

Underwater Photography

a web magazine

Feb/Mar 2003



Nikon D100 &

Subal D10

Nikon 12-24mm

Inon Z-220

Colour filters

St Vincent

Cornwall

Crocodiles

Mating mandarins

Aquariums

Antibes winner

Classifieds

Has the future arrived?

First impressions of the Nikon D100 underwater in a Subal D10

By Alexander Mustard

Digital is the future of underwater photography. There is little doubt. It is clearly no longer a question of if. The question is when.

In 2002, Nikon released the D100 digital SLR and it has been greeted by a furore of activity from housing manufacturers. In contrast, housings for Nikon's higher specified D1 series were conspicuous by their (almost total) absence. But the cheaper, lighter, smaller D100 has already been promised homes from the likes of Aquatica, Hugyphot, Ikelite, Light and Motion, Sea and Sea, and the subject of this review, Subal. Has the future arrived?

My aim in this article is to assess the D100 from the point of view of someone who is already shooting a 35mm Nikon SLR underwater and is thinking about digital, because I see them as the most likely client for the D100 (for one thing they will already have the lenses). This article represents my first impressions. I have not yet used a digital TTL flashgun with the housing underwater, nor have I taken it on a typical diving trip. But at a time when SLR photographers are taking digital increasingly seriously, I hope you find my initial experiences valuable.

The camera

The D100 will look and feel familiar to any modern Nikon SLR user. Although this camera shares its number with the F100



it is more closely related to the F80. It is a curious mix of old and new, for example, it has a traditional F lens mount on the front and modern LCD monitor screen and boat load of buttons on the back. Familiar are Nikon's four exposure modes: P - Program, S - Shutter Priority Auto, A - Aperture Priority Auto and M - Manual. The three exposure metering modes are conventional too: matrix (3D 10 segment), centre weighted and spot. If you are used to a Nikon you can switch on the D100 and get snapping immediately.

Inside the D100 it's all new. Film has gone; in its place is a CCD with 6.1 million effective pixels (Megapixels or Mp), which produces images of just over 3000 by 2000 pixels. To put this in terms that might make more sense - this is equivalent to scanning your slides at 2200 dpi,

or a high quality (300 dpi) print size of 25.5 cm by 17 cm.

All digital SLRs all have an astonishing wallet emptying ability at purchase. The D100 is £1600 in the UK. But for trigger-happy photographers the lack of film costs produces a considerable reimbursement. I have had my D100 for a little over 3 months and have already downloaded 3000 pictures from it (an amount that surprised me). Certainly many of these shots were taken for evaluation, but 3000 pictures is the equivalent of 84 films, which at say £6 to buy and develop is over £500 saved!

The digital images from the camera can be saved onto either a Compact flash card or an IBM Microdrive in one of 5 image formats: RAW NEF (Nikon Electronic image Format), TIFF and three levels of JPEG. The RAW files are the CCD output



warhol.jpg - These pictures show the results of using a grey card for white balance calibration in the pool (under tungsten lights). No filters were used in these shots, all colour adjustment was done by the camera's electronics. a) shows my friend (with typical "Yorkshireman in January" complexion) as he would appear on daylight balanced film; b) is the white balance calibration from the grey card; c & d) are the warmer and cooler auto-bracketed white balance shots, respectively. All: D100 + 17-35mm, 1/15th @ f2.8, 1600 ISO.

and are the highest quality images available from the camera. They can be read in Photoshop with the plug-in supplied with the camera. TIFF files are something of an irrelevance because they take up more space than the RAW files and cannot contain more real information (having been converted from the RAW files by the camera). If you want TIFF files it is best to produce them on your computer after downloading. Most people will find the high quality (fine) JPEGs ideal for most situations. On the 1Gb Microdrive, currently the largest memory card available for the camera, and therefore sure to be a favourite underwater, shooting at 6Mp the RAW format gives 107 shots, TIFF 59 shots, fine JPEG 320 shots, norm JPEG 625 shots and basic JPEG 1200 shots (the

actual number of jpegs will depend the compressibility of the image content).

Unlike most non-SLR digital cameras the LCD monitor is solely a user requested feature for reviewing images and cannot be used as an alternative to the viewfinder when shooting. The monitor has a 9 times image zoom, which is excellent for checking the sharpness of that shrimp's eye! LCD monitors are the sworn enemy of batteries, and by not relying on the LCD during photography the D100 has outstanding battery life. The camera will easily take over a 1000 shots between charges and the claimed 1500 is obtainable when the LCD is used sparingly. Recharging the small, light lithium battery on either 110 or 240 volts takes less than 2 hours.



Mask1.jpg and Mask2.jpg. Correct colours? Digital cameras offer two ways to colourful images artificial lighting or calibrated white balance. The upper image (*mask1*)



The Housing



Like the camera, the Subal D10 will have a reassuring layout to owners of the latest generation of Subal housings. Compared to my F100 housing it is lighter and more compact, but accepts all my existing Subal ports. The camera is mounted in the housing on a removable base tray, meaning it can be whipped in and out in seconds if need be. However, both the lens and image storage card can be removed with the camera still in place. The LCD monitor is very well shaded in the cast aluminium housing, and can be seen easily underwater, which is often a major failing of clear plastic housings.

The D10 has two flash synch sockets, two handles, two strobe arm mounts and a leak detector. The housing provides dials and buttons to all the camera's major controls. There are 25 in all, which must be something of record? The few functions not controlled are far from crucial for underwater shooting! Typical of a Subal, all the housing control dials work immediately, without any modification to the camera.

The housing is only slightly negatively buoyant in the water with a good posture. Unlike digital compacts there is no delay in the shutter mechanism, you press the kill button and you have a picture - it's exactly like a film SLR. The 5 area autofocus is good, but in low contrast situations and when shooting macro I notice that the D100 is inferior to my F100. This is simply because the D100's autofocus is driven by a Multi-CAM 900 module (shared with the F65 and F80), rather than Nikon's better Multi-CAM 1300 (on the F5, F100 and D1 series).

My minor gripes are first that there is no way of telling the position of the function dial from outside the housing without either guessing from

the camera's top control panel display or looking through the viewfinder to see what exposure mode you've selected (which you don't usually do when turning this dial). The second is that the gearing on the sub-command dial (that controls the aperture) is very long and it requires 5 and 3/4 complete revolutions to go from f2.8 to f22 in third of a stop increments. But I am nit-picking. In general the housing is superb.

Lenses

The D100's CCD is smaller than 35mm film (its about the same size as APS film). This means that the viewfinder (which shows 95% of the final image) is also smaller than a 35mm camera's. The Subal housing has an image reducer on the viewfinder to allow the entire screen to be seen through the housing while wearing a facemask. The resulting image is small, but even in a dark pool I was content, I always prefer to see the whole picture. Viewfinders are personal, and I would recommend checking this aspect of the camera is to your taste.

So while the F mount allows all Nikon compatible lenses to be mounted on the camera, the main consequence of the smaller CCD image area is that the effective focal length of lenses is



Sticks.jpg - A branch under the ice. The D100 produces sharp and richly coloured images even in difficult shooting conditions (such as a murky lake, under the ice, in the UK, in January!). D100 + 16mm. Subal D10. No flash. Aperture priority. f6.3 1/60th. ISO 500. White balance - auto.



snail.jpg - For macro the D100 is pretty similar to film. At the moment flash exposure is manual, which is not a problem with stationary subjects and instant image review. Once D-TTL strobes are available this will be solved. The faster ISO (200 versus 50) means that you get a couple of stops more depth of field. D100 + 60mm. Manual. f29 (equivalent) 1/125th. ISO 200. White balance - AUTO. YS30 on FULL.

increased by 1.5 times. For example, a 20mm becomes a 30mm and a 105mm becomes a 160mm. While this does not render lenses obsolete it does

change their characteristics.

The only dramatic transformation is the 16mm fisheye, because so much of its huge coverage is in the corners

of the image, which are outside the CCD. The lens is still wide, but more like 100 degrees than 180. However, the lens also loses much of its fisheye distortion and even in the square sided pool it can be hard spot it is not rectilinear. My 17-35mm becomes a wide/standard zoom of 25-53mm, but with fantastic close focus. My 60mm macro lens is now a 90mm capable of a bit over 1:1. Excellent!

Interestingly, Nikon have just announced a 12-24mm lens, specifically designed for the D1 and D100 cameras that is the equivalent of an 18-36mm. I have not tried this lens, but it will be a serious investment in the system for anyone who buys it, since the lens is not fully compatible with 35mm SLRs.

On a positive note the smaller CCD size actually means that you get better optical quality from your lenses because the CCD uses only the best glass in the centre of the optic, thus reducing vignetting and chromatic aberration and increasing corner sharpness.

TTL Troubles and Flashy Thinking

The D100 has a built in flash, which is not particularly helpful in the housing. Furthermore, the D100 (and D1 series) are not capable of traditional Nikon TTL flash metering. Therefore, they will not TTL with traditional Nikon compatible underwater flashes. Traditional TTL flash metering monitors the light from the flash reflecting off the film while the shutter is open and quenches the gun once enough light has been supplied. CCDs are not as reflective as film so this doesn't



weed+sun.jpg - I am pleased with how the D100 handles light rays, which is something that other digital cameras have struggled with. I imagine much of this different comes from the better optics available on the F mount. D100 + 16mm. Subal D10. No flash. Aperture priority. f6.3 1/320th. ISO 400. White balance - auto.



kimmerage_uwp.jpg - Domeports and wide angle lenses let digital cameras take decent split levels for the first time. With the narrower lens coverage of the fisheye with the D100 notice how much less distortion there is in this image compared with a 35mm fisheye shot. D100 +

work on the D1 and D100. Most interestingly Fuji have solved this problem with the S2 and can manage traditional Nikon TTL. Nikon digitals cannot!

Nikon's solution is D-TTL. And three new flashguns for us to buy: the SB-28DX, SB-50DX and SB-80DX. D-TTL monitors the light from the subject through the lens using pre-flashes in the imperceptible microseconds after the kill button is pressed but before the shutter opens. If the subject's reflectivity changes while the shutter is open the camera cannot adjust and the exposure is wrong. Which is potentially problematic for moving subjects and rear curtain flash.

In addition to housing a D-TTL gun, a number of underwater strobe manufacturer's are busy introducing digital TTL guns for us to consider.

But at this stage, I would strongly advise checking how uw digital strobes really deliver "TTL" with your system before parting with the hard earned.

Of course, manual flash works fine. With instant image review it is very easy indeed to either adjust the aperture or the flash power to fine-tune the exposure. (The camera would make a fantastic teaching aid for flash exposure on photo-courses.) However, I don't want to be messing about with manual flash when the whale shark swims by or the pygmy seahorses are mating. TTL is a tool we have come to expect.

The slowest ISO sensitivity of the D100 is equivalent of 200 ISO/ASA. Presumably more light (slower speeds) does not give a significant increase in performance from the CCD? For anyone used to soaking light into Velvia, the 2+

stops are a big difference. At ISO 200 in a reflective pool, using just a single Sea and Sea YS30 on full power, I produced correct exposures at typical shooting distances at f16 with a 17-35mm and an equivalent of f47 with a 60mm macro at 1:1. Flash exposure has a maximum synch speed of 1/180th.

Balancing act

For my money, white balance control is the most attractive reason to take digital cameras underwater. With daylight balanced film if we photograph a white diving slate above the water it is white. As we go down the water column it will photograph bluer and bluer. This is caused by the change in the light spectrum illuminating the slate (the slate doesn't change colour!). When we go underwater we see more colours than our film can record. Our brain knows the slate is white and recalibrates the colour spectrum accordingly, restoring some of the real colour. In other words, our brain is controlling the white balance of the image. In a similar way a digital camera can control the colour spectrum that the CCD senses and give us white light away from the surface.

The D100 has 7 standard white balance settings, but unsurprisingly there isn't one for "coral reef at 5 metres". However, the camera does have a user-controlled setting, which can be tuned to the in situ light spectrum by calibrating the camera with a grey card. Once you have learned the safe route through the Nikon menu maze, this is very simple.

This doesn't mean you can swim to any depth, whip out the

grey card and have daylight on tap. Colour correction filters will still be required on the lens to get the spectrum into the ballpark. Then the white balance correction can fine-tune this rough calibration back to daylight. In the pool, under tungsten lighting this system works very well. It is one of my main projects for this year to get this working in the sea. And I will report on my progress in UWP.

One of the D100's best features for underwater photography is that it offers white balance bracketing. When switched on this means the camera takes extra images either side (in colour spectrum terms) of the calibrated white balance. But the camera is smarter still, because you only have to press the shutter once and the camera will calculate all three output files from that single exposure!

Verdict

The six million pixel, sorry, dollar question remains: does the D100 produce large enough files to be a replacement for film? Has the future arrived? Well the answer to this question depends on what you want to use your images for. For on screen viewing, projection and home printing - yes. For large reproduction in books and fine-art A3 prints - not quite. For magazine publishing - mostly. But the final decision for magazine image use will be the art editors (who always seem to want 50Mb scans to use as thumbnails!).

In two current UK diving magazines I counted up the underwater images used in features and less

than 5% were equal to or above the D100 output at 300dpi. So in theory you could take 95% of the magazine's images with this camera! But will the art editors let you?

The D100 is a fantastic camera for underwater photography and can simply do things that film cannot. It can take several hundred pictures on a dive, it can let shoot the colours your eyes see, you can alter film speed and shoot is close to darkness, and you can check your results as you go along. But the D100 is not a replacement for 35mm because the final image is still no match for a slide. It is best considered on its strengths not its weaknesses. At this stage the D100 is not a replacement for film, it should be thought of as an alternative or better still companion. A camera which has a completely different set of skills. The future hasn't arrived with the D100, but it is firmly in sight.

Alexander Mustard

**Further reading on the D100 available as eBooks:
Thom Hogan's Complete Guide to the Nikon D100.**

<http://www.bythom.com/d100guide.htm>

Cardinal and Peterson's The D100 and D1 Generation Update.

<http://www.moose395.net>

