Digital Camera Fully Compatible

Highly Accurate Exposure Control "S-TTL"

Digital Camera Fully Compatible, Newly Developed S-TTL System

"S-TTL" enables TTL auto shooting by an external strobe for a digital SLR camera as well as for a point & shoot digital camera.

INON S-TTL auto strobe supports any manufactures' model providing highly accurate exposure control.

Film camera era without strobe selection problem

TTL stands for "Through The Lens" and TTL auto strobe system controls flash amount to provide correct exposure based on calculation by camera's internal sensor metering reflecting strobe light from a subject through the lens. This TTL system meters actual light amount reflecting from a subject providing accurate exposure.

When we start with the history of underwater TTL auto strobe, underwater camera "NIKONOS V" released in 1984 was the first to provide automatic TTL flash control for underwater strobe SB-102, SB-103 succeeded by NIKONOS V compatible underwater strobes form other manufactures. The 5 pin electrical sync connector for NIKONOS V is most popular and widely adopted to connect an underwater strobe and underwater film camera (underwater camera / housing).

A film SLR camera has flexibility to select an underwater strobe. As far as housing has NIKONOS type electrical sync connector and properly wired, automatic TTL flash control is usable with any TTL auto strobe like Nikon SB-105, INON Z-220, Z-22 connected via electrical sync cable.

NIKONOS type 5 pin electrical sync connector and NIKONOS V with INON Z-22 strobe

Film camera compatible strobe is not usable for a digital camera!?

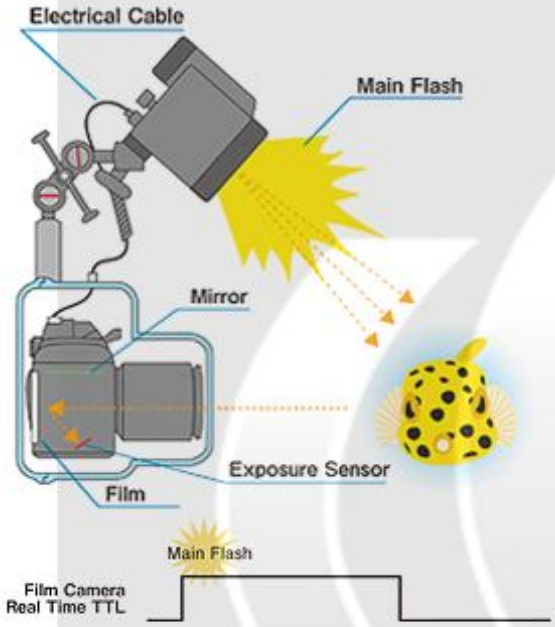
Underwater TTL strobe circumstances have been drastically altered with the spread of digital camera among divers. Some underwater housing for digital SLR camera has NIKONOS type electrical 5 pin sync connector as same as film camera housing. Since the housing has same NIKONOS type sync connector, existing film camera compatible underwater strobe has been considered compatible with a digital SLR camera via 5 pin sync cable but happened to experience error message on the digital camera or blackout on an image even the strobe worked. Why this happened?

This is because automatic TTL strobe system difference between a film camera and a digital camera.

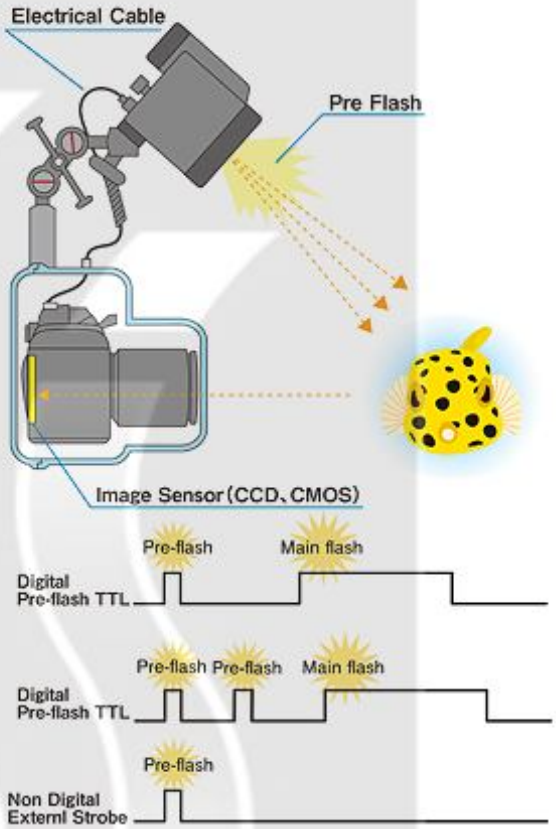
The film TTL auto system makes single flash while digital TTL auto system employs pre-flash type making two to three flashes. Film TTL auto strobe system starts firing at the same time the shutter opens and reflecting strobe light from a subject is recived at a film. The reflecting light on the film is metered by the sensor to determine when to cease firing for correct exposure. This process takes only about 1/1000 second.

In contrast, digital TTL auto strobe system can not calculate adequate exposure based on reflecting light from a subject since image sensor (CCD/CMOS) reflectivity is comparably low comparing to a film. So digital TTL strobe system gives preliminary flash for very short period of time (pre-flash) just before the shutter opens metering reflecting light from a subject by the sensor to calculate necessary amount of light for correct exposure and starts emitting main flash at the same time the shutter opens. Canon E-TTL and Nikon i-TTL employs this system.

When we connect conventional film camera compatible TTL strobe to pre-flash type digital SLR via sync cable, the strobe makes full dump by pre-flash signal then the shutter opens before the strobe has been fully charged resulting in quite under exposed image only with ambient light. Even two time flash compatible strobe like INON Z-220 strobe, does not fully support a digital TTL and force to use Manual flash mode.



Film SLR: A strobe starts firing at the same time the shutter opens and quenches firing when correct exposure has been obtained.



A film compatible TTL strobe connected to a pre-flash type digital SLR via electrical cable flashes does not support TTL auto exposure resulting in synchronization only with first pre-flash or totally uncontrollable.

The birth of digital fully compatible S-TTL

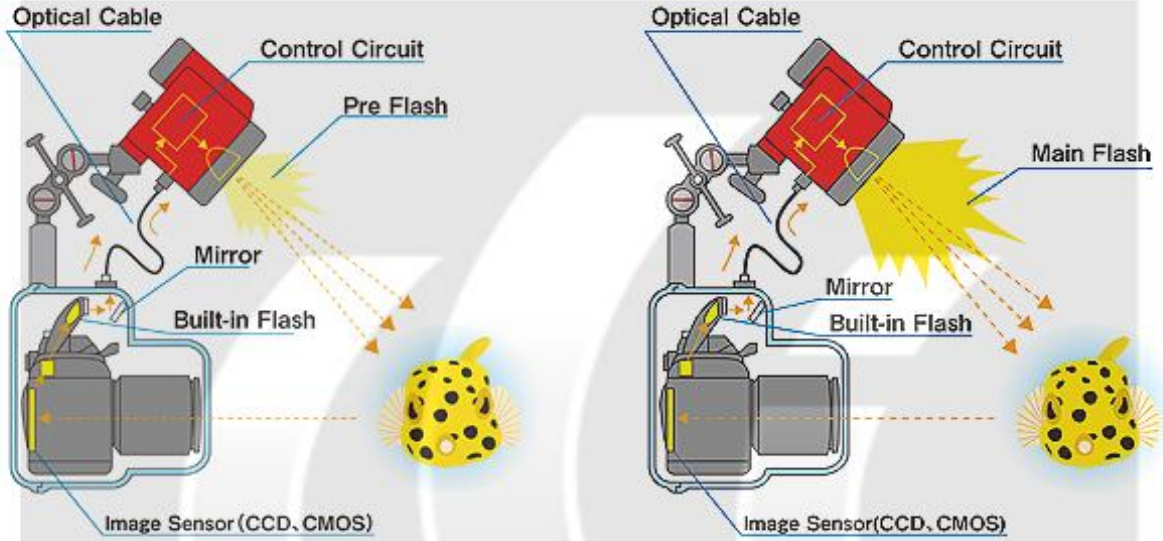
A film camera seems to depend more on photographer's skill, experience and feel since the camera does not allow checking images on site. A digital camera allows us to check images right after shooting and enable to try to shoot again as much as we like. And high capacity memory card further allows to shoot hundreds of images. The digital camera makes entry level of underwater photography getting down and nowadays more people buy a digital SLR camera and underwater housing even they have just started underwater photography. However underwater photography gets more difficult because underwater strobe does not work in TTL auto.

INON is among the first to support digital TTL auto system with "S-TTL" auto mode equipped D-2000 strobe and Z-240 strobe.

The proper name of S-TTL is "Optical Synch TTL". S-TTL enables to perform in TTL auto exposure as same as genuine TTL strobe from camera manufacture, based on camera's built-in flash light to use as a signal to be transmitted to a strobe. S-TTL uses digital camera's built-in flash light not as a light source but as like a controller to trigger S-TTL strobe.

The built-in flash of a digital camera makes weak flash (pre-flash) before main-flash to calculate exposure. This pre-flash is transmitted to S-TTL strobe to control the strobe to make pre-flash to a subject. The reflecting light from the subject goes through the camera's master lens to an image sensor then a processor calculates main flash light amount for correct exposure. Finally the built-in flash makes main-flash which is transmitted to the S-TTL strobe to cause main-flash of the S-TTL strobe.

S-TTL auto compatible INON D-2000 strobe and Z-240 strobe works in TTL auto mode by simply setting their main dial to S-TTL position.



Digital camera's built-in flash lights are transmitted via an optical fiber to the S-TTL strobe to make pre-flash and main-flash instead of the built-in flash.

Highly versatile S-TTL

This S-TTL auto system is compatible with any make, model, shooting mode regardless of a compact digital camera or a digital SLR camera as far as a camera is pre-flash type.

Since S-TTL works based on optical signal, theoretically there is no limitation on number of strobe to use as long as they are connected via optical fibers.

INON S-TTL strobe also supports explosively sold transparent housing among divers with simple and reliable external strobe shooting only by pressing the shutter release button. INON has released number of "Mount Base" and "Optical D Cable Cap Set" products to attach a conversion lens and an optical cable on compact digital cameras continuously released from camera manufactures; Canon, Olympus, Sony, Nikon, Fujifilm, Panasonic, etc. INON now supports more than 50 different camera models and will successively provides compatible products for latest models.

4 x Z-240 strobes connected to INON X-2 housing via optical cables.

INON system has so called Clear Photo Film to stick on built-in flash surface to change visible light to invisible infrared ray to prevent built-in flash light to leak not causing backscatter or exposing suspended particles in an image.

Since S-TTL strobe requires digital camera's built-in flash as control signal, a digital camera without built-in flash like Canon EOS 5D or Nikon D3 can not use S-TTL auto function.

Even a digital camera with built-in flash, S-TTL strobe does not properly work if a housing does not allow the camera to pop-up its built-in flash or does not have structure to transmit built-in flash light to an optical fiber. So it is important to check if S-TTL is usable when you select a camera and an underwater housing.

Clear Photo System

INON S-TTL strobe works for TTL auto shooting with any pre-flash type digital camera system as far as they make flash underwater, you can use same S-TTL strobe even you change your camera/housing. An optical fiber is free to unplug/plug underwater enabling S-TTL strobe to be shared among two cameras. INON S-TTL system would be ideal control technique for underwater strobe with its broad versatility and reliable exposure even for multiple strobe system.

Wide range of Mount Base products and Optical D Cable / Cap Set products support each different digital cameras.

INON S-TTL Supports Fine Exposure Adjustment and Shadow Control in Dual Strobe Configuration

"S-TTL" Auto of INON Z-240, D-2000 series and S-2000 is not just to work out "full automatic strobe shooting" with point and shoot digital camera.

●Flash output can be finely adjusted even though in underwater TTL Auto circumstance for desired exposure depending on preference.

●Three dimensional appearance can be obtained by adjusting flash output balance between both ends strobes to control shadows under dual strobe configuration.

INON S-TTL Auto Strobe enables you to have above unique advantages by simply clicking control dial, which was impossible with existing underwater TTL Auto strobe. INON Z-240/D-2000 series/S-2000 realize your high sensitivity that can not be satisfied with existing underwater TTL Auto strobe.

■INON D-2000 Type4

No.1

Fine and creative flash output tune for desired exposure even in TTL AUTO

Flash output compensation using [EV. Control Switch] in "S-TTL" Auto mode

[Bit brighter] EV.Control Switch: A

[Standard position] EV.Control Switch: B

[Bit dark] EV.Control Switch: C

It will get hard to express one's image with existing underwater TTL auto strobe when a user gains experience of underwater photography. This is because that desired exposure is vary by each photographer's sensitivity and appropriate exposure is also vary depending on shooting condition like subject color etc. "S-TTL" of Z-240 / D-2000 / S-2000 enables fine flash output adjustment of based on desired exposure or appropriate exposure which may vary depending on shooting condition. Manually controllable [EV Control Switch] enables you to select "real" appropriate exposure by simply dialing the switch.

●Sample data

Set D-2000 to "S-TTL Auto Mode" and set [EV Control Switch] to [B] (standard position) position.

Compare different setting of "A" for (Bit brighter), "C" for (Bit dark) and "C-" for (Rather dark), then select "real" appropriate exposure setting.

●Note

Actual exposure may be different from the sample depending on camera / shooting condition /shooting parameters (aperture, distance to subject etc.) though setting [EV Control Switch] to "B".

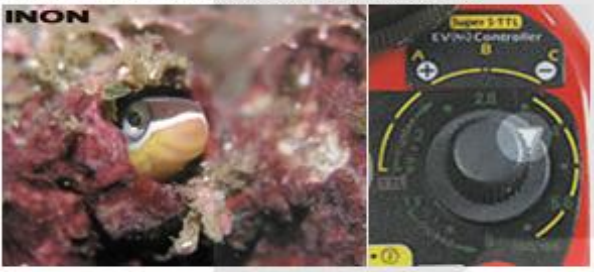
●Equipments

Camera / housing: C-5050Z / PT-015

Strobe: D-2000 x 2 (both strobe set to "S-TTL" Auto)

Attachment lens: UCL-165M67 x2

[Rather dark] EV.Control Switch: C-



●Photo data / subject

Camera setting: f2.6 at 1/1000, ISO=100, Telephoto end, with Macro Mode ON

Subject: Piano blenny (face size: approx.1.5cm / 0.6inch width)

Distance to subject: approx. 5cm/2inch

Location: Fukuura Japan, Photo by R.Hattori

No.2

Accentuate three dimensional appearance with dual strobe

Advanced application of "S-TTL" Auto to control shadow of a subject

Configure another D-2000 Series / D-180 Series / Z-240 as External Auto Operating Strobe

[Flat lighting, bit overexposed]

It was impossible for existing underwater TTL auto strobe to intentionally make asymmentric lighting under dual strobe configuration and only "flat" lighting was available. However, with INON unique technology it is easy to control darkness of shadow by setting Z-240 / D-2000 / S-2000 to "S-TTL Auto" and another D-2000 series, D-180 series or Z-240 to External Auto.

When using D-2000 series x 2 or Z-240 x 2, "S-TTL Auto" side and "External Auto" side can be instantly switched over by dialing control knob enabling you to control not only darkness of shadow but can select which side of a subject you have shadow. The function to control shadow under dual TTL auto strobe used to be only possible with high-end SLR camera system on land.

[Left] "S-TTL" Auto side: EV.Control Switch: B (select position at correct exposure)

[Right] External Auto side: Aperture: f8.0

●Sample Data

Set "S-TTL Auto Mode" in the opposite side ("Left" side in this sample) of D-2000 to shadow side ("Right" side in this sample).

Set base exposure position ("B" in this sample) with [EV. Control Switch].

Set the other D-2000 to "External Auto Mode" and select same aperture value as camera's setting on EV Control Switch (select " f 5.6 " corresponding to camera's setting in this sample).With above setting, base lighting is obtained ([soft shadow] in this case).

Change aperture setting of the D-2000 (as External Auto Strobe) and take shots; "f 8" for [flat lighting, bit overexposed], "f4" for [normal shadow] and "f 2.8" for [dark shadow]

In the case 2 x D-2000 series or 2 x Z-240, you can instantly switch over "S-TTL Auto" side and "Exterbal Auto" to have a shadow on the ohter side of the subject.

[Soft shadow]

●Note

It is necessary to connect underwater housing and each strobe directly by specific "Optical D Cable / Cap Set" and "Optical D Cable" as shown image right.


[Left] "S-TTL" Auto side: EV.Control Switch: B (select position at correct exposure)
[Right] External Auto side: Aperture: f5.6

[Normal shadow]


[Left] "S-TTL" Auto side: EV.Control Switch: B (select position at correct exposure)
[Right] External Auto side: Aperture: f4.0

[Dark shadow]

Standard position of [EV. Control Switch] for appropriate exposure may be differ from position " B" depending on camera, shooting condition or camera setting (such as distance to subject, aperture setting etc.)

External Auto compatible D-2000 series, D-180 series and Z-240 can be used as a second strobe. When using different strobe model as a second strobe, it may be necessary to step down (D-180 series) / step up (Z-240) aperture setting on the strobe over camera's aperture setting since flash system of D-180 series / Z-240 is different from the system of D-2000 series (1st strobe).

It is possible to select Manual mode on the strobe not to be used as "S-TTL" Auto strobe. In this case, total light amount is adequately controlled by the S-TTL operating strobe within "S-TTL" Auto exposure range. Make sure to set Advanced Cancel Circuit to "ON" regardless of using External Auto / Manual.

A camera which allows to fix aperture setting and ISO sensitivity, is desirable to use second strobe in External Auto or Manual.

●Equipments

Camera / housing: C-5050Z / PT-015

Strobe: D-2000 x 2 (one in "S-TTL" Auto mode and the other in External Auto mode)

Attachment lens: UWL-100 Achromat Wide Conversion Lens Type 2 + Dome Lens Unit for UWL-100

●Photo Data / Subject

Camera setting: f 5.6 at 1/1000, ISO100, telephoto end with Macro mode ON

Subject: Cat shark (Length 30cm / 11.8 inch approx.) Distance to subject: 20cm / 7.9 inch approx.

Location: Fukuura, Photo by R. Hattori


[Left] "S-TTL" Auto side: EV.Control Switch: B (select position at correct exposure)
[Right] External Auto side: Aperture: f2.8