PHOTOGRAPHY 101

Learn the Technical aspects of Photography

Why are we here?

Objective:

"to give you some understanding of why you might push more than just the big shiny silver button..."

Why am I here?

Why am I making this presentation?

Simply put:

“to share understanding”

Why are we here?

What will we cover?

Aperture vs Shutter vs DOF

Film/Sensor Speed

Camera Photography Modes

Camera Functions

Colour Temperature - White Balance

f-stop's

Shutter speed's

DOF's

f-stop's, Shutter speed's and DOF's

What is an f-stop?

An f-stop or f-number is the ratio of the focal length of a lens to the diameter of it's Aperture.

$$f/\# = \frac{f}{D} \qquad f/\# = \frac{35}{6.25} \qquad f/\# = 5.6$$

So, on a 35mm lens with an Aperture diameter of 6.25mm

the f-stop would be 5.6.

f-stop's, Shutter speed's and DOF's

What is an Aperture?

In photography an Aperture refers to the 'stops' built into a lens. The stops are the adjustable leafs that can be closed or opened at varying sizes to allow more or less amounts of light on to the film/sensor.
Generally each 'stop' is half or twice the area of the next stop up or down. Though some cameras will allow and increase in aperture less than this.
Common f-stops are f2.8, f4, f5.6, f8, f11 and f16

f-stop's, Shutter speed's and DOF's

Are you sure?

This can be worked out as follows, using a 35mm lens on f5.6 and f8

f5.6	**f8**
$f/\# = f / D$	$f/\# = f / D$
$5.6 = 35 / D$	$8 = 35 / D$
$D = 6.25mm$	$D = 4.375mm$
$r = 3.125mm$	$r = 2.1875mm$
$A = pi\ r^2$	$A = pi\ r2$
$A = pi \times 3.125^2$	$A = pi \times 2.1875^2$
$A = 30.68\ mm^2$	$A = 15.03\ mm^2$

f-stop's, Shutter speed's and DOF's

What is Shutter Speed?

Shutter speed is length of time the film/sensor is exposed to light through the lens. Basically, how long the shutter is open.

Shutter speed is measured in seconds and though the most common shutter speeds are in fractions of a second, most cameras show only part of the fraction. eg: 1/125th of a second is shown as just 125

Aperture vs Shutter Speed

Q: What happens when you change your Aperture?

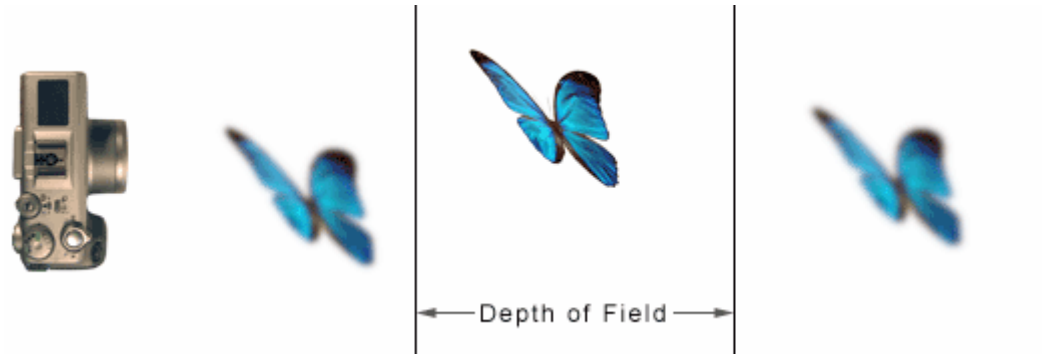
A: The amount of light available to the film/sensor is either increased or decreased.

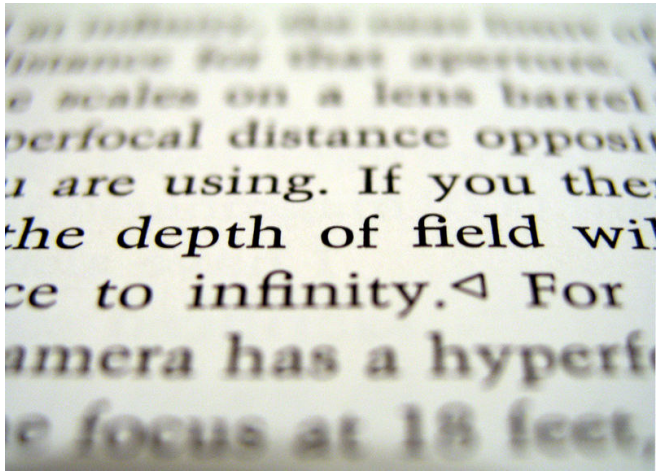
If only the aperture is changed the photo will be incorrectly exposed. Therefore the shutter speed needs to be adjusted to suit.

f-stop's, Shutter speed's and DOF's

What is DOF or Depth of Field?

Depth of Field is the distance in front of and beyond a subject that appears to be in focus.





f-stop's, Shutter speed's and DOF's

What changes Depth of Field?

Changing the Aperture size will affect the Depth of Field

A larger Aperture will create a smaller Depth of Field
A smaller Aperture will create a large Depth of Field

f5

f32

Film/Sensor Speed

Film/Sensor Speed

What is Film Speed?

Film speed is the measure of a photographic film's sensitivity to light.

What is Sensor Speed?

Sensor speed is determined by the amount of light a sensor needs to produce a certain quality in signal to noise ratio.

ISO vs ASA

They are basically the same thing, they are scales to designate the sensitivity of film that are designed by two organizations:

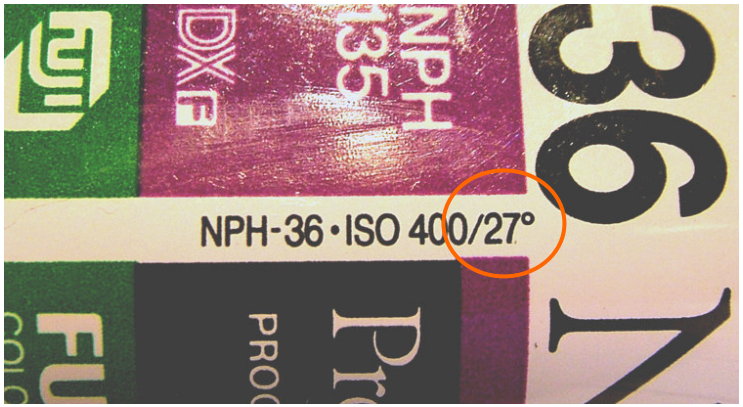
***ASA**: American Standards Association*
replaced by
***ISO**: International Organization for Standardization.*

Each scale level going up is twice as sensitive to the amount of light applied as the level below.
eg 200ISO film only needs half the of light as 100ISO film.

Film/Sensor Speed

What's all the DIN°?

Another scale, more commonly found on older flash units is the DIN scale, which is a logarithmic scale. While unlike the 100ISO = 100ASA scale, the DIN scale still has a corresponding scale to the ISO/ASA scale, it works with values that increase by 3. eg a ISO/ASA100 film is equal to DIN21 ° and increase it by 3 and you get DIN24 °which is equal to ISO/ASA200. You still see both ISO and DIN values printed on Film boxes and canisters in the form of ISO 400/27°.



Film/Sensor Speed

Choosing ISO film / settings

There is a balance needed when selecting ISO film or settings in a digital camera, as faster films/settings tend to cause a grainy effect and start to lose their colour saturation. Whereas the slower film/settings have a much finer grain / noise and usually are richly saturated and less contrasty.

Film/Sensor Speed

A note on Film Grain

Generally the higher the ISO level the Grainier the photo will be.

The grains of Silver Halide in the emulsion of film need to be bigger in order to be more sensitive to light.

They also develop in an all or nothing way, hence why faster film tends to be more contrasty than slower fine grain film.

Camera Photography Modes

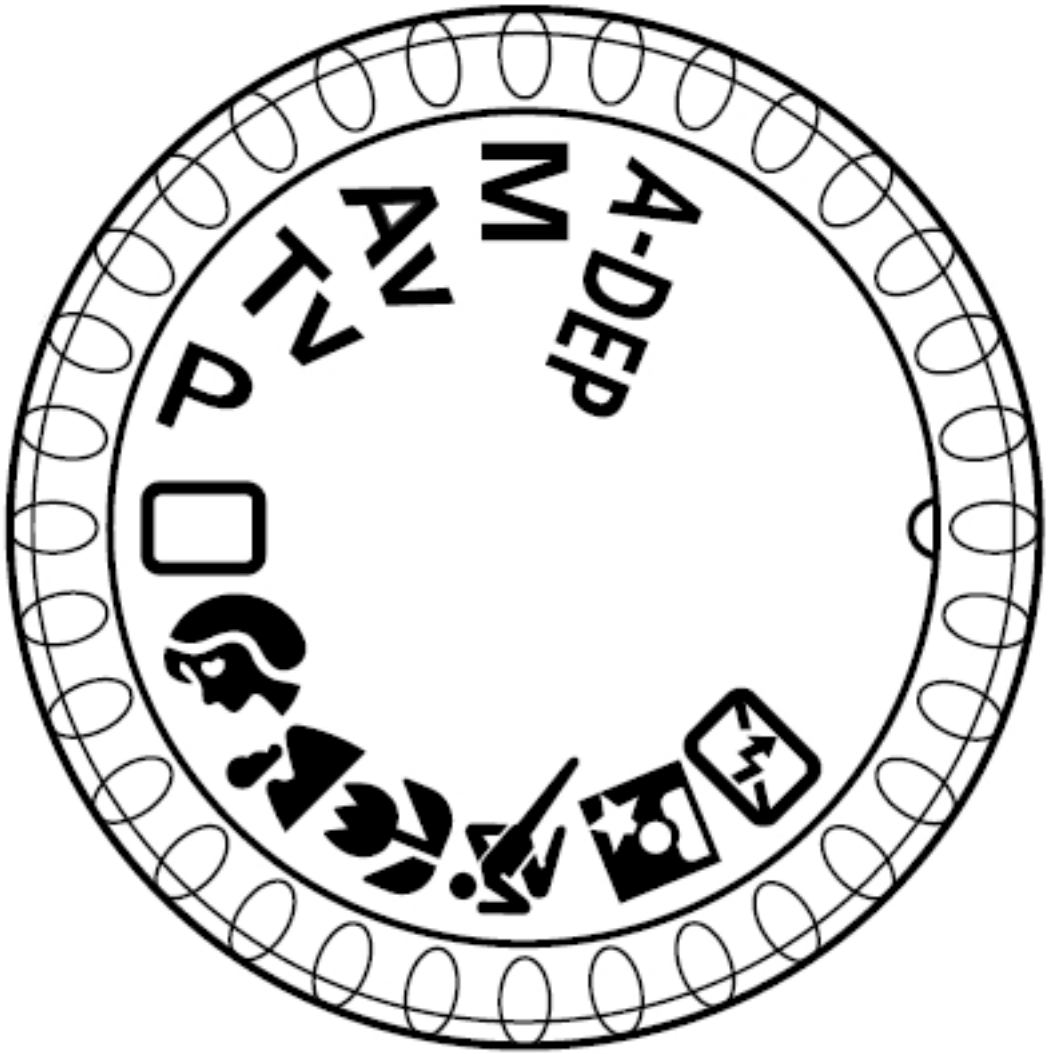
Camera Photography Modes

On most camera's there is a Mode Select controller, most use a dial while some let you select the mode via a menu system. Whatever method is used they generally do the same thing.

Below is a list of the most common mode types:

- Fully Automatic Mode
- Programmed Automatic Mode
- Shutter Priority Mode
- Aperture Priority Mode
- Manual Setting Mode
- Scene Program Modes
- Movie Mode

Camera Photography Modes



Canon

Camera Photography Modes

Nikon

Camera Photography Modes

FUJIFILM

Camera Photography Modes

OLYMPUS

Camera Photography Modes

Camera Photography Modes

PENTAX

Camera Photography Modes

Fully Automatic Mode

In this mode the Camera will make virtually all your settings decisions for you.

Basically used for a point and shoot style of Photography

The camera will decide what aperture setting, shutter speed, white balance, metering type, focus modes, flash modes, etc.,.

Nikon

Canon

Pentax

Olympus

Kodak

Camera Photography Modes

Program Mode

In the Programmed Automatic Mode the camera will still select the Aperture and Exposure settings automatically but you can change other settings such as White Balance, Focus modes, Bracketing, Sharpness and Flash settings.

P

Most brands use the P symbol for Program Mode

Camera Photography Modes

Shutter Priority Mode

The Shutter priority mode is similar to the Programmed Auto mode, with the exception of the user being able to set the Shutter speed manually while the camera will compensate and adjust the Aperture accordingly.

Most camera's will have a way of telling you when you go beyond speeds that it cannot compensate via the aperture, while keeping the amount of exposure correct.

S	**Sv**	**Tv**	**S**	**S**
Nikon	*Canon*	*Pentax*	*Olympus*	*Kodak*

Camera Photography Modes

Aperture Priority Mode

The Aperture priority mode is again similar to the Programmed Auto mode, with the exception of the user being able to set the Aperture size manually while the camera will compensate and adjust the Shutter speed accordingly.

Again most camera's will have a way of telling you when you go beyond an Aperture size that it cannot compensate for via the Shutter speed, while keeping the amount exposure correct.

A	**Av**	**Av**	**A**	**A**
Nikon	*Canon*	*Pentax*	*Olympus*	*Kodak*

Camera Photography Modes

How Aperture and Shutter modes work

A *relatively* simple equation is used when using Aperture and Shutter Priority modes.

Let's say:
A = Aperture setting **S** = Shutter speed **E** = Correct Exposure

Then $$E = \frac{A}{S}$$

Camera Photography Modes

How Aperture and Shutter modes work

For Example if, when using say 100ASA film/setting, my:
Correct Exposure E needs to be: 0.128
And I want to use f16, my Shutter speed setting would be worked out as such:

$$E = \frac{A}{S}$$

$$0.128 = \frac{16}{S}$$

$$0.128 \times S = 16$$

$$S = \frac{16}{0.128}$$

$$S = 125$$

Some may recognise the 100ASA film speed f16 and shutter speed of 1/125 as the settings needed when testing the “Sunny Sixteen Rule”

Camera Photography Modes

How Aperture and Shutter modes work

Using this formula, a table of Shutter Speed settings can be worked out as the camera would according to you changing the Aperture Size

f Stop	Shutter Speed
16	125
11	80
8	60
5.6	40
4	30
2.8	20

Camera Photography Modes

Other Exposure modes

On some cameras you may find other exposure modes.

For example on Pentax cameras they have an Av, Tv and Sv.
The Sv is not to be confused with Shutter Priority, on a Pentax camera Shutter Priority is symbolised by Tv (Time). The Sv (Sensitivity Priority) mode lets you adjust the Aperture and Shutter speed and then the camera will adjust the Sensor Sensitivity accordingly.

Check your user guide for any other modes on your camera.

Camera Photography Modes

Manual Mode

Good ol' Manual mode…
In this mode the camera may as well be a an old plate camera, as you need to adjust all the settings to make the photo work.

Having said this though, most cameras still, by default, select some settings such as White balance automatically for you, though you may override/customise these settings yourself.

M

Most brands use the M symbol for Manual Mode

Camera Photography Modes

Scene Program Mode

There a wide range of Scene Program modes available on the different models of cameras out there.

Scene Programs are modes that are tailored to suit certain types of scenes, eg Action, Macro, Portrait…

The camera will *lean* towards a set of parameters designed to get the best settings for the type of scene being used

Most cameras use very similar symbols to designate which mode you are using

Camera Photography Modes

Scene Program Modes

Portrait Mode

When using portrait mode the camera will generally use a small aperture setting, allowing the subject to stand out in focus from the background which will be softened by being out of focus

Landscape Mode

Landscape mode will program the camera to use a large aperture setting, capturing the whole vista from near to far.

Action / Sports Mode

Action / Sports mode will make the camera use faster shutter speeds. Tending to 'Freeze' the action.

Camera Photography Modes

Scene Program Modes

Macro Mode

Macro mode will allow the camera to focus a lot closer (depending on the lense) than it normally would. Also, the camera generally uses centre focus to isolate the subject.

Night Mode

Using night mode will allow the camera to use long shutter speeds, usually up to around 3 seconds. A tripod or other mount is needed when using this mode.

Night Portrait Mode

Using Night Portrait mode will use similar settings to portrait mode but will also allow the camera to use flash times appropriate to lighting a closer foreground, hence not overexposing the subject.

Camera Photography Modes

🎥 : Movie Mode

Well, Movie mode is another one that doesn't need a whole pile of understanding..

In this mode you can make Popcorn and 5 litre cups of Coke…

Camera Functions

Camera Functions

Now, we'll take a look at a couple of those little warts all over the camera with odd letters and symbols on them.

AE-L *Auto-Exposure Lock*

 *Exposure Compensation*

 *Flash Mode*

 *Drive / Shooting Mode*

Camera Functions

AE-L *Auto-Exposure Lock*

Use this function when you want to take pictures with the exposure fixed for a particular subject. Best used for when your subject is very brightly backlit.

Aim the camera at your subject and press the AE-L button, the camera will setup the Exposure for the subject, keep the AE-L button pressed and compose and take your shot as normal.

Camera Functions

Exposure Compensation

Use this function for shots where you cannot obtain the optimum brightness (exposure), such as shots with extremely high contrast between the subject and the background.

This function is similar to AutoExposure Lock, but is handy for times when you are taking more than one photo and you know that the exposure needs just that little bit more or less each time.

Camera Functions

Built-in Flash Mode

*On **Automatic** the camera will fire the flash for the duration it needs to light the scene as best it can, it also adjusts shutter speed and aperture accordingly.*

*When the flash is turned **off**, it will not fire even when the scene is poorly lit and/or the flash is popped up.*

*Use **forced** flash as a fill-in flash when taking photos of a subject that is brightly backlit (such as someone in front of a window)*

***Red Eye Reduction** should be used on the known vampires so that there identity may be hidden.*

***Slow Sync** allows you to use slow shutter speeds, so you can take photos of subjects with night backgrounds and get both nicely exposed.*

***Rear-Curtain Sync** flash fires at the end of the exposure, giving a more even exposure by not fooling the camera into thinking it has enough light.*

Camera Functions

A note on Red Eye

What is Red Eye Effect?
The light of the flash occurs too fast for the iris of the eye to close the pupil. Light is focused onto the blood-rich retina at the back of the eye and the image of the illuminated retina is transmitted to the camera resulting in the red appearance of the eye on the photo.

What does Red Eye Reduction do?
Preceding the actual exposure flash is a series of short, low-power flashes that trigger the iris to contract, reducing the effect of Red Eye.

Simple eh?

Camera Functions

Drive / Shooting Mode

Automatic Bracketing: *takes one shot, then two more, one above and below the first at stop values preset in the camera setup.*

Top 5 Frame Continuous: takes up to five frames in *rapid* succession (NB depends on camera)

Long Period Continuous: *Depending on your camera this mode will take continuous shots until the memory buffer is full, at this time the continuous mode will stop or slow down its rate of fire.*

Final 5 Frame Continuous: This mode will let you take continuous shots until you release the shutter button, it will then keep the final 5 frames.

Colour Temperature
White Balance

Colour Temperature - White Balance

What is Colour Temperature?

"The colour temperature of a light source is determined by comparing its hue with a theoretical, heated black-body radiator. The Kelvin temperature at which the heated black-body radiator matches the hue of the light source is that source's colour temperature" *Wikipedia: Colour Temperature*

What is Hue?

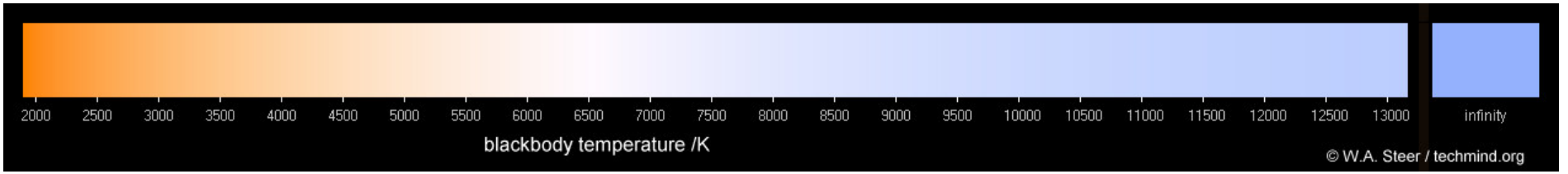
Hue is the property of light by which the colour of an object is classified as red, blue, green, or yellow in reference to the spectrum. *www.dictionary.com*

What is a Black Body Radiator?

A black body is an object that absorbs all electromagnetic radiation that falls onto it. No radiation passes through it and none is reflected. *Wikipedia: Black-body radiator*

Que? *Manuel: Fawlty Towers ☺*

Colour Temperature - White Balance



Display	Mode	Color temperature (Approx. K)
AWB	Auto	3000 - 7000
☀	Daylight	5200
⌂	Shade	7000
☁	Cloudy, twilight, sunset	6000
☀	Tungsten	3200
▭	White fluorescent light	4000
ϟ	Flash	6000
▱	Custom*	2000 - 10000
K	Color temperature	2800 - 10000

from Canon EOS 20D Manual

Colour Temperature - White Balance

So, what's White Balance?

Basically White balance is changing the cameras settings (automatically or manually) to correct the colour casts caused by different Colour Temperatures, so that the colours will appear as they would to the naked eye.

Should I change it?

Generally, no... Most cameras will do a pretty good job in automatically correcting the White Balance.

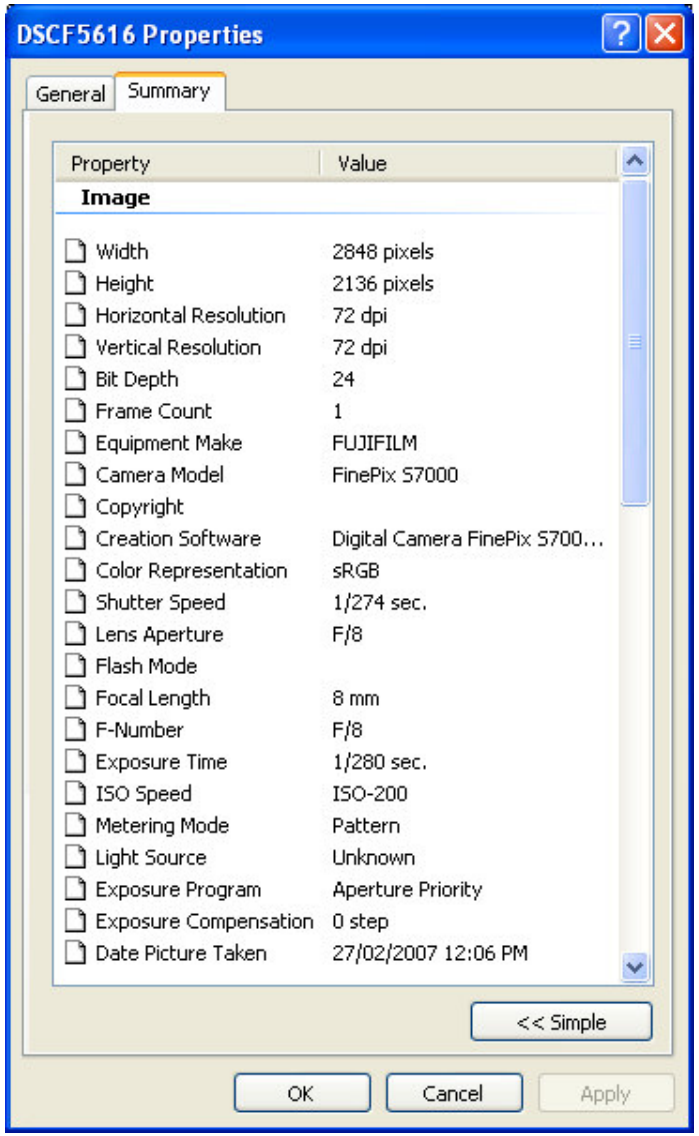
The most common time to change White Balance is when you are trying to enhance or change the cast intentionally.

Those who saw the Movie Makers film "Murphy's Law" may know that the night scenes were actually filmed in day time. The night feel was achieved by manually adjusting the white balance in the video camera to add a dark blue cast, giving the impression of night.

Random Ramblings...

EXIF: Exchangeable Image File Format

EXIF is actually a specification for the file format used by Digital Cameras.
It defines Metadata tags contained in a file recording things such as:
- Date and Time
- Camera Settings
- Thumbnails for LCD preview on cameras, file managers and manipulation software
- Descriptions and Copyright information (generally not included by the camera but in post processing software)



Random Ramblings...

Reciprocity Failure:

Reciprocity Failure is generally not a problem with digital cameras, if your using film then it can cause colours to be recorded incorrectly due the colour layers in the film not responding equally to the light, also causing an incorrect exposure. It actually occurs both in long exposures and also very short exposures. RF can be corrected by adding a colour correction filter and changing the aperture size

.

A good example of Reciprocity failure is when you generally get an odd colour cast when using the moon as a light source. In fact the colour temperature from the moon is the same as daylight. Remember where the actual light is coming from!

Sources:

- www.wikipedia.org: The Free Encyclopaedia

- Fujilfilm, Nikon, Canon, Kodak, Sony, Pentax and Olympus User Guides

- www.photo.net

- How to create Photographic Special Effects by Allan Horvath

- Practical Photography by John Freeman

- www.dictionary.com

- Dad

Thanks for coming...

Go home now...

Bye bye...

Go on... Get!

Shoo!

You've stayed your hour!

Have they gone?