

TAKING CONTROL OF AUTOFOCUS

I am sure that life would be much more pleasant if we had a butler to do all the dirty work for us. Wash the dishes, mow the lawns, unclog the sink, clean the oven. The extra time could be used to improve our quality of life, or watch a whole lot more sport on TV.

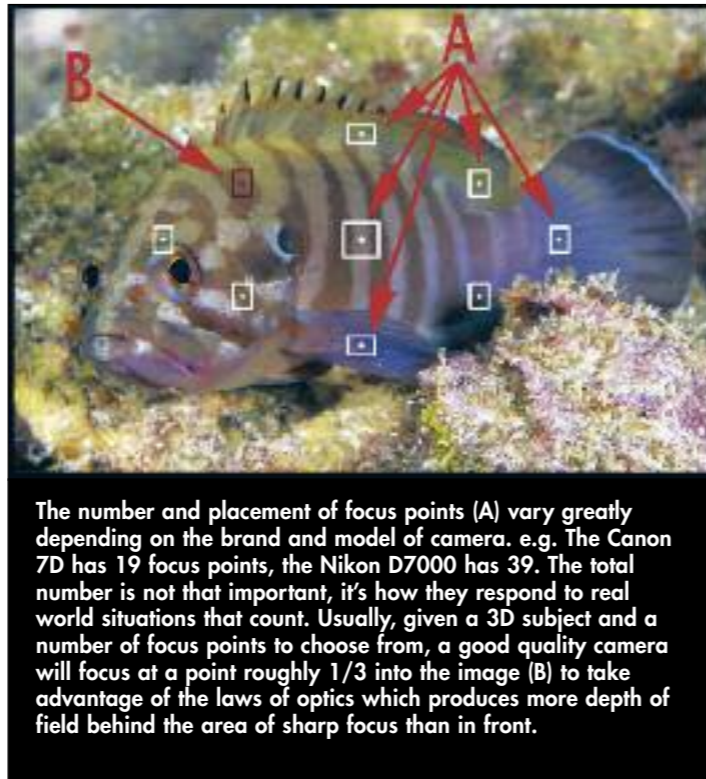
Photographically, we have such a servant: Autofocus. Unless you've had the experience of using a long manual focus lens, you may not really appreciate just how much work autofocus takes off our plate. This is even more the case when using a long lens, say a 100mm macro, in an underwater housing. You could get a serious case of repetitive strain injury in your wrist as you crank back and forth between the closest focus point and a subject further away, not to mention the missed photos, as it would take quite a bit of time to change focus between a subject 5 cm away to one that was only 50 cm away. Take it from me, manual focus is not what it's cracked up to be.

Autofocus can not only be as accurate, or more so if you have less than 20/20 vision, than manual focus, it is much, much quicker. Not only will you be more productive, being able to take more shots in a given time period, especially if it involves many changes in camera to subject distances, but you will be able to respond much quicker to small focus changes. The down side of autofocus is that it can all go horribly wrong. Like any auto function, it is presuming that what it does is what you want. It can also be tricked into focusing on the wrong point of your composition or hunting frantically for something to target while you screech into your regulator, as you know you just missed that shot of your dive buddy with Ethel, the mermaid, swimming behind them.

Modern cameras can have a variety of autofocus systems. Your camera may use a light beam to achieve focus or ultrasound, it may compare variations of image focus or image contrast. I won't bog you down with all the technical stuff that goes into making your particular system work. The bottom line is that at some point the camera makes a decision then applies that mechanically to the focus setting in your lens.

Just like a security guard, nobody notices what they are doing until it all goes wrong. You can be a reliable, diligent, highly efficient and proficient guard for 20 years but it only takes one security breach for all that to go down the drain. The same applies to your autofocus. Your camera may work just dandy all of the time, dive after dive, but right when you need it most, it all falls in a heap. Lets look at some of the situations that can breach your autofocus security.

First off, for autofocus to work, it needs something with texture to focus on. Remember, like your light meter, it cannot see the subject, only the light waves bouncing back down through the lens. To you, a white shark charging at your camera would get



The number and placement of focus points (A) vary greatly depending on the brand and model of camera. e.g. The Canon 7D has 19 focus points, the Nikon D7000 has 39. The total number is not that important, it's how they respond to real world situations that count. Usually, given a 3D subject and a number of focus points to choose from, a good quality camera will focus at a point roughly 1/3 into the image (B) to take advantage of the laws of optics which produces more depth of field behind the area of sharp focus than in front.

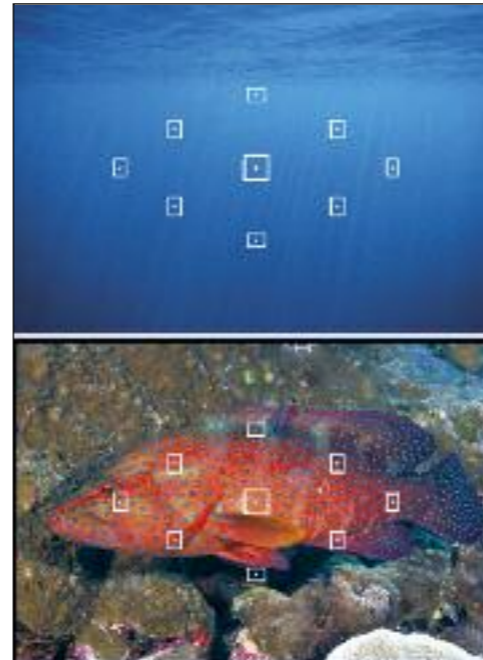
your attention, but to the light meter it is just a bunch of bright white areas (the razor sharp teeth and white belly), some mid toned areas (the upper skin colour and whatever water is in the shot) and dark/black areas (the pitch black eyes and possibly it's gaping throat). It blends it all together and comes up with an exposure for 18% grey. The fact that the subject also happens to excite your senses is lost on the exposure system, it doesn't care.

Same with autofocus. It looks for contrast and makes a decision. If all it can see is a flat tone, then for all your autofocus can tell it could be 1 cm away or 1 km away. No matter where the lens focus is set, it all looks like a flat grey mess. So if you are trying to focus on plain open water your autofocus will have no hope in providing a correct focus, unless of course something is there to provide texture. For example, with a good lens with a maximum aperture suited for autofocus (between f2 & f2.8) you might be able to pull focus on some junk floating in the water column. But almost all of the time, your lens will just grind away, focusing back and forth between minimum and maximum distances looking for something to use as a focus point.

You can try it right now. Pick up a sheet of paper, of any colour or tone, fill your camera's frame and see if you get sharp focus. Chances are that your camera will just search away. Even if your subject has a little bit of texture, such as the skin of our white shark subject, if light levels are low your focus system may still struggle. That is why some cameras have a pre-flash of

visible or invisible (infrared) light if you try to take a photo in a dark room or at dusk/night.

The solution to this situation is to use your focus lock. This may be a separate button on your camera but in most cases, if you hold down the shutter button half way, your camera will focus then stay focused as long as you hold the button down. So you would focus on something the same distance away as your subject then recompose before pushing the button all the way down. You will have to check what setting your camera has for it's autofocus. For example, it may be set to focus continually, even during those microseconds between pushing the button all the way down and the shutter opening.



A low contrast situation (top) can have your lens searching in and out of focus, looking for something to focus on. The longer the lens, the longer it will take to rack back and forth between infinity and the minimum focus distance. With low contrast and low light, you probably will be better off focusing on something at the same distance away then lock and recompose. Other subjects (bottom), even in low light (like this grouper under a deep coral ledge), will lock in, even if your eyesight fails you. While locking in on spots is easy, some points (usually the center/central ones) have a special design to avoid issues when focusing on straight lines.

Some top of the line systems have predictive focusing where it will set focus to where your subject will be at the precise instant of exposure. So in the case of our white shark charging at the camera, if the shark is, say 2m away when you push the button, it may be 1.8m or 1.5m away before the exposure is actually made. The lens will be set to the point of focus predicted by the

speed of the subject.

Or your camera may be set to focus continually so holding the shutter button down will not activate the lock focus. So check the camera settings and, of course, your manual, to see what autofocus features your system has and what you can control.

The principle is the same as covered in a previous article where exposure lock is used to overcome problems with very bright or very dark areas causing less than optimal exposure. Of course, manual exposure solves that so no need for exposure lock, but if you insist on auto exposure, exposure lock is a very handy tool to have. Focus lock will provide the same insurance for those tricky instances where the normal operating procedure fails.

Another common situation is where a photo is about to be taken which has texture and contrast galore, but not right in the center of frame or in the area covered by multiple focus points. For example, you may have a diver hovering over a busy reef, maybe even both sides of the frame have lots of subject matter, maybe even across the normally empty top as well. But the very center of your image is just blue water, or a dark hole. Maybe even a plain area of a black wetsuit. The solution is the same, move the camera a touch to focus, lock it, then recompose.

This will usually be a problem if you only have the central focus spot activated or any other single focus point. Most cameras have an active area of multiple focus points with the camera choosing one that is the closest point to you and/or which has the best contrast to operate with. However, while that is fine to use in most circumstances, the point in the middle of the frame is the fastest and most accurate focus point to use. This is purely a factor of optics and the laws of physics. If your camera has to 'think' and decide which point to use, that takes time. If it only has one point to use, and that point is in the optical center of your lens, then it will react much, much faster and accurately. However, using just one point has the drawback of limiting you to what's directly under that chosen point.

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he's always the first to put up his hand. He's also dived the southeastern Australian continental shelf and photographed shark species nobody knew would be found out there. Kelvin is a BBC Wildlife Photographer of the Year marine category winner

and his unique work is on www.marinethemes.com

digital photography



Predictive or Servo focusing is best suited to long lenses and fast moving subjects. When you are using wide open apertures, predictive focusing can make all the difference between a critter with sharply focused eyes, and one with a sharp tail and not much else.

In practice, I find that allowing the camera to use a multiple choice of focus points works best under most circumstances. It also allows you to compose off center or with the main subject out of the dead center of frame. However, if speed and accuracy is of essence then selecting the center point, as the only focus point, wins hands down. This applies to low light situations as well. Since you are using the optical center of your lens, your focus system will also work better when things get dull.

If you are using continuous focus mode or predictive focus mode then using just the single central focus point will provide the very fastest and most accurate result. Underwater that may not be an issue as most things move relatively slowly. But on the way out or back from your dive site, coming across some jumping dolphins or breaching whales will push your camera to the limit. Using just a single center point will give you the fastest focus response.

At times you might find that selecting a single focus point well off center is the best option. For example, if you are working with a long, slender fish with the eye, say, 1/4 of the way into frame, then selecting a matching focus point, or one close by, is worth the time and effort, especially if it is a skittish animal that does not take kindly to you focus locking and recomposing. Leaving your camera on a multi-choice setting will usually have you focusing too far down the body of the fish, leaving the vitally important eye out of focus. Or your composition may have the eye outside your area of focus detection. Just don't forget to set your camera back to your normal focus setting afterwards. It will prevent aggravation later.

If you are using an SLR with a longish lens such as a macro, you might find that you have an option to flick a switch on the lens barrel to limit focusing to a given range. This is a function that, in theory, would limit focus searching. Macro lenses have a long focus rack, 2-4 times, or more, of a wide angle lens. What that

means is that if your camera starts to rack the lens to achieve focus, it might take a lot of time for the lens to rack from, say, minimum focus to infinity focus and back. Let's say that you are a fraction too close to your subject so that the lens cannot focus on anything. The camera will then try to find a point to focus on by racking back and forth to find a sharp point. If you set your lens focus limit switch on, if you are close to minimum distance it will not rack all the way back to infinity, making the search a lot quicker. In practice, it does not work, as you may want to photograph something that is just beyond the limit setting. Unless you can physically reach inside and flick the switch off, the lens will not be able to focus beyond the limit point.

If you start your dive with the lens set at the infinity focus point you will not be able to focus on anything that is within the closer operating distance of the macro lens, which I bet is where you want to be working. If you start your dive with the lens at minimum focus setting, you will not be able to focus on objects further away, such as a shy fish hiding back under a ledge.

My recommendation is to leave the switch off and put up with the searching. In fact, use a bit of black tape to lock it in the off position. And while you are at it, do the same with the manual focus/auto focus switch (if your lens has one). Murphy's Law dictates that you will bump either or both switches on that dive where you definitely need them off. One of my Nikon macro lenses has a manual/auto focus lock button that will not be bumped off which is a nice touch, but often it is just a small slider switch. Gaffer tape to the rescue.



Even with multiple focus points available and active, you might find that the point that the camera chooses (A) is not what you want. The solution is to use your camera's focus point selection controls to force it to use one particular point. Here I want the eye (B) sharp so I would select the outermost left hand point and use that to focus on the eye, lock focus, then recompose. It does sound tedious but is surprisingly quick with just a bit of practice. Don't forget to reset the focus point back to the default auto selection.

You can limit the focus searching if you make sure you have an area of contrast within your focus zone and that you are not trying to focus closer than your lens' minimum distance. You can also stop knee-jerk searching by gently touching the shutter button off and on so that if you find that it is having trouble locking onto your subject it is less likely to go into that long grinding journey up and down the focus rack. A bit of practice helps as you will soon get the feel for things with your particular set-up.



While using just the single center focus point is fast and accurate, particularly in low light situations, there are times when it fails, due to composition and an area of low contrast. Some cameras also have a setting where just a few points are selected in a cluster around the center point but that too can fail. Here, multiple points would have solved the problem.

focusing, fast moving objects, dull light) and use focus lock if all else fails.

There are situations and specialist lenses that work best with full manual focus. We will show you when and how to make that work best in the next issue.



Bottom line: don't use the focus limit switch (A). It causes more problems than it solves as you can't just flick it off and on when you're underwater. Use a bit of black gaffer tape to keep it in the On or Full position. While you are at it, tape up the manual/autofocus switch (B) so that it does not get knocked out of Auto mode. While this Nikon 60 mm macro has a great button lock (B) most lenses just have an easily knocked plastic switch.

If you accidentally start a dive with a housed camera set to manual focus, you might as well just surface and fix it. Chances are that you have no focus gears in place, partly because the drag of the gear and the control knob could burn out your focus motor.

In brief, avoid focus limits on macro lenses (tape them up to be sure), use a wide area of multiple focus points for general shooting, use a single center point when speed and accuracy is needed (predictive

LINKS>

<http://en.wikipedia.org/wiki/Autofocus>

<http://electronics.howstuffworks.com/autofocus2.htm>

<http://www.digital-slr-guide.com/digital-slr-autofocus.html>

<http://www.all-things-photography.com/focus-points.html>

<http://photonaturalist.net/quick-tip-for-getting-a-faster-autofocus>

<http://www.youtube.com/watch?v=1Ke1f5VMATU> (or search on www.youtube.com for your camera model).