

# Digital Photography School

## Moving Toward Manual Settings: Understanding ISO (a beginner's guide)

*This is the third installment in a series by Hawaii photographer [Natalie Norton](#) on becoming confident with manual camera settings.*

If you are new to photography, or don't have a clean grasp of manual settings, I recommend that you go back and read the first two installments of this series: [Understanding Aperture](#) and [Understanding Shutter Speed](#) and then come on over to learn about ISO.



This picture of my son Cardon was a tricky one to capture. We were visiting a skate ramp at a friend's house and it was nearly dark. I could slow my shutter speed down to a certain point, but not too far, because let's just face it, he's a wiggly little 3 year old! I'd end up with a blurry image FOR SURE! I could open my aperture as wide as possible (1.2 on a 50mm lens), but I didn't want to have an incredibly shallow depth of field. I wanted at least his entire face and shoulders to be in focus. I could use my flash, but low and behold I hadn't brought it along and the camera I had on hand (Canon 5d) doesn't have a built in flash unit . . . SO, what's a girl to do??! PUMP UP HER ISO, that's what! I bumped my ISO all the way up to a mighty 1600 and got the shot. Sure it's a little noisy (don't freak out if you're not familiar with digital noise, we'll discuss it below), but nonetheless, my ISO allowed me to get the shot of my sweet little 3 year old rockin' it right at the skate park.

Now, I'm just going to apologize in advance for all the technical mumbo jumbo. . . I'll try not to make it too dry, BUT you're about to be one step closer to mastering manual camera settings. Dance a celebratory jig, grab a glass of water and park your little bottom. Let's GO!

### 1. What is ISO?

Your ISO allows you to take pictures in low light situations.

It is basically a measure of your digital sensor's sensitivity to light. The higher the number, the more sensitive to light your sensor becomes.

## **2. What is a Sensor?**

Your digital sensor is where your image is exposed (aka RECORDED).

## **3. What is Exposure?**

This should be a review from the other posts in this series. Exposure is light recorded on your digital camera sensor.

## **4. How Does ISO Affect the Final Image?**

Well, if ISO determines how sensitive your sensor is to light, and your sensor records the light (a fancy way to say records the finished image) then that sensitivity of the sensor is basically going to determine (along with your aperture which determines how MUCH light hits the sensor and shutter speed: which determines the DURATION OF TIME the light is exposed to the sensor) how bright your image will be (how much light will be absorbed by the sensor).

Ijustwontherunonsentenceoftheyearaward! Yay me!

PLEASE TRUST ME, IT SOUNDS A LOT MORE COMPLICATED THAN IT ACTUALLY IS.

## **5. What is Digital Noise?**

Film is composed of lots of little circles that make up the GRAIN of the film. Digital photography is similar, except for that our little circles aren't circles at all, they're squares. . . a gazillion little squares that come together to create an image. Sometimes those little squares in the image become slightly visible and this is referred to as NOISE. Check it out in the image of my son above.

## **6. What Does Digital Noise Have to do With ISO?**

Well, digital noise increases with ISO. The lower the ISO the less noise you will see (and most likely you won't see any at all). As your ISO increases, the noise level does as well. This noise level most likely will not become significant until your ISO reaches numbers of 800 or higher (depending on your camera). Rumor has it that the new Nikon D3 has magic ISO capacities that allow for ISO's of 1600 and even higher with NO NOTICEABLE noise whatsoever. I've yet to get my hands on one of those babies, but when I do I plan to give you DPSers a full report.

HERE ARE SOME BASIC GUIDELINES FOR SETTING ISO: please don't be intimidated by my mad drawing skills. What you see below is the result of YEARS of dedicated study and commitment!



On a sunny day - set you ISO low, try 200 ISO.



On a cloudy day - bump up your ISO a little, 400 might be a good starting point.



If it's dimly lit, indoors, evening and you are not using a flash, dial up a higher ISO - somewhere in the vicinity of 800 could work.

Remember that generally speaking the higher your ISO, the lower the quality of your image. That said, it's important to keep in mind that sometimes grain can add a fun artistic edge to a photo. On more than one occasion I've been known to add grain later in Photoshop to achieve a certain look.

### **Here's your ISO assignment:**

I want you to test your camera's image quality at different ISO settings. Set your camera to AV (Aperture Priority). Set your aperture to no lower than 4. . . preferably around 5.6 the purpose of this assignment is not to mess with exposure, composition or depth of field. The goal is to test your camera's ISO capacities and how it holds up under the pressure of high ISO's. Step outside into the open shade. Shoot an image at 100 ISO and move up incrementally through your camera's available ISO's all the way until you reach your camera's maximum ISO. . . don't worry, your camera should make up for the extra sensitivity of the sensor by shortening the shutter speed. Upload the images and check the quality. If you really want to get the most out of this assignment, I recommend that you print each image to at least 8×10 or even 16×20. You'll be glad you did if you really want to know your camera's susceptibility to digital noise. Study the images and determine what you feel is a good ISO range that still maintains image quality for your particular camera.

Come back soon for the follow up to these posts where we're going to put this all together and get you shooting comfortably in manual settings! You're so close to achieving the creative freedom and confidence as a photographer that manual settings allows. YAY!

Happy Shooting!

*Natalie Norton is a wedding and portrait photographer. She resides on the North Shore of Oahu,*

Hawaii. Check her out at [www.natalienortonphoto.com](http://www.natalienortonphoto.com).

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## 40 Responses to “Moving Toward Manual Settings: Understanding ISO (a beginner's guide)”

- [Rosh Says:](#)

Amazing noise reduction

It really is amazing how the quality of pixels are increasing. I recently, by mistake, took an image at 1600 with my 5D for a client. It was a sunny day. The client didn't even notice.

The increase in noise reduction in the newer cameras are opening up new worlds and flexibility for photographers. I can't wait to see what the manufacturers will offer over the next couple years.

Rosh

<http://www.newmediaphotographer.com>

- [Martin Says:](#)

Hi there,

I have been reading for a while now here on DPS and just LOVE these amazing posts. They really help me understand and get me to a new level on photography. Thank you very much.

This series of you, Natalie, I find rather enjoyable. You have a very fine and entertaining style of writing and explaining. Thanks a lot, again.

Martin.

- [Amy Says:](#)

Insightful and clever—I love that in a good post. Plus, I am insanely jealous of our massively amazing drawing skills—one day!

- ttexxan [Says:](#)

Good article on noise...I have a D3 and to say it has no noise at higher ISO is a stretch. Its there but very very minimal. At higher levels Im talking about ISO of 2400, 3200, 6400. If I nail the exposure with an ISO of 6400 it will look like ISO 1600 from other camera's on the market today. I have several samples if someone wants to see ISO 6400 and what can be achieved in almost no light. Don't be afraid to bump the ISO and go for that low lit shot!! Lots of good noise reduction programs out as well to help reduce

- Barbara [Says:](#)

Does it make sense to do this for each lens or are you mostly testing the camera?  
Can you tell this is a real newbie question? But I won't know unless I ask.

- Tom King [Says:](#)

Good info and fun to read. Thanks!

- [Pete Langlois](#) [Says:](#)

@Barbara

Lens choice doesn't matter in this case as the f/5.6 is achievable on any lens. The author states they use a f/1.2 lens and not many people have glass that has a f/1.2 aperture. I mistakenly shot prom photos at 1600 on my Nikon D50 by accident and I did see some grain but the client didn't notice. You're testing the sensitivity of you image sensor. The D50 has better low light sensitivity than the newer D80. Looking forward to testing out the new Nikon D90.

Pete

<http://www.petelanglois.net>

- ttexxan [Says:](#)

From what I understand the best camera's out there today for higher ISO is the D3, D700, D300, 5D, if your looking at these...This is going from lowest noise at higher ISO and down.  
If you looking at camera's in the 1200 market and below then the new Nikon or canon's will probably all be about the same up to around 1000-1600. Pushing lower end cameras passed that is going to get real messy fast.

- [Rasmus](#) [Says:](#)

You didn't mention how ISO works inside the camera, so allow me to throw in that detail: The sensor becomes more sensible to light, as more power is channeled through it.

In theory, shooting at higher ISOs should drain your battery faster, though I have never experienced that to any noticeable degree. :)

- [Author: Natalie Norton Says:](#)

Barbara,

That is a completely legitimate question. Pete's right, you're testing your camera, not your lens, so I recommend using the lens you use most frequently to run the test.

Good luck! Let us know how it goes!!

Natalie Norton

- [Author: Natalie Norton Says:](#)

Rasmus,

Thanks for explaining!

Natalie Norton

- [taryn Says:](#)

natalie, thanks for explaining ISO. i even loved your incredible drawing skills. you rock!

- [Paul Says:](#)

This entire series has been very very nice. Well presented and clear for beginners like me. This ISO series was a day too late, as I was shooting at ISO 1600 for a performance, and 800 would probably have done it. Lesson learned!

- [Shelly Says:](#)

Natalie — thank you for another great article to help in my quest for understanding such wonderful things! (I love the artwork, too!)

- [richard Says:](#)

Thank you SO SO much Natalie! For real. This is so USEFUL!

- [Rajat Says:](#)

Nice article,

Natalie - just a small request, can you please post similar article on using flash. I just screw up every image i take using flash coz of which i stopped using flash at all. I particularly find it difficult to set aperture and shutter speed while using flash. I normally increase my ISO to 1600 in low light but still lot of them comes shaken due to extremely low shutter speed. I just have on-camera flash right now.

- [xlt Says:](#)

i try to keep ISO as low as possible. but sometimes there are situations i have to rise it (concerts,

cloudy days, evening shots etc.). Still i try to keep it till 400. then noise isn't very noticable. Except if you're lightening picture later e.g. in Photoshop. then noise comes out.

- [xlt Says:](#)

an yes, sometimes noise adds effect to photography. if you have very noizy photo - convert it to black & white.

- [Rima Says:](#)

I have a film Slr(canon EOS 300X) and a compact digital camera Canon 570IS. Higher iso with film cameras are still Ok. But with compact digital it is horrible. I shot one picture of sunset at 400 ISO and it had tremendous noise. The RGB noise is very irritating and cannot be removed

- [Brett Dickson Says:](#)

Another high ISO trick is to convert the image to black and white as the sensor noise is more pleasing in B&W.

Here is another example:

<http://www.flickr.com/photos/brettdickson/2321612535/>  
f4 @ 1/10 Sec & ISO 1600

- [Andy Says:](#)

So if you're shooting in FULL manual how do you figure this into your equation? I saw that you used Av, is that the best way if you start messing with iso?

- [Alan Perry Says:](#)

Rima

If you have Photoshop you can blur the colour channels in LAB mode which helps get rid of the colour noise.

Alan

- [Artdrea Says:](#)

I just have quick question how do you take pictures of a ballet preformance? because last time i tried all the figures were washed out. does ISO help with that?

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- [Doug Pardee Says:](#)

Rajat:

Shutter speed does not affect flash exposure. In a flash photo, shutter speed is used to control the amount of ambient light in the exposure. The flash has its own “shutter” - the number of microseconds that it is lit. The flash rarely is on for longer than 1/1000 second, so it's really good at freezing action and preventing visible camera shake.

You probably are setting the camera up for “fill flash”, where the camera tries to take the picture using ambient light and uses the flash just to fill in the shadows. I don't know about other cameras, but on a Canon DSLR the Av exposure mode is fill flash - if you want normal automatic flash, switch to P mode.

- Toby [Says:](#)

So if you have a high-quality camera, is there any reason to be using the very-low ISO levels like ISO 100?

- [Deanna Says:](#)

@toby-

absolutely- the lower the ISO the more sensitive the sensor is to light, and the more color saturation your image will have...

- Rosa [Says:](#)

I have a Nikon D40. In the menu, I see an option for noise reduction on/off. What are the recommended settings here? Does this do anything to reduce grain at high iso settings?

- [George Fragos Says:](#)

Noise is also increased by underexposure. Here's an example I took the “Zombie Hunters” movie set at ISO 1600 <http://fragostech.com/album/img-2.jpg>. You'll notice that the underexposed zombie at this level of underexposure is almost B&W with considerably more noise than the more properly exposed woman.

- Gina [Says:](#)

Very nice article!

I like some noise in the pictures, but whenever I've tryied high ISO, colors looked so dull... any advice on that? (I'm a total beginner)

- Bruce [Says:](#)

I was asked to take some photos for a friends birthday party using my 400D with the built in flash. As this was my first dSLR and it was only a few weeks old, it was my first test of ISO capabilities. I shot in JPEG (altho I now use almost exclusively in RAW). I quickly realised that ISO400 was not gonna cut it and bumped it up to 800 and then 1600. I was stoked at the quality of the images compared to my Canon S3IS which had noticeable and unsightly noise at 400!!! Even at ISO1600 the images we're vastly superior.

I have now upgraded to a Canon 40D (which has better noise reduction capabilities than the

400D) and also the 430EX so I can use bounce flash.

Shoot RAW...Shoot Canon...

- [Judy Wood Says:](#)

I've been shooting on manual for the last few weeks for the first time since I bought my first digital about five years ago. Never had the nerve or confidence about what to do until now, and I'm greatly enjoying it. Changing ISO is the one thing I usually forget about. Maybe now I'll have that option stuck in my head a bit better.

- [Rob Says:](#)

Good and clear article. It's also wise to familiarise yourself with what Noise reducing programs and do and the side affects. This can be a very useful tool.

- [Bob Bevan Smith Says:](#)

I think of ISO this way: a correctly exposed image is likened to a glass of water. The glass should be full (to avoid underexposure), but not overflowing (overexposed). So you turn the tap on for a short time (shutter speed) and open it part way (aperture). If the tap is wide open (f2) the glass fills quickly (1/500th sec shutter speed), but if only dribbling (f16) then it takes longer (1/8th sec).

Now suppose you can change the pressure of the water coming to the tap. If the water pressure is low (100 ISO) the glass fills steadily with no splashes (low noise) but increase the pressure (400 ISO) and the water will come out faster, so shorter exposure time (1/8th sec becomes 1/30th sec), but more splashes (noisier).

- [Chet Dailey Says:](#)

It is amazing how things have changed. ISO was the same for film, just a different medium being tweaked. There was a time when we dreamed of super fast lenses that could see as well as the human eye in the dark. How great is it that we don't need to buy a lot of expensive glass now to get great light sensitivity? Hear Hear for the advances of modern technology.

- [Mark Hiatt Says:](#)

I bought the new Canon XSi several months ago and have been experimenting with it since. I have taken several shots using ISO 1600 and it is amazing how little noise there is at that setting. Good article and feedback.

- [Toby Says:](#)

@Deanna

Wait, I thought lower ISO meant LESS sensitivity?

- [Bruce Says:](#)

@ Deanna

As per Toby's comment, I am pretty sure that the lower the ISO, the less sensitive it is too light. That is why increasing ISO is recommended for fast moving subjects, low light conditions and minimising camera shake.

Use a tripod for low ISO pictures.

- Yo Bobby [Says:](#)

Great series! Looking forward to the other key manual setting... white balance!! It seems to be the one I frequently forget to set and image quality is greatly effected.

- Bruce [Says:](#)

@ Yo Bobby

Shoot RAW, this will allow you to significantly more control over the white balance at post processing. If you are shooting JPEG you pretty much need to nail the white balance at the time you take the shot.

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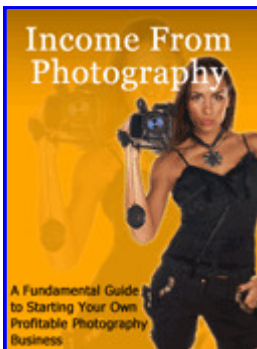
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