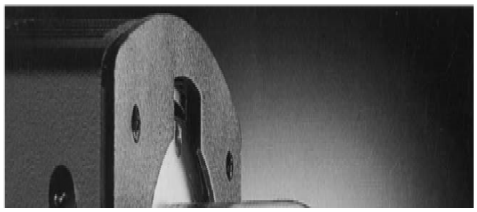
## 1. What you should know

Flash has been used in photography since the middle of the nineteenth century. Then, magnesium powder was burned to produce the intense light necessary for photography, and it could be a dangerous process. Later, the magnesium was contained within a capsule or bulb, to be eventually replaced by aluminium and zirconium wire as the modern flash bulb evolved. Fox Talbot was the first to take a photograph using purely electrical means as early as 1851, using the light from an electrical spark. Even then he understood the potential of electronic flash for portraiture and action photography. It took the best part of a hundred years, however, before electronic flash equipment had developed into a practical photographic tool. Today, Fox Talbot's simple power of the flash unit. When the flash unit is switched on and the capacitor connected to the flash tube, it will not discharge immediately because the tube itself does not conduct electricity. Instead, a short high voltage "triggering" pulse is fed to a wire wound around the exterior of the tube. The gas inside the tube then "ionizes" and is able to conduct electricity. The capacitor then discharges its electric charge through the tube, producing a brief, but intense flash of light. The triggering pulse is commanded by a signal from the camera shutter, ensuring that the flash fires the instant the shutter is open, or is "synchronized" with it. The capacitor is then immediately recharged, ready for the next flash.

### Flash Power

Originally, the power output of an electronic flash

film speed. Thus a flash unit with a guide number of 44 metres (or 132 ft), for ISO 100 film means that it will expose film correctly at an aperture of f:11 at 4 metres or 12 feet distance. If the dimension of the light source is small compared to the distance the system gives a good guide for small amateur fixed reflector flash units, but the figures will vary when the beam angle is altered by changing the reflector. It is therefore less suitable for use with professional flash equipment with a large range of reflectors and lighting accessories.



general purpose reflector. This gives both a comparative measure to use from system to system, and also gives an idea of reflector efficiency, both of interest to the serious photographer. As an idea, a small to medium power monolight like the VISATEC SOLO 800 B will correctly expose ISO 100 film at a distance of two metres (or 6 ft) using a lens aperture of between f:32 and f:22, using a universal reflector. The Guide Number of this particular combination is about 55 metres resp. 154 ft.

### Colour Temperature

One of the advantages of using electronic flash is that the average colour temperature of the light produced closely resembles that of daylight. The colour temperature of the flash changes during the flash output. Initially, the colour temperature rises

units vary widely and colour accuracy is important. Colour-stabilized flash units are available for these applications. With these, colour temperature is constant over a wide power variation.

### Flash Duration

When the capacitors in an electronic flash unit discharge through the tube, the light output varies with time. At the beginning, the capacitors are fully charged, and the flash quickly reaches its peak. After this, the power decreases gradually as the capacitors are emptied, and the flash power dies away slowly, so much so that it is difficult to say exactly when the flash output stops completely. For this reason, manufacturers have decided to


an effective flash duration of between 1/250 and 1/2000 second on this basis. This is a good way of comparing flash duration times of one unit against another.

### Flash Duration t 0.1 versus t 0.5

When you want to freeze motion with a particular flash unit t 0.5 shouldn't be taken as a guide to do so. Even after the flash intensity has dropped to half the peak value, it is still producing light that can expose film, and blur rapid motion. For this reason the standards offer a second definition "total flash duration" as the time the flash output exceeds 10% of the peak value also known as t 0.1. This time tends to be about three times as long as the t 0.5 figure, and is a much more meaningful measure of a flash unit's ability to freeze motion. Thus, whilst a manufacturer quotes a t 0.5 flash

exposure. Some cameras, however, with a slow synchronization speed, and a powerful modelling light can have a significant influence on the overall exposure. As the modelling light has a warmer colour temperature than the flash, it can affect the colour balance of the shot. If this happens, it is sometimes better to turn the modelling lamp power down, or even switch it off just before the flash exposure.

### Lighting Accessories, Light Shapers

One of the major advantages of electronic flash over other forms of light is the great variety of lighting effects possible by the use of accessories. They can soften or harden the light, produce lighter or denser shadows, accentuate subject texture and increase or decrease colour saturation. Every photographer should have a good selection


### Snoots

Snoots are cone-shaped accessories which narrow the beam angle down to a small diameter circle, but without sharply defined edges or shadows. They are useful for producing background patterns, and in adding small areas of light, hair lights for portraiture, for example.

### Umbrellas

Generally, umbrellas are used for indirect illumination, where light is bounced off a white, silvered or golden interior. Transparent umbrellas can also be fitted with a diffusing material for use for direct diffused light. Umbrellas are most useful and flexible accessories, giving a wide variety of lighting qualities. Used at short distances they give soft shadows and medium colour saturation. Used further away, the light becomes harder and colours more saturat-

yield better saturated colours then umbrellas. Soft boxes can need a lot of power to drive them, so if much still-life photography is planned, make sure you have plenty of power.

### Diffusers

The light pattern from a reflector can be substantially changed by the use of a diffuser, and most manufacturers supply a selection of them. They can dramatically soften shadows, and whilst a diffused reflector is not a substitute for a small soft box, it can give similar results. There are also many DIY (do-it-yourself) options using a variety of materials, from rigid sheets of matt Plexiglas held in front of a reflector, to rolls of tracing paper draped over a silver lined umbrella. The only caution is to make sure diffusing material is kept well away from hot modelling lamps to minimize the risk of fire.


VISATEC FM 2000 flashmeter

## 2. A Matter of Exposure

There are many things which contribute to the

been other methods used, however. One works

Flash meters are not expensive today, and they basically consist of a sensitive photo transistor measuring circuit which will measure both the short burst of flash together with any ambient light over a pre-set time, known as the "gate" time. Depending on the meter, this can vary between 1/8 second and 1/500 second. On the cheaper meters this gate time is fixed, normally at around 1/60 second, on others it can be varied to suit the shutter speed used on the camera. This can be important when photographing moving subjects in bright ambient conditions. A camera shutter speed of 1/250 second will help to minimize subject movement by keeping the effect of ambient light down to a minimum. If the flash meter gate time is set to the same speed, then an accurate exposure reading will result. A simple flashmeter e.g. the VISATEC FM

light, medium and dark tones. These average to a mid-grey tone, and if the exposure is based on this, all lighter and darker tones will be exposed correctly. An incident light exposure meter therefore needs to measure the intensity of the light falling on the subject and give the exposure necessary to reproduce a mid-tone or 18% grey tone. It does this by measuring the light falling on the subject with the aid of a hemispherical translucent plastic diffuser which is placed over the meter's measuring cell.

### Reflected Light Measurement

Whilst incident light readings will satisfy the majority of picture taking situations, there are some subjects, particularly studio still-life sets, where reflected light measurements are more appropriate. Here, the flash meter reads the intensity of

lens, so the field measured from the camera position is broadly the same as that seen in the viewfinder of the camera. If the meter is brought closer to the subject, there are some interesting alternatives. The first is to position a standard grey card, like the Kodak Neutral Test Card, in an area of the set that is receiving the full intensity of the flash source. If the exposure meter is brought close to this so that the measuring cell is only seeing the grey card, the result will be an average grey reading. This will be very similar to an incident light reading using a hemispherical diffuser, and the two techniques are, in fact, interchangeable.

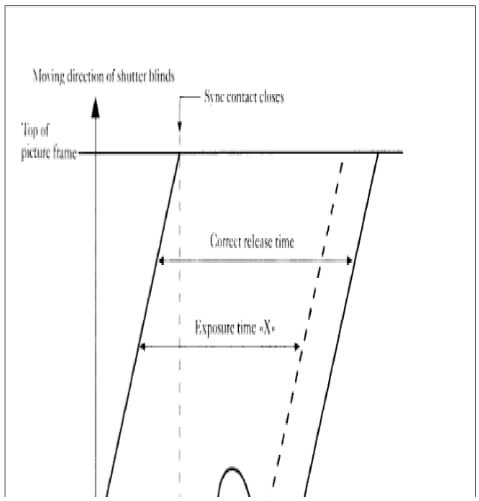
increased by around one f-stop or EV (exposure value) to take account of the subject brightness. One way of dealing directly with this problem is to take an exposure reading from a highlight area (not specular highlights!) in the scene and use this to compute the actual exposure.

This is also a good technique to use when there is no natural mid-tone in the scene, and it isn't possible to introduce a grey card into the set. If a reading is taken from a highlight area, adding two and one third f-stops to the measured exposure will retain detail in the photograph from the highlights down to the shadows within the contrast range of the film used. This is an exposure technique favoured by professional photographers working with colour transparency materials. It is also possible to do the same thing

## Shutter Speeds and Flash Duration

It is a common belief that because flash duration times are generally short, one can use the fastest shutter speed with electronic flash providing it is within the synchronization range of the camera shutter. Depending on the method the flash manufacturer uses to measure the flash duration of his units, the flash is emitting some light during a much longer period. If the camera shutter isn't open for the whole of this time, then the total output of the flash unit won't be available to expose film. Ideally, the camera shutter shouldn't close fully until the output of the flash has died down completely (for focal plane shutter this condition is a must to avoid uneven exposure over the film format), and this can mean a speed three times as long as the quoted effective flash duration. Happily, there are some guidelines. In the studio, the

is used for interior shots, but it can also be used to advantage with full length fashion shots in attractive interior and exterior settings. Here, the secret is to balance the output of the flash units so that shadows are filled in without the flash light dominating the shot.



unit with a continuously variable power output like the VISATEC SOLO 1600 B and 3200 B units is invaluable in these circumstances. Another way is to increase the shutter speed by one f-stop and decrease the camera aperture by the same. The ambient exposure will remain unchanged, but the flash exposure will be effectively halved, reducing the fill-in light. The light from a flash unit can also be reduced by increasing the distance between the flash head and the subject, or by using a Softlight reflector with various density diffusers.

If the camera will accept a Polaroid instant picture back, then this is a good way to learn to balance flash and daylight lighting to start with. A little experience with a good flashmeter, however, will give good consistent fill-in-flash photographs in the longer term.

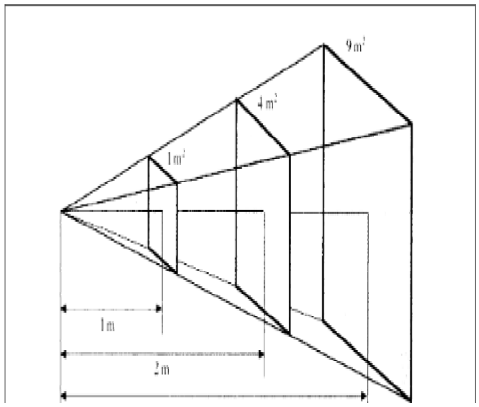
## 3. Working with Flash

Electronic flash brings independence and a high degree of lighting control to the photographer. Possession of a flash outfit with a couple of heads and a selection of accessories means there are few subjects that can't be handled competently and creatively, whatever the weather or the ambient lighting conditions. To use flash well, however, does need an understanding of a few of the ways in which it works. There are a few simple rules.

### The Inverse Square Law

Unlike the parallel rays of light from the sun, the intensity of light from a lamp base reduces as the distance from the lamp to the subject increases. This fall off of light is defined by the inverse square law, which simply states that the light reduces as

posed by about 1 f-stop if the subject at 2 metres is correctly exposed, or the subject at 2 metres (or feet) will be 1 f-stop overexposed if the subject at 3 metres (or feet) is correctly exposed. This principle is fundamental to the use of flash, and examples can be seen in everyday photographs. If a picture is taken of a child cutting a birthday cake on a table, for instance, unless the cake and



f-stop. If the lamp base only is moved back by one metre, however, the flash-subject distance increases to three and four metres respectively. Applying the inverse square law shows that the lighting difference between the two subjects is now approximately half an f-stop instead of one f-stop (the difference between one ninth and one sixteenth). Bouncing the flash from a wall behind the camera will usually increase the flash subject distance even further. Another way of solving the problem is to use two lamp bases, positioned so that the flash–subject distance is the same for both.

## Depth of Field

Photographing subjects at different distances from the camera can bring in depth of field prob-lems. Whilst the illumination difference between

## High-Key and Low-Key Set-ups

A low-key treatment of a subject usually involves high contrast lighting against a dark background, with high-key needing soft, low contrast lighting against a light background. The inverse square law can help creating low-key effects simply by positioning a dark background some distance behind the main subject. If the main subject is placed exactly halfway between the lamp and the background, the background illumination will be two f-stops below that of the main subject. Using a dark surface will guarantee a solid black low-key background.

For high-key work, the inverse is true. One way is to position the background as close as possible to the subject to minimize light fall off due to the inverse square law. A better way, however

Low-key

consists of a key light positioned 45 degrees to the side of the camera, and 45 degrees above it. This position gives a lighting effect not unlike the mid-afternoon sun, and gives pleasing modelling to both the male and female face. A soft light, produced by an umbrella or a large soft box are most suitable for female portraits, whilst the harder light and reflector combination is usually better for male studies.

The shadows produced by this key light need to be lightened by the use of a fill-in light, and this is best positioned as close as possible to the camera lens. A good lighting accessory for this is a small soft box. Or a reflector/diffuser combination. The ratio of the power of the key and fill-in light is important, especially with colour transparency materials. A good starting point is that the fill-in light should be