This section also deals with problems of lighting – indoors and out, natural or artificial. Sometimes the concern is mostly technical, such as shooting at night, copying drawings, or taking accurate color pictures with a mixture of different light sources. Other lighting problems here are more concerned with the visual effect and feeling you want to convey in the photograph – how to give a sense of movement, drama, or brilliance, for example. Sometimes you will find that answers overlap, but the topics as a whole have been selected to span the widest possible range of practical photographic situations.