

INON D2000 and its S-TTL system

By Alexander Mustard

In my opinion this review comes down to one big question. Does the Inon D2000 strobe really provide accurate TTL metering with almost every compact digital camera, without any electronic communication between the camera and the strobe? Yes. It does. This achievement makes the D2000 a very important product for digital photographers, and as a result I have given the product a pretty thorough workout in this article.

The D2000 is the latest strobe from Japanese company Inon. Owners of their previous models, the Z220 and D180, will already be familiar with its rugged shape. All Inon's compact strobes use their T-shaped dual flash system, with specially designed reflectors that produce an even, circular pool of light irrespective of the rotation angle of the flash head. The D2000 is small, lightweight, ideal for travel, and close to neutrally buoyant in water. Power comes from four AA batteries, and although I do not own any Inon strobes, I have used both the Z220 and D2000 and have found them exceptionally frugal on batteries (I did 13 dives in Bali on one set in the Z220). The recycle time of

the Inon strobes is also impressively short, and I have never had any reliability issues in my brief time with them. Anyway, to business! What is new and exciting about this strobe is the TTL system. Nearly every digital compact camera determines its flash exposure by firing a weak pre-flash (after you press the shutter but before the picture is taken). This light is reflected back from the subject through the lens (TTL). The camera looks at how much light has returned and works out how strong the main exposure will have to be - and sets the main flash accordingly and fires it. The D2000 works by surreptitiously taking the place of the camera's own flash, for both the pre-flash and main flash, with the camera unknowingly controlling the D2000 output. Inon

call this system S-TTL, which is short for the catchy "Optical Syncro Through The Lens" strobe metering. The few other external flash systems capable of digital TTL are connected to the camera electronically (e.g. the housed Olympus FL-20 strobe) and because of this they need to be able to speak exactly the same language as the camera. As a result, electronically connected systems can only be used with the specific camera brands and models. The D2000's only connection to the camera is a fibre optic cable and this makes it much more compatible. It sounds strange, but makes more

sense when you start to use it. The first step when attaching the D2000 is to block the light from the camera's internal flash with Inon's visible light filter. This filter still allows non-visible wavelengths through which are used to trigger the D2000 via the fibre optic. Now when the camera fires its pre-flash the D2000 detects it and fires a proportional pre-flash too. The camera sees only the D2000 pre-flash and thinks that it is its own (remember its own flash is blocked). From this it works out how much more light is needed for a correct exposure and increases the duration of its flash



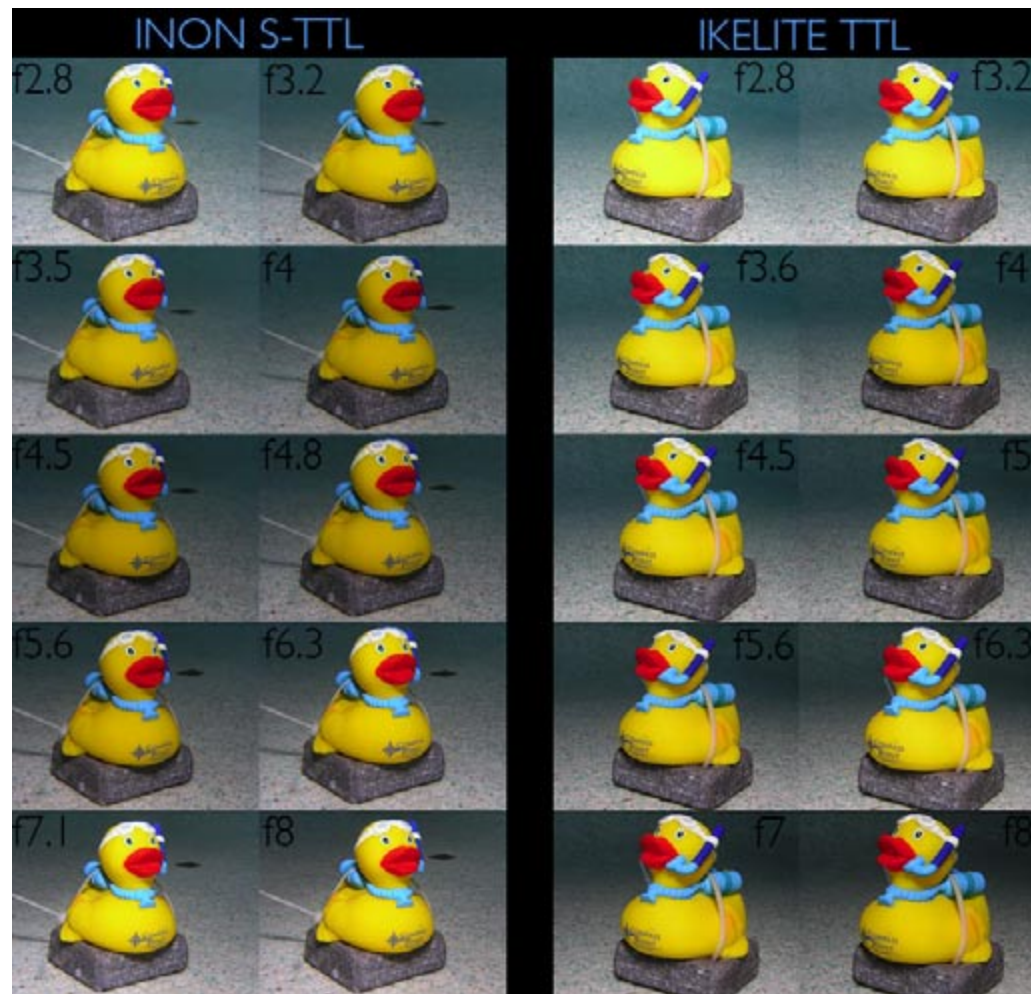
accordingly for the exposure. Again the light from its own flash is blocked, but the D2000 sees it through the fibre optic and fires in its place, detecting and mimicking the required increment in flash power. Result: you get the correct exposure!

So, that is the theory, now to put it to the test. For obvious reasons I could not test the D2000 with every compact digital camera on the market, so I chose to test it with one of the most popular the Olympus 5060 in a PT-020 housing. I must say that the red colour of the Inon D2000 looked very smart with the matching PT housing!

Test One: Controlled conditions TTL test.

The raison d'être of TTL flash metering is to ensure that a strobe gives out the required amount of light for a correct exposure. The simplest way to test this capability is to take a series of flash lit photographs of the same subject at a range of lens apertures. If TTL is working then the strobe will vary its power output to give the correct amount of light for each aperture. If the TTL is not working and the strobe is giving out a constant amount of light then shots that start off correctly exposed will become increasingly underexposed as the lens's aperture is closed. Of

course, you can do TTL tests in air, but last time I looked this magazine is called UWP, so I grabbed my rubber duck and headed off to the pool! I wanted to ensure that the lighting of my images was dominated by the strobe light, so I chose the darkest corner of the deep end of the Compass Point Resort pool, in Grand Cayman, for my tests. I also used a fast shutter speed of 1/800th for all the shots. But this is the Caribbean and it is sunny, so even at 1/800th of a second there is still some ambient light influence in the shots (visible as brighter backgrounds at wide apertures). As I am sure you can see immediately the S-TTL performance was very impressive, producing consistent exposures through the range of apertures. By happy coincidence, I was able to simultaneously test an Olympus 5050 in an Ikelite housing, with an Ikelite DS125 strobe capable of Olympus TTL (kindly loaned to me by Barbara Janssen). Ikelite's version of Olympus TTL is only available with their housings and only works when they are used in conjunction with their DS series strobes. The Ikelite housing and strobe are more expensive than the Inon and PT housing but, as you can see from the results, this system works well too. There is a slight over exposure at f2.8 as a result of the strobe not being able to quench fast enough at this aperture.



Rubber-ducky TTL tests. If TTL flash metering is working properly then it should automatically produce correct exposures at a range of apertures. While testing the INON D2000 on an Olympus 5060, in a PT housing (images on the left), I had the chance to do a back to back test with the Ikelite TTL system, using an Ikelite DS125 strobe on an Olympus 5050, in an Ikelite housing (on the right). Note Ikelite TTL is an electronic wired TTL strobe system, and only available with Ikelite housings and digital strobes. I present both sets of images for your information. You can see that both worked very well over the range of apertures. (Note these pictures were taken with different cameras - hence the slightly different aperture steps).

This is more noticeable on the Ikelite because the DS125 is more powerful than the D2000, and is an artefact of the testing conditions and should be ignored.

Test Two: Macro Photography.

Pool tests complete, it was now time to get into the Caribbean and get cracking on some real pictures. Ever since Nikon introduced underwater TTL with the Nikonos V in 1984, underwater photographers have been relying on it for macro photography. Macro images, by definition, represent small picture areas close to the camera - characteristics that mean TTL flash exposure is usually reliable. After the pool tests I was expecting the D2000 to do well. And it did not disappoint producing very reliable exposures both where the lighting was flash dominated and also in balanced light. One very interesting feature of the D2000 is that it has an S-TTL compensation switch on the back of the strobe that allows the user to compensate the flash power relative to the camera's suggested TTL exposure - either brightening or darkening it. The system worked well, and I tended to add some compensation to about 30% of my macro shots. These were only minor changes, usually to suit my taste rather than correcting a wrong exposure. I predict that many users will quickly become addicted to the extra creative control that this feature adds.

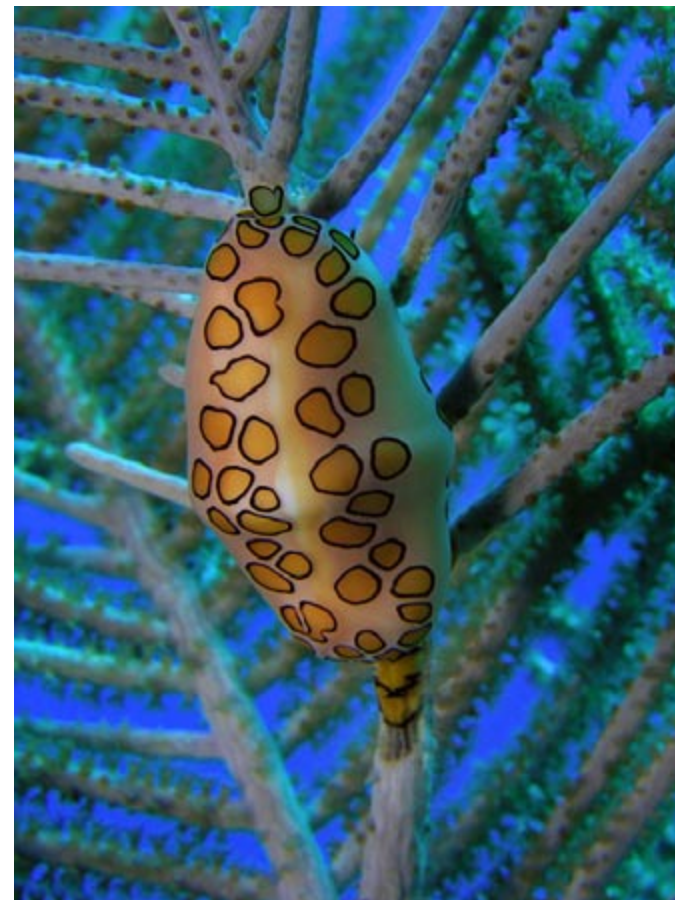


Photographers favour TTL exposures for macro because the metering of the small picture area is usually handled easily. This sub-inch long triplefin was the smallest subject I tried with the Olympus. Again the S-TTL did a good job with this flash dominated macro photograph. Olympus 5060. PT-020 housing. Stacked INON UWL 165 and 330 close-up lenses. 1/400th @ F8. D2000 on S-TTL.

Test Three: Fish Photography.

The other area where TTL has always appealed to photographers is in fish photography. TTL is desirable because it means that the photographer does not have to worry about the exposure and can concentrate on capturing the moment with a moving subject. Again I tried both flash dominated and balanced light shooting and the S-TTL performed well, even with the most challenging subjects I could find. I would say that I dialled in S-TTL compensation on about 50% of my fish shots.

A disadvantage of using pre-flash TTL for this type of photography is that it slightly extends the



Having successfully tried a flash dominated macro shot, I wanted to see how the S-TTL would cope with a balanced light macro shot. I think that S-TTL has done a most acceptable job here under more complicated lighting conditions. Olympus 5060. PT-020 housing. Stacked INON UWL 165 and 330 close-up lenses. 1/40th @ F8. D2000 on S-TTL.

shutter lag before the picture is taken compared to switching the pre-flash off and doing without TTL (this does depend on the camera). This extra lag gives the subject slightly more time to move!



For this next image I wanted to find a tricky subject for the TTL: a dark fish swimming over white sand. The S-TTL didn't get it right every time, but in this case, after I had dialled in some compensation, it did a perfect job of this Smooth Trunkfish swimming over the sand. Olympus 5060. PT-020 housing. Standard lens. 1/125th @ F8. D2000 on S-TTL.

Test Four: Wide Angle.

Even back in the days when everyone was shooting film, TTL was not universally favoured for the complexities of wide angle lighting. I have to admit I always used TTL, but I felt that wide angle would be the biggest test for the D2000's S-TTL. In actual fact this is more a test of the camera's flash

metering capability rather than the strobe. It is important to remember that the S-TTL is only as good as the camera that controls it. And some compact cameras have better strobe metering than others.

I found that I used the S-TTL compensation control on most of my wide angle shots with the Olympus. I admit that this was mostly fine tuning, but I think that



I thought that wide angle would be the toughest test for the strobe. I found that I would usually use some S-TTL compensation for these shots, but once dialled in for a particular setup, it did a good job. Olympus 5060. PT-020 housing. UWL 100 with dome port. 1/8th @ F8. D2000 on S-TTL.

photographers who are fussy about their lighting will find that they do the same. I must also add that I found the S-TTL compensation system very easy to use and I got pleasing results immediately with this camera (this image of the diver in the cave is from my first morning with the camera and strobe, taken before I had done the pool tests). Throughout these

tests I was using the Inon strobe without a diffuser and as such its coverage is about 100 degrees. Normally this is fine for wide angle because we rarely want to light the whole scene with flash. Instead we concentrate on lighting the foreground and not worrying about the open water at the top of the image. The example image of the diver in the cave is unusual

in this respect and therefore shows some strobe fall off towards the corners of the frame. I would recommend using a pair of D2000s for this sort of shot. Actually, I prefer to have two strobes for all my wide angle. I did not have two D2000s with me in Cayman, which would have allowed me to shoot dual strobe S-TTL. Instead I made use of the fact that the D2000 can be switched into manual (non-TTL) mode and the camera into non-pre-flash mode. This meant that I could fire any underwater strobe as a slave from the D2000. If the pre-flash is not switched off then the standard strobe will be fired by the pre-flash, not only ruining the pre-flash metering but also it is unlikely to recycle in time for the main exposure. I used one of my Subtronic Alphas as a slave strobe with the D2000 on most of the dives I made and this combination worked well (I haven't included these images in this review because they were shot without S-TTL).

General features of the strobe.

My only big gripe with the strobe is the very complicated multi-function control dial on the back. The Inon engineers have been very clever and made this single dial on the right hand side of the back of the D2000 capable of controlling TTL compensation in S-TTL and S-TTL-low modes, as well as communicating your aperture to the strobe in Auto mode and also for determining flash power in Manual mode. But this also makes it very complicated, especially as the starting places for the different modes are in different places on the dial. I do not want to sound overly critical here because I realise that owners of the strobe will quickly become familiar with its functions, as I did, but the first time I used the strobe it was like trying to figure out Rubik's Cube. Underwater! Early purchasers of this strobe were further frustrated by a lack of an English Manual when this strobe was released, although Inon has subsequently distributed it to them.

The fibre optic cable is one of my favourite features of this strobe because of all the potential hassle it saves since it does not rely on electrical connections and is impossible to flood! When I used to use TTL with my housed Nikon F100 I would have to worry about 40 electronic connections between the camera's hot shoe and my strobe. The synch cable also represented potential flood points of both the housing and strobe. The fibre optic solves all these worries, but it is not perfect. First I found the cable a bit too short for some strobe positions. Also because the D2000 is only fibre optically controlled it does not offer as flexible a camera upgrade path, as say a Z220, which can be fired both fibre-optically and electronically. It



Fish photography has always been a popular area for TTL because it frees the photographer from worrying about exposures when trying to capture "the moment". The INON D2000's S-TTL took care of the exposure to all I had to concentrate on was pressing the shutter at the right time to capture the gaping mouth of this Spotted Moray Eel.

Olympus 5060. PT-020 housing. Standard lens. 1/400th @ F8. D2000 on S-TTL.

is possible to use the D2000 with Nikonos style connectors, and it is capable of Nikonos-style TTL, but you must purchase Inon's Optical Converter, which is quite expensive. Another point of interest about the D2000 is that the flash duration is much shorter than other similarly powerful underwater strobes. This is helpful to the digital underwater photographer because it allows us to shoot fast shutter speeds with digital compact cameras without losing flash power. I'll explain why this is important. A disadvantage of digital compact cameras is that most have a smallest aperture of F8, which can be frustrating when trying to control the influence of available light in images



A picture of me with the camera rig I used for these shots. Photo by Joe Hoyt.

(for example when we want macro shots with black backgrounds). Fortunately, most of these cameras have electronic shutters, and therefore can synchronise with the flash at any shutter speed. So we can control ambient light by using fast synch speeds ($>1/500^{\text{th}}$). However the problem with this approach is that at synch speeds in excess of $1/500^{\text{th}}$ most underwater strobes do not have enough time to fire all of their light. As a result at faster and faster shutter speeds the strobe underexposes more and more. The short flash duration of the D2000 is thus advantageous because it offers lots of light at fast shutter speeds. Finally I want to comment on the focus assist light that does not turn off during the pre-flash and therefore must be fitted with a red filter to stop it interfering with the flash metering. Personally I don't see this as a big problem. What is more of an issue is that accuracy of pre-flash metering can potentially be affected by other light sources, as with the focus light (this is an issue with the camera and not the flash).

S-TTL Compensation.

In my tests, I found S-TTL produced great results much of the time automatically, as I have said above. When S-TTL didn't work or I was feeling fussy/creative the TTL compensation control allowed me to easily adjust the lighting to my tastes. The way that S-TTL works is to sense and then exactly duplicate when the camera's own flash switches on and off (both for the pre-flash and again for the main flash). When we dial in S-TTL compensation all we are doing is telling the strobe to burn a bit longer than the camera tells it to when we want to brighten the exposure, and to start its flash a bit after the camera says when we want to darken the contribution of the strobe.

I believe that most photographers will end up using the TTL compensation on many of their shots because it works so well. My only issue with this is that if this is the case then they didn't need TTL in the first place. They might as well be using a manual strobe. I accept the point that TTL is a nice tool to have in the box, and the TTL ability of this strobe is what a lot of people have been asking for. But if you are going to use your own inputs to get your desired exposure then the best starting place is the fixed output of a manual strobe, rather than the potentially changing

output of a TTL strobe. Again, I would temper this comment by re-stating that this is a personal opinion and of course the D2000 can be used as a manual strobe.

Conclusion.

By far the most important feature of the D2000 is that it offers a reliable TTL system that works with almost every digital compact camera and housing. It is compact, strong, powerful (yet frugal on batteries) and promises to continue to build on Inon's reputation for reliability. The controls do take a bit of getting used to, especially if you switch modes during a dive, but once you have it is very easy system to use. For the beginner it offers the simple automation of reliable TTL flash. For the more advanced photographer, who wants more creative control, the D2000 gives it to them, both as compensation for the TTL and full manual control. The D2000 is an innovative and capable product, and it is one of the few on the market that will really grow with you as a photographer.

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