

Choosing and Using Underwater Strobes with Digital Cameras - Redux



A School of Digital Strobes This group of versatile strobes feature sophisticated electronics that let them work in concert with viewfinder digitals, digital SLR's or film cameras.

When a bunch of us were first playing around with shooting digital cameras underwater and discussing our experiences on the internet, it quickly became obvious that all of us were running into the same road block – how to use a strobe. Just about everyone that I know tried to use a normal slave strobe, only to discover that most digital cameras fire a pre-flash that causes the slave strobe to fire before the shutter is actually open. In my first version of this essay I focused on one strobe in particular that had found a way to solve this problem and detailed the design features of two strobes yet to be released. Three years have seen a lot of changes in cameras, in the housings for the cameras, and in the strobes available for use with them.

What's Out There

The Sea & Sea YS-90DX was first on the scene, and remains a benchmark. Shortly after the YS-90DX hit the market, Ikelite introduced the DS-50 and DS-125 strobes along with their TTL capable DS Slave Sensor and 10 step manual EV Controller. Recently, a new player has entered the game (at least recently on the

American scene). INON, a Japanese company, has begun U.S. distribution of their strobes, which all have digital capability. The Z-220, Z-220S and the D-180 have been on the Japanese market for years. Sea & Sea is also introducing the YS-90Auto, which has an optical sensor built into the head of the strobe which calculates proper exposure based on the aperture of the camera. The INON D-180 introduced this system - more on how well it works later. Epoque and Sea & Sea also offer small digital slave strobes. While these tiny strobes which use two AA batteries offer an attractive sized package for the traveling photographer, and their price appeals as well, my opinion is that they lack the power to do anything except frustrate the beginner and annoy the experienced shooter.

For this article, I took the Ikelite DS-125 and DS-50, the INON D-180 and Z-220, and the Sea & Sea YS-90DX to the island of Bonaire for two weeks of intensive testing. The YS-90Auto wasn't available at the time I started my testing, but its features are very similar to the YS-90DX.



Octopus Shot with the D-180 in Auto Exposure Mode.

In his *The Nikonos Handbook*, Jim Church outlined his method of using a flash meter to measure the power of a strobe. Jim suggested that you set the meter's ISO setting to half of what you actually use, thereby compensating for shooting underwater. For the test strobes, I set it to ISO 50. He said to set the meter's shutter speed setting to 1/500 to eliminate the effect of ambient light in the room. It was brought to my attention that this could truncate some strobes' flash cycle, so I tested each strobe at speeds of 1/60 through 1/500. I set the strobes exactly 4 feet from the meter, which according to Jim will give you an accurate reading for three apparent feet underwater. The results are in the table above right. The readings are given in the third stop readings found in Olympus and other digital cameras. These readings are a bit misleading, however, because they do not address the angle of coverage of the strobes. While the DS-50 delivers as much light as the DS-125, it is to a smaller area. Unfortunately, I did not have the equipment to measure the light at several points. What I did to take a look at the spread was to fire the strobes in pairs while aimed at a large piece of grey car trunk carpet. The carpet absorbed the light nicely, and gives us a picture of the spread. The strobes were 32 inches apart and 2 feet from the

<i>Strobe/Speed</i>	1/60	1/125	1/250	1/500
Z-220	f11	f11	f10	f9
DS-125	f10	f10	f10	f7.1
DS-50	f10	f10	f10	f10
YS-90DX	f8	f8	f8	f7.1
D-180	f6.3	f6.3	f6.3	f6.3

carpet. For each strobe tested, you can see how it looks against the competition. One note on comparing the photos. The DS-125 has a significantly warmer color temperature. The cooler lights will appear brighter in a comparison like this, when the DS-125 is actually delivering as much or more light.

One more comment before we get down to it. After I moved from the C-4040 to the C-5050, I discovered that one of my favorite new features was the "Slave" setting of the camera's flash. In this mode, the camera fires no pre-flash, and then fires a small (adjustable) blip of a flash to trigger a slave strobe. Slave mode offers three unique advantages. 1) Super Macro mode does not cancel the flash when it is set to "Slave", as it does in the normal mode. 2) the delay between pressing the shutter and actually taking the picture is greatly reduced. 3) Battery life in the camera is increased by minimizing the power consumed by the flash unit. The pre-flash brings nothing to the party when shooting in manual camera mode with manual strobe control, so I found the "Slave" setting a great feature – one I would look for when choosing a camera.



Female Longlure Frogfish Taken with the Ikelite DS-125 and the EV Controller. I created the deep shadow by adjusting angle and dialing down the strobe output.

Ikelite DS-125

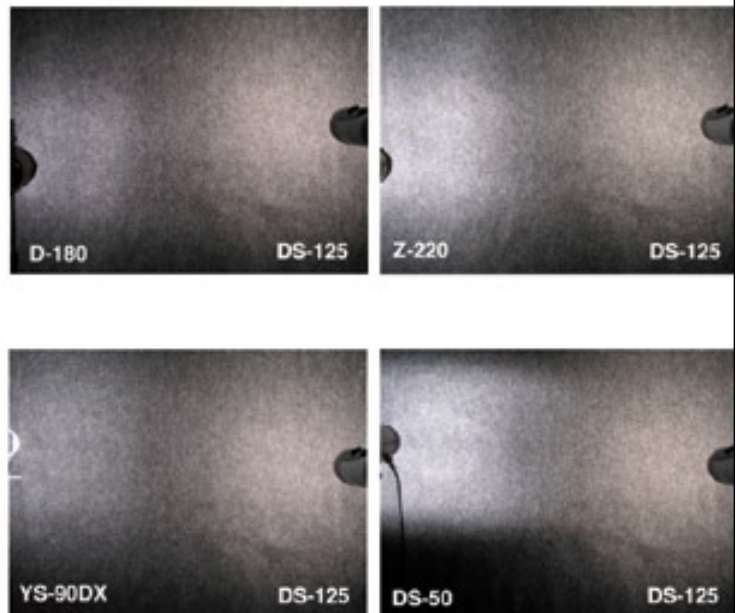
This is the largest and heaviest strobe in the test group. It is also the only one that does not use AA batteries. The proprietary power pack serves up several dives' worth of flashes per charge. The downside is that you'll have to carry the charger unit and if you're planning a lot of dives, possibly a spare battery. The DS-125 has a very nice modeling light, powerful enough to serve as a primary dive light for night dives. To use the DS-125 with the PT-015 housing (or any housing that does not have a hard wired connection), you will need either the Ikelite DS Slave Sensor or the Ikelite EV Controller. The first mimics the pre-flash, flash and quench of the camera's built-in flash. The EV controller reads the camera flash and offers a 10 step manual control dial. Both controllers attach to the sync cord connection of the strobe, and then must be aimed at the camera's internal flash.

In the chart on page 2, you'll notice that at shutter speeds higher than 1/250, the shutter will close before the strobe has completed its cycle. If you need it all, be sure to stay at 1/250 or slower.

I used the strobe and controllers with Ultralight Control System's triple clamp and a mounting arm that ULCS has built specifically for the Ikelite sensors. Ikelite has released an arm accessory for their tray systems that allows the sensors to remain stationary when adjustments are made to the strobe arms. I would have welcomed this feature. I adjust my strobes for every



Ikelite DS-125



shot, sometimes several times on a single subject. The aim of the sensor was another detail to deal with that I would have preferred to avoid.

In using the DS-125 with the EV controller, I was able to quickly zero in on a correct exposure with a couple of shoot-review-adjust cycles. I set the EV controller to "No Pre-Flash" and the C-5050 to "Slave".

When used with a hard-wired connection, like many of Ikelite's housings offer, the EV controller can be used in-line, turning the simple trigger command into a start-stop signal, based on the output level you have selected. This is a great feature if you have the connection available.

I was less enthusiastic about using the DS-125 with the DS Slave Sensor. Exposures ranged from perfect to radically under-exposed, with no apparent rhyme or reason. Two exposures taken just a few moments apart would rarely achieve the same results. In addition, the DS Slave Sensor required the use of the normal pre-flash mode, increasing the shutter lag and rendering the Super Macro mode unusable.

If you're looking for a flexible system, you should know that you can use the strobe's 1/2, 1/4 and 1/8 manual settings when connected to the DS Slave Sensor, giving you TTL and manual controls at the same time. However, given the inaccuracy of the TTL exposures, the extra shutter delay, the loss of SuperMacro mode, the extra task of aiming the sensor and the coarse manual control, the DS-125/DS Slave Sensor was my least favorite strobe in the group.



Ikelite tray and arm system has a fixed post for the controllers (left). With the triple clamp, the aim of the controller is moved with every arm adjustment.

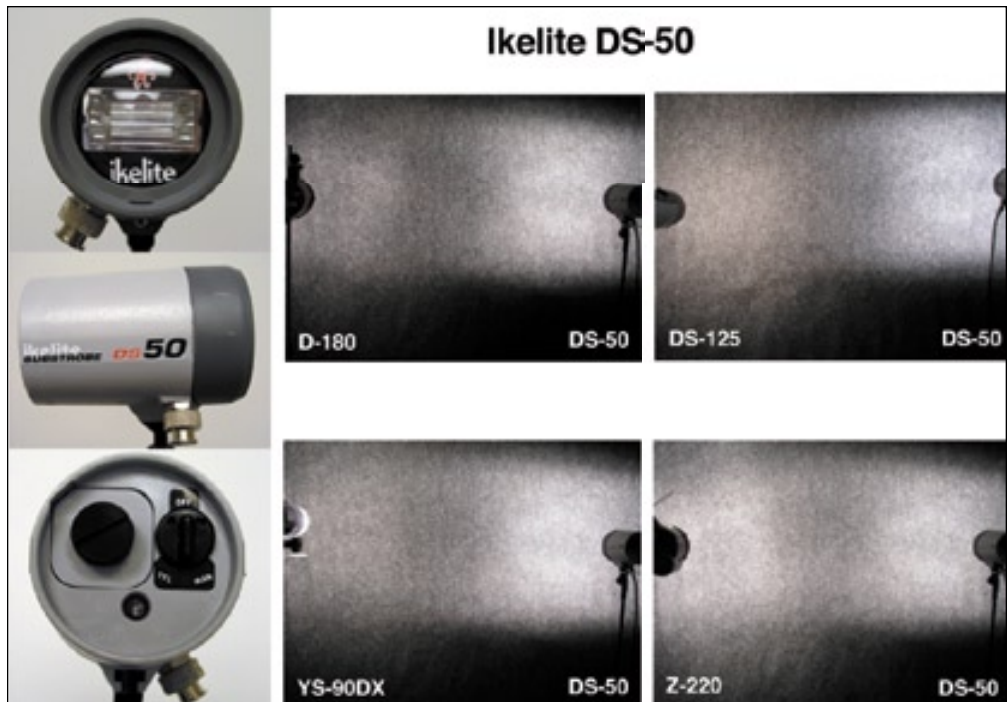
Ikelite DS-50

When I first started shooting underwater, I used a Nikonos V and a pair of Ikelite SS-50's. Whenever I would set up my gear in the company of other shooters, I would often endure snickers generated by my puny little strobes. Those usually ended very quickly after the first few rolls went through the processor. The SS-50 and the new DS-50 are very well suited to my shooting style and my personal taste. A pair of smaller strobes let me play with shadow depth and detail in a way that one large strobe doesn't.

I shot the DS-50 with the DS Slave Sensor on the second day of my trip and thoroughly enjoyed every minute of it. It was like old home week. The DS-50 and DS Slave Sensor perfectly mimicked the camera's flash, yielding very accurate exposures in situations where you might normally expect quenching systems to fail (small subjects with blue water backgrounds and highly reflective subjects, as examples). It was the "Get it right the first time" champion of the test. If you like to "hunt" skittish subjects that won't often allow repeated exposures, this strobe might be for you. It is a size and weight that the traveling diver will appreciate and that feature also makes it a pleasure to use underwater. It has minimal drag and is very easy



Arrow Crab Shot with the DS-50 and DS Sensor



to adjust. You can have minimal clamping pressure on your strobe arm joints and still hold position. If you favor relatively close subjects and you want the camera to control your strobe, the DS-50 will deliver accurate exposures with a quality of light that I thoroughly enjoy. If you want to shoot dual strobes, both will require the DS Slave Sensor, you cannot drive two strobes with one sensor. Why the DS Slave Sensor worked so well with the DS-50 and so inconsistently with the DS-125, I cannot say, I can only say that was my experience over several dives with both strobes.

The DS-50 offers only a full dump in manual mode, making the EV controller a highly recommended accessory for manual shooting. The EV controller works nicely with the DS-50, also bringing back the Slave mode and Super Macro.

When I did the comparison tests, the DS-50 had the most precisely defined light "shape" of any strobe, and it is not necessarily a shape you would want. The edges at the top and bottom of the "window" are very abrupt and the shape is rectangular. The sides are not as sharply defined as the top and bottom. It was quite surprising to see this physically small strobe deliver the same amount of light as the DS-125 – albeit to a much smaller spot. You can see in the comparison shots, the DS-50 delivers its light to one small area. The power of this small strobe permits the use of the supplied diffuser to soften the hard edges. I shot it with the diffuser in place, and did not notice in my shots the significant drop-off seen in the test shots.

INON D-180

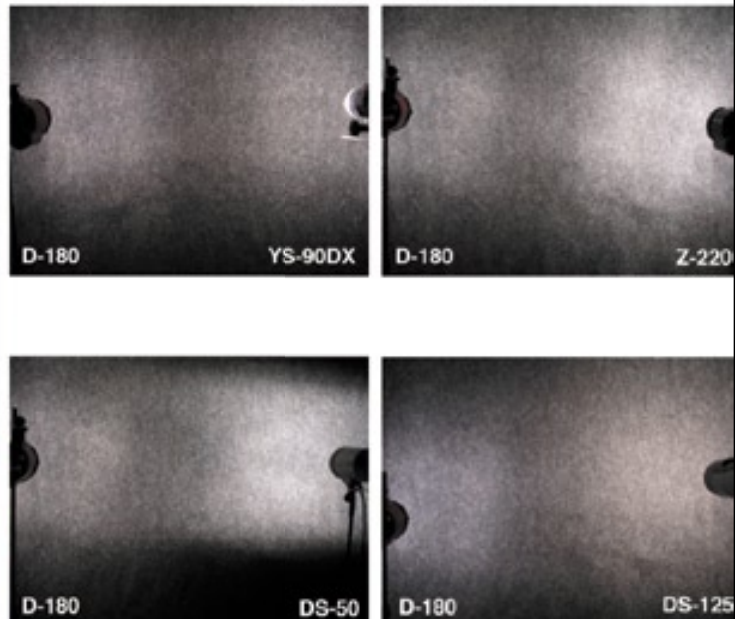
This is a very slick package for the PT-015, earlier PT housings, and other OEM housings from Olympus, Canon and Sony. The D-180 can be used with either pre-flash or non-pre-flash cameras. It comes configured for pre-flash systems. Unlike other systems that ignore the pre-flash, the INON Advanced Cancel System fires a pre-flash that is 22 times brighter than the camera's pre-flash. This convinces the camera to fire only a small flash. It has no effect on the exposure, but it makes your batteries last a lot longer and gets you ready for the next shot a lot faster. Dropping the supplied little magnet in a recess in the strobe body and securing it with a screw makes it ready to go with the C-5050's "Slave" mode or other non-pre-flash cameras. This is the preferred method, if it is available to you. But, if you are shooting a camera where the pre-flash can't be eliminated, the Advanced Cancel Circuit works very well. However, if you're shooting in Program mode (or whatever your camera calls full auto), I would test this system carefully. In full manual, it should have the desired effect, but that much extra pre-flash might cause P mode to do something unexpected. Unfortunately, I didn't think to test this. It was pointed out after initial publication of the article.

It's the least powerful strobe in the group, but consider: when metered, at a distance of 3 apparent feet (4 measured), it calls for an aperture of 6.3, right near the sweet spot of the C-5050. You certainly won't be lacking for power in most circumstances. It also occurred to me during the testing that I rarely shoot from 4 feet away, I'm usually much closer. Unless you are shooting an ultra wide-angle conversion lens, the D-180 has plenty of power.

The D-180 has an "Auto" mode that estimates the amount of light needed by the camera based on setting a dial on the back of the strobe to the aperture of the camera. It is based on an ISO setting of 100, but if you are shooting at a different ISO, just adjust a stop or two up or down, as needed. Having the sensor in the



INON D-180



head of the strobe presents a few problems, particularly for someone like me that fiddles with strobe position and distance constantly. When the strobe is at approximately the same angle to and distance from the subject as the camera, it works quite well. However, I just described exactly the reason you want an external strobe in the first place, that is, to get the light off the same plane as the camera and at a different angle to the subject. Still, I found the Auto mode to be very accurate -- much more effective than I envisioned it would be. When it struggled because the strobe was much closer than the camera or at a weird angle, it was easy to correct by telling the strobe I was at a different aperture than I actually used. Since I have spent the last couple of years shooting the YS-90DX, I fumbled a bit with the aperture dial, since "more light" was



French Angelfish Shot with the D-180 in Auto Mode.



Four Eye Butterfly and Sea Horse Shot with the D-180 in Auto Mode. No second chances on a shot like this. The butterfly was just cruising through, at high speed. Slave mode and the D-180 made it work.

exactly opposite the direction I would have turned the YS-90DX dial. This won't be an issue if you're not switching from one strobe to another. When the "Auto" mode simply won't work (sometimes I have the strobe much closer than the camera), the D-180 has 4 manual level settings, **Full**, **1/2**, **1/4**, and **1/8**.

The D-180 has a built in focus light, which can be switched to either burn for 8 seconds or locked on. The focus light shuts off the instant the strobe fires and comes back on immediately after. Even at low shutter speeds, you won't get a hot spot in your shots. Unlike

the powerful light of the Ikelite DS-125, the focus light of the D-180 is inadequate as a primary light for night diving. It is there mostly to aid you in aiming the strobe and to give the camera a bit of help in finding focus at dusk and in the shade of reef structures. It is a great feature, and one to which I quickly became accustomed.

All INON strobes feature two flash tubes, one oriented horizontally and one vertically. This makes for a "rounder" shape to the light pattern and softens shadows, particularly when working close.

Another nifty feature of all INON strobes is the INON Clear Photo System for masking the camera's flash. The INON fiber optic cable package comes with a set of pre-cut tapes and some film. The film blocks all visible-spectrum light but transmits infrared light, which is what the slave eyes read. Place a piece of the film over the camera's built-in flash and the flash is blocked, but the strobe will still get the signal to fire. The mask handled being removed and reattached several times -- I used the D-180 and Z-220 frequently and made it the entire two weeks with one mask set. The fiber optic cable itself is nicely designed, as well. On the camera end, it has a clamp that attaches to the housing's diffuser. The fiber optic cable is inserted into the clamp and locked. It is a very secure fitting. The clamp comes set up for dual strobe mounting, too, a feature I am dying to try. The strobe end features a sturdy plastic collar that threads onto the slave sensor on the bottom of the strobe.



INON Details Left Top: Cable attachment to housing diffuser. Left Bottom: Film mask blocks visible light, but passes IR. Right: Secure connection to strobe.

INON Z-220

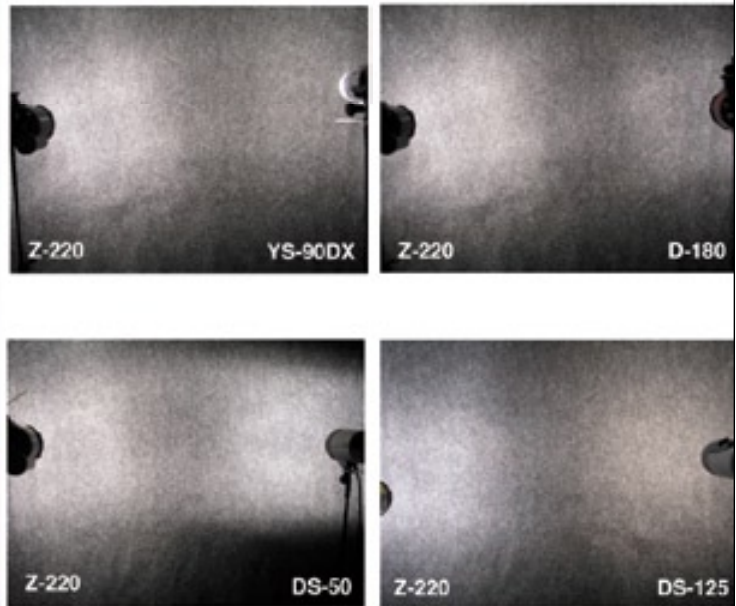
The big brother of the D-180 has a different feature set, more power, and two versions. The two versions are the Z-220 and the Z-220S. The normal model has a focus light and laser aiming light that work brilliantly with some hard-wired systems, but not at all with others and only work with slave fired systems if you rely on the slave sensor without the fiber optic cable. A little research is called for before choosing the Z-220. Make sure it works with your system before you buy it.

If the zoomy features won't work, opt for the Z-220S, which eliminates the focus and laser aiming light, but retains the power and flexibility.

The Z-220 (either one) delivers more power than the Ikelite DS-125 in a much more compact package. It has no automatic mode (unless attached to a hard-wired TTL camera like the Fuji S-2 or Nikon 99X or 5X00). It has a very nice ten position manual control that allows the same fine adjustment delivered by the Ikelite EV Controller, without having the extra hardware. In this, it is very similar to the Sea & Sea YS-90DX, only with more power and a better system of attaching the fiber optic cable. If hard-wired, the Z-220 uses Sea & Sea cables, found just about everywhere. Like all manual control systems, the shooting cycle begins with a guess – “How much light do I need?” Once you have selected a power level, based on the scene, the ambient light, and the aperture selected, take the shot. Upon review, you can decide if your lighting was correct, over or under exposed. Then adjust the strobe output and shoot again. The cycle goes “Guess/Shoot/Review/Adjust/Shoot” until you get it right.



INON Z-220



Notice in the chart on page 2 that shutter speeds faster than 1/250 truncate the strobe cycle. Keep it open longer if you need all the light available.

If you are shooting a d-SLR or one of Light & Motion's Tetra or Titan housings, the Z-220 should make your short list. For the OEM housing market, if you want all the power you can get in a compact package, this strobe is for you. Personally, I would sacrifice the extra power for the better feature set of the D-180.



Goldentail Moray Shot with the INON Z-220.

Sea & Sea YS-90DX

The first manufacturer to successfully address the issue of digital camera pre-flash was Sea & Sea with their YS-90DX. It is a modification of their YS-90, adding slave circuitry that ignores the pre-flash and fires on the main flash. It has a dial that allows fine adjustment of the strobe output. Three years after its introduction, all of those features are available in one form or another on all the strobes in this article, but when the YS-90DX was introduced, it was revolutionary. Even with the new competition, the YS-90DX remains a very viable option. The controls are easy to understand and clearly laid out, but a bit small, particularly for those of you who shoot in cold water with gloves.

Notice in the chart on page 2 that shutter speeds faster than 1/250 truncate the strobe cycle. Keep it open longer if you need all the light you can get.

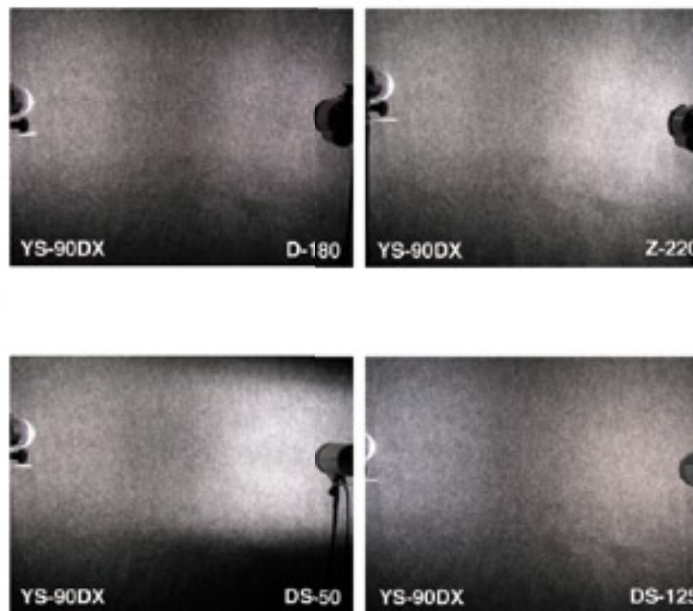
Like the INON Z-220, the YS-90DX has the flexibility to be connected by fiber optic cable, slaved or hard-wired. This makes either one a good choice if you think you might be changing systems sometime in the future,



Sailfin Blenny (above) and **Spotted Cleaner Shrimp** (right) Shot with the Sea & Sea YS-90DX.



Sea & Sea YS-90DX

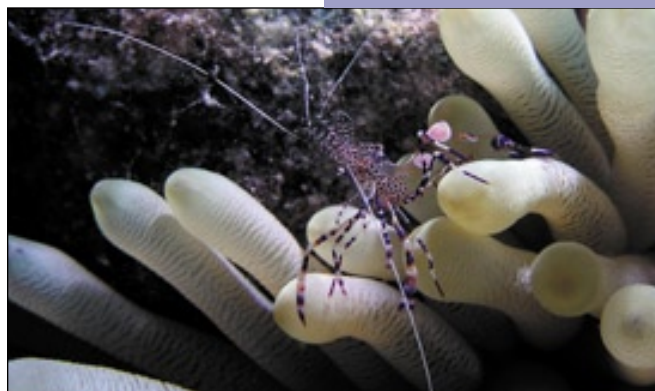


or if you are using both digital and film systems and want to use the strobe for either format.

The fiber optic cable of the YS-90DX is attached to the housing with a Velcro® patch and with a collar similar to a diffuser to the strobe. I have used this system for years, and have had very little trouble with it. Nevertheless, I think Sea & Sea could learn a lesson from INON on how to deal with the wide variety of housings and deliver a secure and positive system.



Sea & Sea fiber optic cable



Conclusions

The good news is all of these strobes work well. The bad news is that makes it hard to choose which to buy.

The INON D-180 impressed me. I really liked the flash masking system and the way the cable attached to the strobe and to the camera. I also liked the fact that I could put the camera into “Slave” mode and still have the strobe give me an “Auto” exposure. It was not as accurate in some situations as the Ikelite DS-50 with the DS Slave Sensor, but I didn’t have to sacrifice Super Macro mode, which I use a lot on tiny critters that allow the camera close. I like the fact that when the quenching system is fooled, there is a back-up plan in the four fractional power settings, though it would be nice to have half stop settings. One downside is that unlike all the other strobes tested, the D-180 is fiber optic trigger only. It does not have a hard-wired connection for use with housings that have that feature. However, if you’re shooting one of the OEM housings and don’t plan on upgrading any time in the near future, I highly recommend this strobe. When I was through testing and started shooting for myself, this is the strobe I reached for, even though it has the least total light.

The DS-50 and the DS Slave Sensor delivered the most accurate automatic exposures of any of the strobes I tested when the strobe was closer to the subject or at an odd angle. It has excellent power (more than others in its price range), will serve the traveling diver well with its small size, and adequately covers fish portraits and close-ups -- the situations where TTL works well. Unfortunately, in those situations where TTL doesn’t work, the DS-50 offers only a full dump. Unlike the D-180, its quenching system requires the camera to be in normal operation (not “Slave”). This takes Super Macro out of the picture and increases the shutter lag.

If you opt for either Ikelite, do not wait until just before a trip to buy them. That’s probably good advice for any gear purchase, but Ikelite has struggled with some quality control issues, and you want plenty of time to test

– repeatedly – any gear before leaving on an expensive dive vacation. I also personally don’t like the extra parts (the EV Controller or DS Slave Sensor) necessary to make the strobes work with viewfinder digitals.

The INON Z-220 packs a lot of power into a small package. It is a bit of a shame that the focus light and aiming laser don’t work with a lot of the systems popular in the USA, but INON has addressed that by offering the Z-220S. If you want to shoot the 130 degree INON wide angle adapter with dome port, a pair of these would complement that lens beautifully. One will cover it, but two would let you get creative.

The YS-90DX represents a touchstone for me. I know exactly what to expect from it, and it rarely disappoints. It delivers a nicely diffuse light pattern over a broad area, but as you can see in the comparison shots, not as much light as some of the others.

I had a ball writing this article. I hope it helps those of you looking for just the right companion for your digital dive buddy. Of course, within days of its publication, this report will be obsolete. INON and Ikelite have both shared the fact that new and exciting variations are on the horizon. Guess I better call Bonaire and schedule the next revision.

Thanks to Ikelite, INON, and Ultralight Control Systems for the equipment provided for the test. I would also like to thank Bruce Bowker and the Carib Inn staff for all their help.



Spotted Moray Shot with the Ikelite DS-125.