Manual Exposure without a Meter

Many books explain how to use your camera's meter – the various metering modes, the difference between incident and reflective metering, how to compensate for unusual situations, digital histograms, exposing to the right, etc. But all metering methods are fallible under some circumstances. There is an easy way to get around these problems. Don't use the meter.

Moonrise, Hernandez, New Mexico

Ansel Adams could not find his meter in time for *Moonrise*. The sun was setting behind him and the light did not last long enough for a second shot. He had to rely on experience and quick thinking.

A straight print from original negative would have been dull but it contains the raw material he needed.

In this case Adams based the exposure on what he knew about the invariable brightness of the moon.

In a black and white film negative we can control the recorded exposure and contrast. In a raw digital file we can only control the original exposure but there is a lot we can do with that during post processing.

With manual exposure the photographer deliberately sets the ISO, aperture and shutter speed.

The one critical consideration when shooting digital is *don't blow the highlights*. The easiest way to see if you are getting too much exposure is to watch for flashing highlight warnings (blinkies). If you see a lot of the captured scene flashing, you are probably going to have blown highlights, even in the raw file. If there are just a few small blinkies then the raw information is probably OK.

There are many explanations of how to use your meters and histograms, but there is a much more practical way to accomplish this without a meter. You just need a reasonable exposure to start with.

How Bright is White?

The reflective properties of common materials are constant. All objects absorb and reflect visible light. Fresh black asphalt reflects about 3% of the light. Snow, white paint and egret feathers reflect between 80 and 90% and grass or a gray card reflect about 50%. What is not reflected is absorbed.

If you shine the same amount of light on the same object you will get the same amount of brightness recorded on your film or sensor. The only variation will be due to the direction from which the light strikes the subject and the direction from the subject back to the camera. To avoid blowing the highlights you only need to expose for the worst case – where the brightest possible object (like an egret's feathers or foam on surf) reflect the most sunlight in the camera's direction.

How Bright is Daylight?

The brightness of the sun has remained constant for a long time. You don't need to measure it. Under partly cloudy conditions, some of the scene is in daylight and some in shade. The sunlit portion is still in broad daylight.

Because broad daylight is a constant and reflective properties are also constant, a normal daylight exposure can be easily set using a simple rule of thumb – Sunny 16. At f/16, a shutter speed of 1/ISO (for example, ISO 400, 1/400 @ f/16) will result in a basic exposure that correctly captures a normal range of subjects in daylight. You can get the same effect by offsetting an increase in shutter speed with a corresponding increase in ISO – 1/400 @ f/16 is the same as 1/800 @ ISO 800 or 1/200 @ ISO 200, etc. You can also offset a change in either ISO, aperture or shutter speed with a corresponding change in either or both of the other two.

The Sunny 16 rule is the simplest starting point because it balances all three variables. For example, if you want to capture a landscape in broad daylight at f/11 (the diffraction limit for most full frame lenses) and you want a shutter speed of 1/1000, Sunny 16 would call for an ISO of 500.

Hazy sunlight with soft shadows is about one stop darker than broad daylight. A cloudy day with no shadows is about two stops darker and if there is a heavy overcast the scene will be about three stops

darker. You can easily learn to tell them apart. So Sunny 16 can easily be adjusted by adding from one to three stops to the basic Sunny 16 exposure to cover all of the common daylight scenarios.

Overcast also reduces the overall contrast of the scene. Colors and details will look better for being recorded closer to middle gray. You don't need to expose to the right (ETTR) because the shadows are not as dark relative to middle gray as they are in broad daylight.

Because direct sun provides about three stops more light than skylight alone, illumination in open shade requires about 3 stops more exposure.

Daylight Exposure of Natural Objects

Sunny 16 works as well for digital sensors as it does for film. Both record a proper range of details and colors around middle gray plus or minus about 2 stops – a five stop range.

The sharpest details and most vivid colors will be found around middle gray plus or minus one stop – a three stop range. Any brighter and colors start to wash out, darker and they begin to get dull.

There is a fundamental difference between film and digital. A JPEG image does not normally retain detail and attractive color more than about two stops above (or below) middle gray. The camera's raw file extends that range by only one additional stop on the high side. It "blows out" and stops recording anything at all beyond maximum white. Film can record several additional stops above middle gray although at slowly decreasing contrast.

Film does not record useful detail more than about two stops below middle gray and nothing at all after four stops. The camera's raw file, however, can continue to record useable detail and color five or six stops below middle gray although it starts to get noisy.

Using Sunny 16 in broad daylight comes very close to providing a flawless JPEG straight from the camera. There is only a slight risk of blown highlights that can be easily be recovered if you develop the image from the raw information on your computer.

You can also use some camera presets to keep those highlights from blowing out even in the camera's JPEG (Nikon Active-D Lighting, Canon Auto Lighting Optimizer, Sony Dynamic Range Optimization, etc.).

Exposure Value (EV)

Manual exposure without a meter can be used for many other situations. The following information is from a Wikipedia article for ISO 100:

Lighting Condition	**EV***
Light sand or snow in full or slightly hazy sunlight (distinct shadows)	16
Full or slightly hazy sunlight (distinct shadows)	15
Hazy sunlight (soft shadows)	14
Cloudy bright (no shadows)	13
Heavy overcast	12
Areas in open shade, clear sunlight	12
Full Moon	15
Rainbows, Clear sky background	15
Rainbows, Cloudy sky background	14
Sunsets and skylines - Just before sunset	12-14
Sunsets and skylines – At sunset	12
Sunsets and skylines – Just after sunset	9-11
Galleries	8-11
Neon and other bright signs at night	9-10
Ice shows, floodlit	9
Night sports	9
Indoor sports events, stage shows	8-9
Bright street scenes	8
Circuses, floodlit	8
Night street scenes and window displays	7-8
Offices and work areas	7-8
Fairs and amusement parks	7
Home interiors	5-7
Night vehicle traffic	5
Christmas tree lights (indoor or outdoor	4-5
Floodlit buildings, monuments and fountains	3-5
Distant views of lighted buildings	2

* Assumes ISO 100 and no filter.

An EV of 15 is 1/125 second @ f/16 or equivalent. At ISO 100, that is nearly the same the Sunny 16 which recommends 1/100 second and f/16 for ISO 100 (EV of 14.7).

Here is a partial EV table from the same source:

Camera's	**f-number**								
EV	**1.4**	**2**	**2.8**	**4**	**5.6**	**8**	**11**	**16**	**22**
9	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec
10	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
11	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4
12	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8
13	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15
14	1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30
15		1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60
16			1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125
17				1/8000	1/4000	1/2000	1/1000	1/500	1/250
18					1/8000	1/4000	1/2000	1/1000	1/500

And here is the EV table from the back of a Rolleiflex:

F:	**2.8**	**3.5**	**4**	**5.6**	**8**	**11**	**16**	**22**
1 sec	3	3.5	4	5	6	7	8	9
1/2	4	4.5	5	6	7	8	9	10
1/4	5	5.5	6	7	8	9	10	11
1/8	6	6.5	7	8	9	10	11	12
1/15	7	7.5	8	9	10	11	12	13
1/30	8	8.5	9	10	11	12	13	14
1/60	9	9.5	10	11	12	13	14	15
1/125	10	10.5	11	12	13	14	15	16
1/250	11	11,5	12	13	14	15	16	17
1/500	12	12.5	13	14	15	16	17	18

Exposure Value is the combination of only aperture and shutter speed. It is independent of ISO.

To adjust EV for ISO settings other than 100:

Camera's ISO	25	50	100	200	400	800	1600
Camera's EV	13	14	15	16	17	18	19
Adjustment for ISO	+2	+1	0	-1	-2	-3	-4
Broad Daylight @ ISO 100	15	15	15	15	15	15	15

Increasing the ISO requires an increase in the camera's EV by closing down the aperture and/or selecting a faster shutter speed.

A polarizer reduces the light reaching the film or sensor by about 1.3 stops. Neutral density filters are made to reduce light, usually in whole stop increments.

Camera's EV	14	13.7	13	12	9	5	0
Adjustment for ND filter	+1	+1.3	+2	+3	+6	+10	+15
Broad Daylight @ ISO 100	15	15	15	15	15	15	15

A filter requires a reduction in the camera's EV by opening up the aperture and/or selecting a slower shutter speed.

Examples

Full sunlight (distinct shadows): EV 15

Hazy sunlight (soft shadows): EV 14

Cloudy bright (no shadows): EV 13

Heavy overcast: EV 12