

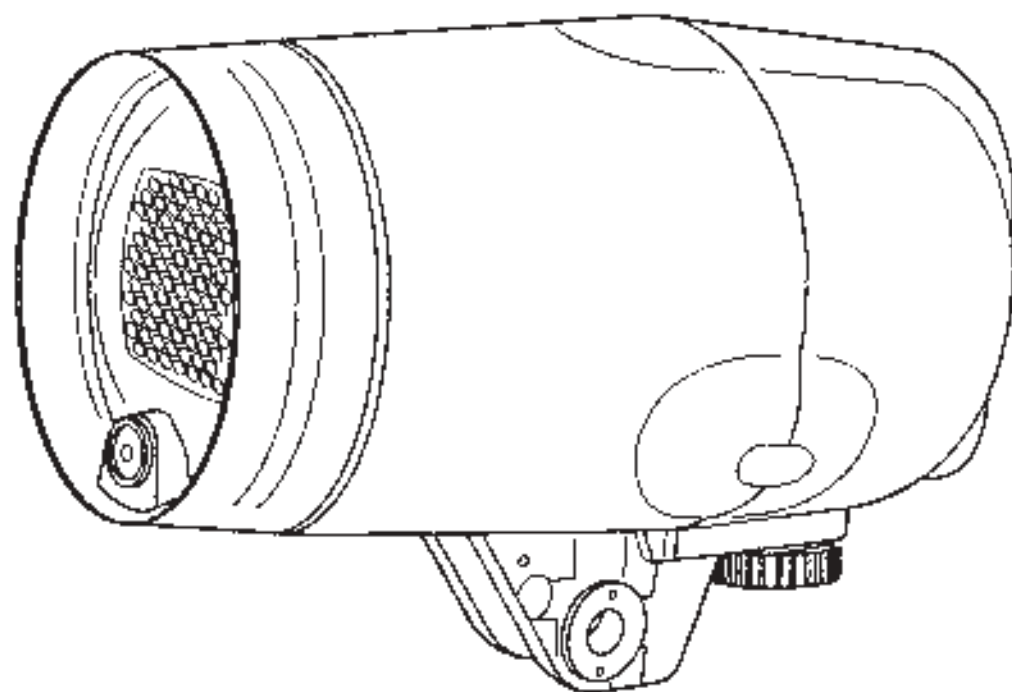
**SEA&SEA**

***UNDERWATER TTL STROBE***

---

# ***YS-90 TTL DUO***

**Instruction Manual**



# ***YS-90 TTL/Duo***

Thank you and congratulations on your purchase of SEA & SEA's YS-90 TTL/Duo Strobe. For proficient operation of all strobe functions and to maximize performance, please read this manual thoroughly before use. Retain for future reference.

## **Table of Contents**

Safety Precautions.....	2
Handling the O-ring.....	3
Identification of Parts .....	5
Before Taking Pictures	
1. How to Install the Batteries.....	6
2. How to Mate Sync Cord with Strobe.....	7
3. How to Mate Sync Cord with Camera.....	7
Taking Pictures	
Operating the Controls.....	9
Exposure Calculation Tables.....	10
About the Cordless TTL System.....	11
The Diffuser .....	12
Maintenance and Storage.....	13
Attaching the Sea Arm Bolt.....	13
Specifications.....	14

# Safety Precautions

- For safe handling of this product, please read the following precautions before use.

Please read the following precautions carefully as they contain highly important information related to personal and product safety. Precautions designated "WARNING!" refer to those situations which could result in serious injury or death. Precautions marked "CAUTION!" refer to those situations or conditions which could result in personal injury or property damage. Please observe all precautions.

## General Precautions for the Care and Operation of the Strobe

### ⚠ WARNING!

- Use only manganese, alkaline, nickel-cadmium or lithium batteries rated 1000mA or less in this unit. Do not use any other type of battery. Doing so may generate a toxic gas.
- Do not fire this strobe with the reflector placed on a table or the floor as that may cause overheating of the internal circuitry and/or fire.
- Do not trigger the flash near combustible materials. It may cause fire.

### ⚠ CAUTION!

- Always make sure that the strobe and accessories are securely mounted to the camera or housing to prevent them from falling off, getting lost, causing personal injury or equipment malfunction.
- Do not attempt to disassemble the strobe. Contact with internal high voltage circuitry can cause personal injury.
- Do not alter or modify the strobe. User modifications can result in flooding or malfunction. User modifications will void the product warranty. If you detect smoke or an acrid odor, discontinue use immediately. Remove the batteries from the strobe. Bring or send to an authorized Sea & Sea dealer for evaluation and repair.
- In the event of flooding, turn off both the strobe and camera or housing and discontinue use. Remove batteries from strobe and camera.
  - \*Beware of increased pressure inside the strobe. Handle with extreme care when opening.
- Do not shortcircuit the connector pins. That may cause equipment malfunction.
- During transportation or when not in use for an extended period of time, remove the batteries to avoid unwanted battery consumption due to accidental activation of the power switch.

- This product incorporates plastic parts. Do not subject this strobe to extreme heat, such as on a car dashboard, or to direct sunlight. Plastic parts are prone to warping.
- SEA & SEA Products Ltd. will not be responsible for unobtained pictures or costs incurred related to the shooting of such pictures due to malfunction of the YS-90 TTL/Duo strobe, housing, camera, strobe, or accessories.
- SEA & SEA Products Ltd. will not be responsible for any damages, repairs, or replacement of the camera, lenses, or accessories used with this strobe due to flooding caused by user mishandling.

## Precautions for Storage of the Strobe

### ⚠ CAUTION!

- When not in use for an extended period of time, remove the batteries; possible battery leakage will cause equipment malfunction.
- Do not store in a damp or humid environment. It can cause mildew or malfunction.
- Do not store in a chemically-laden environment. Naphthalene, camphor, or other strong chemicals can cause mildew, rust, corrosion, and other damage to the metal and rubber components in this product.
- When not in use for a long period of time, periodically attach to the camera and trigger the shutter release (with batteries and without film.) This will exercise the internal parts and keep the strobe in good working condition.

## Handling and Maintenance of the O-ring

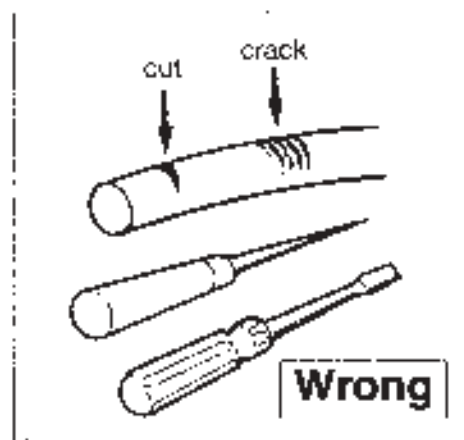
The O-ring on the front case of your YS-90 TTL/Duo strobe provides an airtight waterproof seal. Improper handling of the O-ring can cause flooding. Please observe the following instructions carefully.

### ● Remove the O-ring for inspection.

Before use, check the O-ring, the O-ring channel, and the O-ring contact surface. A thorough examination of the O-ring and the O-ring channel is not possible unless the O-ring has been removed. Never remove the O-ring with a sharp or pointed tool. To avoid damaging the O-ring, use the O-ring Remover, a Sea & Sea tool made specifically for O-ring removal.

### ● Always inspect the O-ring for scratches, cuts, and cracks.

If the O-ring is damaged, it must be replaced.



- **Inspect the O-ring for debris.**

Make sure that there are no foreign particles, such as dust, sand, or hair adhering to the O-ring, O-ring channel, or O-ring contact surface. Such contamination will breach the seal and cause flooding. If necessary, wash the O-ring thoroughly in fresh water and dry with a lint-free cloth. Use a moistened cotton swab to clean the O-ring channel and contact surface. Make sure there is no fiber residue.

- **Lubricate with silicone grease.**

Silicone grease protects the O-ring from drying and abrasion. Dab a small amount of grease onto your finger and draw the O-ring through your fingers until the O-ring is evenly coated. Use the silicone grease sparingly. Too much grease attracts debris.

**⚠ CAUTION!**

Use only the Sea & Sea brand silicone grease in the tube with a BLUE cap. Never use the Sea & Sea silicone grease in a tube with a WHITE cap. Never use any other brands of silicone grease to lubricate the O-ring on your YS-90 TTL/Duo, as they may adversely affect the O-ring sealing capability.

- **Do not crimp the O-ring.**

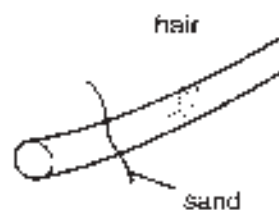
Do not bend or twist the O-ring when fitting it into the O-ring channel.

- **O-ring storage.**

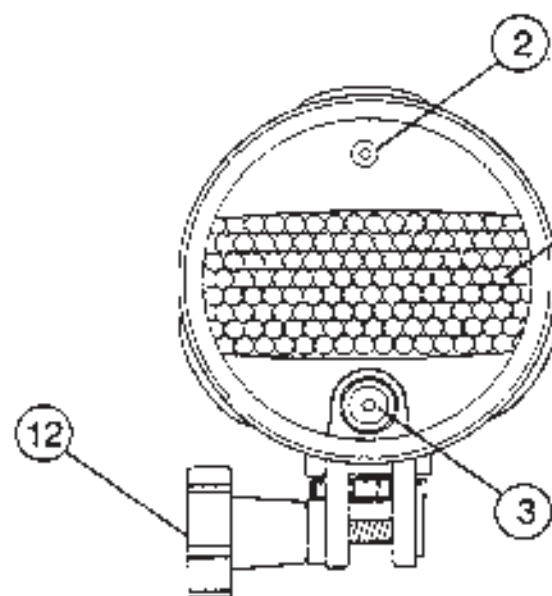
Always store the O-ring in an airtight container and in a cool environment. Keep out of direct sunlight. Make certain it is stored flat is not bent or twisted. Do not place heavy objects on it. Excessive weight will flatten it and impede its sealing capability.

- **The O-ring's life is one year.**

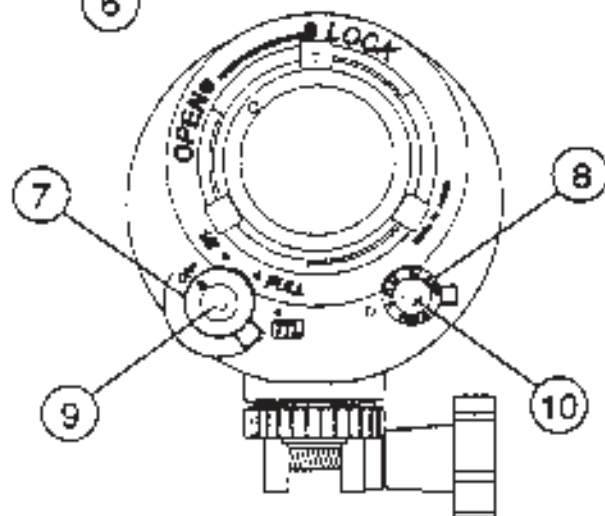
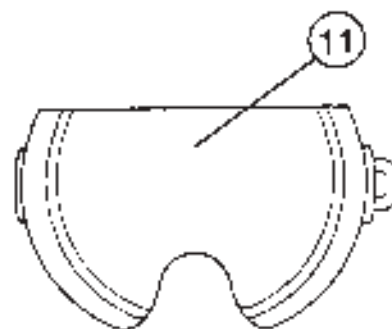
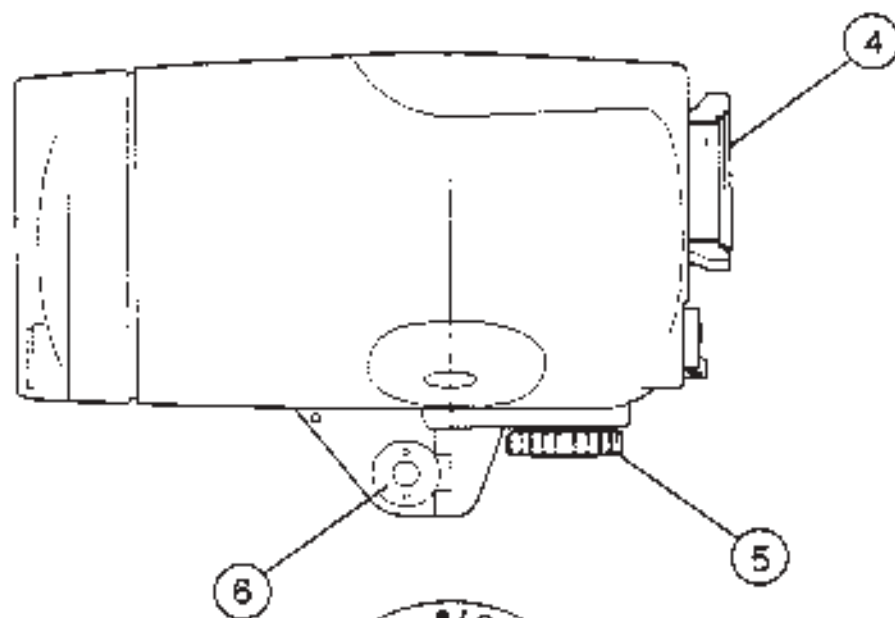
The life of the O-ring depends on the diligence of your maintenance, frequency of use, and storage conditions, but on average, if you maintain your O-ring properly, it will retain its watertight integrity for one year.



# Identification of Parts



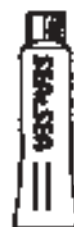
1. Reflector
2. Slave Sensor
3. TTL Slave Sensor
4. Battery Cover
5. Bulkhead Connector/  
Connector Cap
6. Sea Arm Mount
7. Power Switch
8. Slave Mode On/Off Switch
9. Ready Light
10. TTL Confirmation Light
11. Diffuser
12. Sea Arm Bolt



## Accessories



O-ring



Silicone  
grease



4 SUM-3 (AA)  
alkaline  
batteries

# Before Taking Photographs

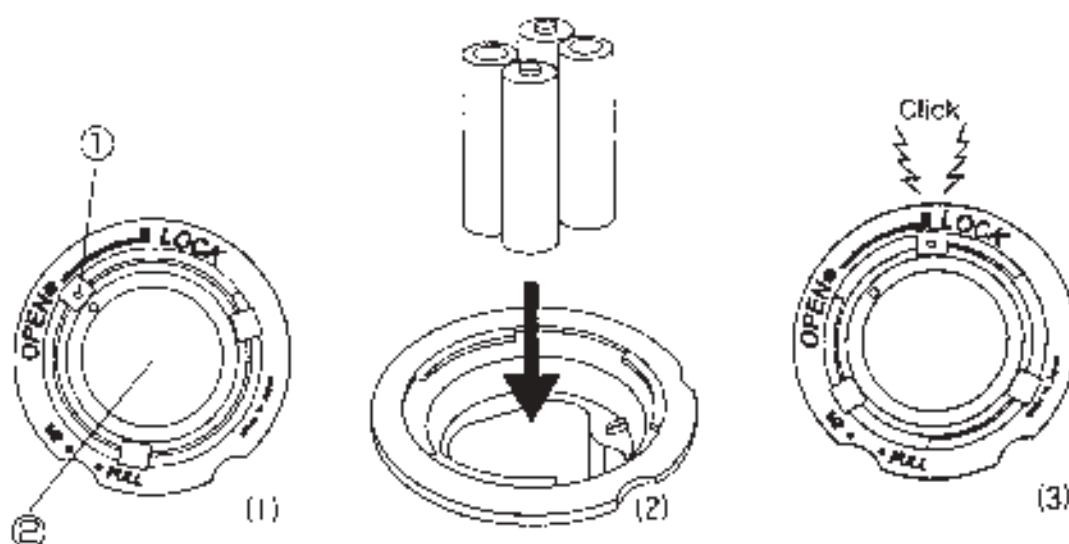
## How to install the Batteries

The YS-90 TTL/Duo is powered by four AA alkaline, nickel-cadmium or lithium batteries.

1. To remove the battery compartment cover, turn part ① counter-clockwise to the OPEN position (Figure 1) and pull the cap ② straight out.
2. Make sure that the power switch is in the OFF position. Insert four batteries with the polarity shown in the battery compartment. (Figure 2)
3. Examine the O-ring for cuts or debris. Lubricate lightly.
4. Fit the battery cover in place, aligning the "O" marks on parts ① and ② with the "O" mark at the OPEN position. Turn part ① to the LOCK position; you will hear it click into place.

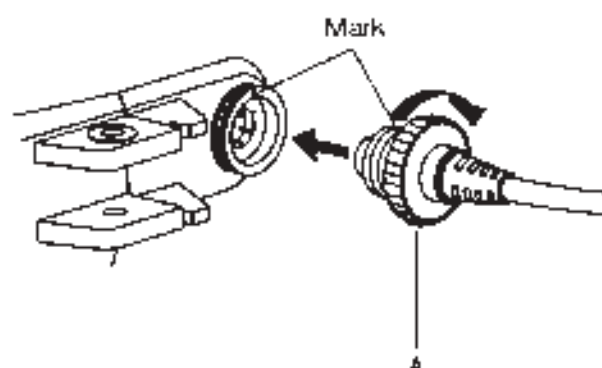
### ⚠ CAUTION!

- Never replace batteries with wet hands.
- Use extreme care not to allow water from your hair or wetsuit to drip into the battery compartment.
- Always replace all four batteries at the same time with fresh batteries of the same kind. Never mix manufacturer's brands.



## How to Mate the Sync Cord with the Strobe

The sync cords are detachable. One connector end mates with the strobe and the other with your camera or housing. **Caution:** When attaching or detaching the sync cord, grasp the connector end, not the cord. Never pull, twist or bend the cord as it may damage the electrical wiring.

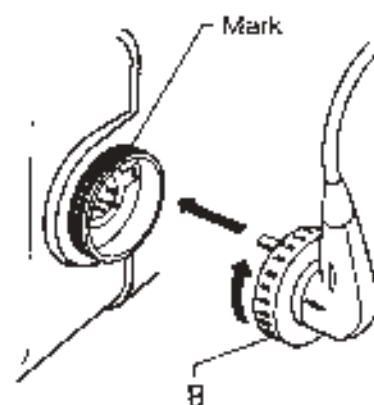


1. Examine the sync cord connector O-ring for cuts or debris. Lubricate the O-ring lightly.
2. Insert the five-pin connector into the strobe's bulkhead connector. Rotate part (A) clockwise till it is secure.
3. To disconnect, turn part (A) counterclockwise, then pull the connector straight out.

## How to Mate the Sync Cord to the Camera

### Four-pin sync cord connector for the Motor Marine II-EX

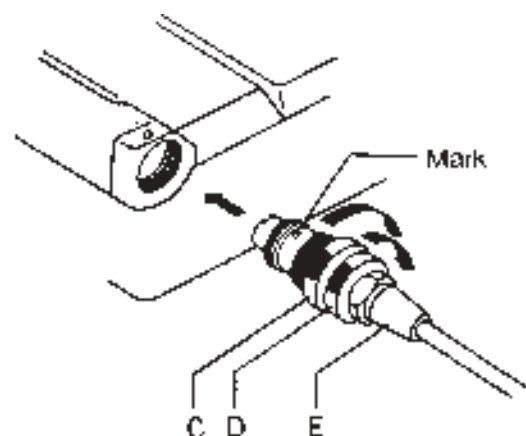
1. Examine the connector O-ring for cuts or debris. Lubricate the O-ring lightly.
2. Insert the four-pin connector into the camera bulkhead connector. Turn the knurled ring (part B) clockwise till tight.
3. To disconnect, turn the knurled ring (part B) counterclockwise till loose and pull straight out.



### Five-pin sync cord connector for the Nikons

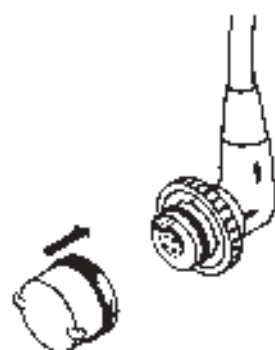
1. Examine the connector O-ring for cuts or debris. Lubricate the O-ring lightly.
2. Turn the large knurled ring (C) counterclockwise until snug against the small ring (D).
3. Insert the five-pin connector into the camera bulkhead connector, aligning the "O" mark on the connector with the "O" mark on the bulkhead connector, as shown.

4. Turn part D clockwise till secure.
5. When connecting to a Nikonos III, turn part C so the it firmly holds the camera to the stay.
6. To disconnect, loosen and release the connector end by reversing the steps 1 through 4 above. Pull the connector straight out.

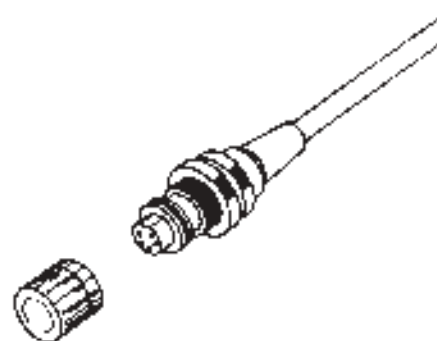


### Note:

- Do not touch the connector's contact pins. Be careful not to get silicone grease on the contact pins. It will impede its function. If grease does accidentally contaminate the pins, clean with alcohol.
- Whenever the sync cord is not attached to the camera and strobe, protect the ends of the connector with their protective caps. Please note that the cap for the end of the connector that attaches to the strobe is different from the end of the connector that attaches to the camera.
- Before rinsing a detached sync cord, be sure to put the connector caps on the exposed ends.



Sync Cord S



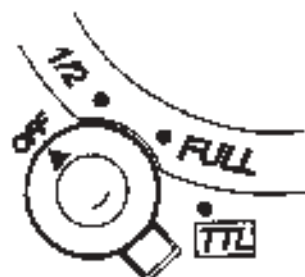
Sync Cord N

## Taking Photographs

The YS-90 TTL/Duo has two controls: the power switch and the slave ON/OFF switch. You can select either manual or TTL with or without a sync cord.

## Operation of the Switches

**<Power Switch>** **<OFF>** The switch position when the strobe is not in use.



**<1/2>** With the power switch in the 1/2 position, the YS-90TTL/Duo operates as a manual strobe, and will emit half the full-powered output (Guide Number 36 ft/11m). Select an appropriate f-stop from the "Manual Exposure Table" on the next page. When the red neon light is illuminated, the flash is ready to fire. Due to the absorption of light under-

water, the underwater guide number is 1/2 the guide number on land. GN 18/5.5 (ft/m) has been used to calculate the f-stops in the table. (The table is for reference only.)

**<FULL>** The FULL position is for manual photography. The strobe will fire a full-powered flash (Guide Number 73 ft/22m). Select an appropriate f-stop from the "Manual Exposure Table" on the next page. When the red neon light is illuminated, the flash is ready to fire. The underwater guide number is 1/2 the guide number on land. Use GN 36/11 (ft/m) to calculate the f-stops in the table. (The table is for reference only.)

**<TTL>** When the power switch is in the TTL position, the TTL automatic mode is activated. In this mode, the strobe automatically measures the brightness of the subject and controls the light output to obtain a correct exposure. With the proper aperture and strobe-to-subject distance (see table on next page), the TTL confirmation lamp (green) will light up for approximately three seconds. If the subject is not within the correct strobe-to-subject range, the strobe will fire at full power and the TTL confirmation lamp will not light up. You will have an overexposure or underexposure. Recheck the distance and the aperture and shoot again.

### **<Slave ON/OFF Switch>**



**<ON>** In this position, the slave function is activated. Set the switch to this position when you want to use the strobe without a sync cord. The strobe will fire when the slave sensor detects light from another strobe.

**<OFF>** In this position the slave function is disabled. Turn the switch to this position when you use this strobe with a sync cord attached or when you use the it as your primary strobe.

**Notes:** If the slave ON/OFF switch is set at the OFF position and no sync cord is attached, the strobe will not fire even if the power switch is set at ON or TTL.

## Calculation of Exposure Value

Aperture = GN/Distance (Since more light will be absorbed underwater, the guide number should be treated as 1/2 of that on land)

\*Film speed ISO 100

Guide number for multi-strobe lighting will be obtained by the following formula

$$\text{Multi-strobe GN} = \sqrt{\text{GN}^2 + \text{GN}^2 + \dots}$$

### TTL Operating Range (reference only)

Aperture	ISO					Distance	
	400	200	100	50	25	m	ft
	5.6	4	2.8			0.7-3.9	2.3-13
	8	5.6	4	2.8		0.5-2.7	1.6-9
	11	8	5.6	4	2.8	0.3-1.9	1-6.3
	16	11	8	5.6	4	0.3-1.3	1-4.3
	22	16	11	8	5.6	0.3-1	1-3.3
		22	16	11	8	0.3-0.6	1-2
			22	16	11	0.3-0.5	1-1.6
UNDERWATER EXPOSURE TABLE							

\*You may have to further adjust from the above reference table depending on the reflectivity of the subject, the underwater conditions, visibility etc.

### Manual Exposure Calculation Table (reference only)

Calculated at Guide Number 11 (1/2 of FULL guide number)

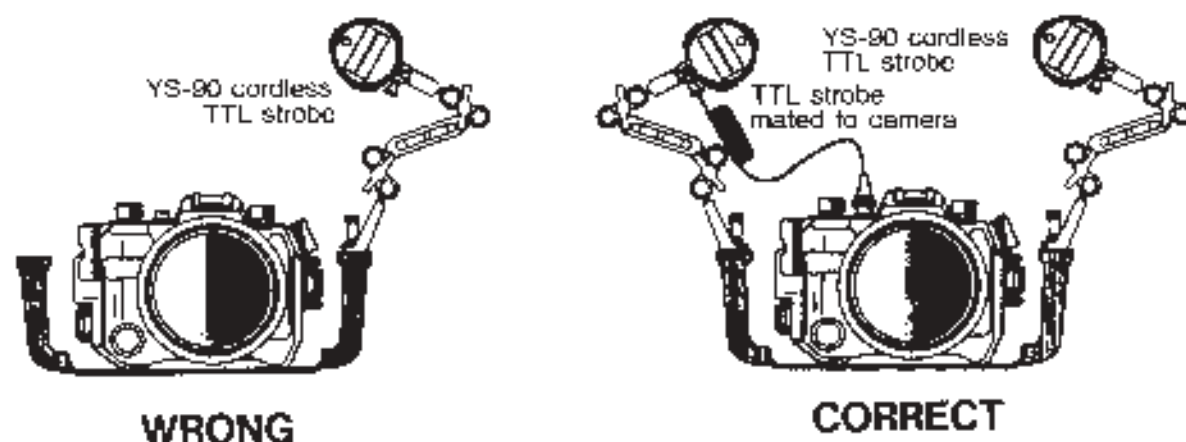
Distance(m)		ISO					Distance(ft)	
FULL	1/2	25	50	100	200	400	FULL	1/2
0.2		22					0.6	
0.3		16	22				1	
0.5	0.2	11	16	22			1.6	0.8
0.6	0.3	8	11	16	22		2	1
1	0.5	5.6	8	11	16	22	3.3	1.6
1.3	0.6	4	5.6	8	11	16	4.3	2
1.9	1	2.8	4	5.6	8	11	6.3	3.3
2.7	1.3		2.8	4	5.6	8	9	4.3
3.9	1.9			2.8	4	5.6	13	6.3
Aperture								

\*You may have to further adjust from the above reference table depending on subject reflectivity, underwater conditions, visibility etc.

# About Cordless TTL Photography

## What is a cordless TTL system?

In dual strobe photography, the YS-90TTL/Duo operates as a second TTL strobe when a prime strobe in TTL mode is mated to the camera. It is capable of automatic TTL operation without a sync cord. To activate the YS-90's TTL system, turn the power switch to TTL and the slave ON/OFF switch to ON. When you trigger the camera shutter, the master strobe fires, triggering the YS-90 in TTL slave mode. The TTL circuitry within the camera limits the light from the master strobe, which in turn limits the light from the YS-90, thus yielding a correct exposure.



### Note for using YS-90TTL/Duo as a cordless TTL strobe.

1. To use the YS-90TTL/Duo as a cordless strobe, you need another TTL strobe connected to the camera. The YS-90TTL/Duo operates only as an auxiliary strobe and cannot perform cordless TTL photography alone.
2. Please observe the distance ranges shown in the TTL range table in this manual. Correct exposures cannot be achieved if the subject is out of range.
3. The master strobe's guide number must be equal to or higher than the YS-90's.

# The Diffuser

## How to Use the Diffuser

- This diffuser reduces the guide number of the YS-90 TTL/Duo to 53/16 (ft/m) on land (ISO 100, full flash) and 24/8 (ft/m) underwater (ISO 100, full flash). For a proper exposure, open up the aperture by one f-stop when using the diffuser.
- Consider water conditions, time of day, ambient light, visibility, etc. and adjust the f-stop if necessary.
- Always rinse the diffuser with fresh water after use.
- Dry with a soft, clean cloth after rinsing.
- Do not subject this diffuser to extreme heat, such as on a car dashboard, or in direct sunlight.

## How to Attach and Detach the Diffuser

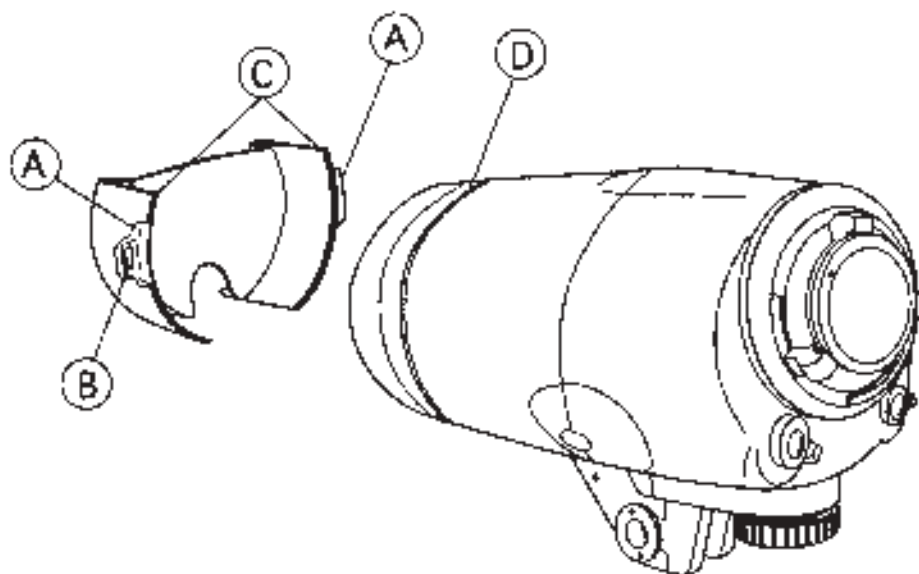
1. Hold part A between your fingertips and press onto the front of the strobe. The two plastic rims (part C) must fit snugly into the groove (part D).

### Caution!

Always make sure that the rims are fitted securely into the groove. The diffuser may come off and be lost or damaged if it is not securely mounted.

2. To detach the diffuser, hold part (A) between your fingertips and pull the rim (C) off the groove (D) at one side, then the other.

\*To prevent loss of the diffuser, should it come loose from the strobe, thread a tie through the hole (B) and attach to the sea arm or sea arm bolt.



## Specifications with Diffuser

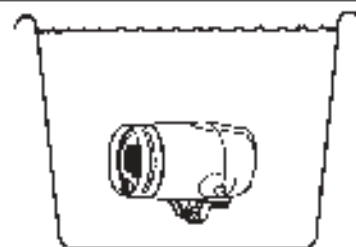
Beam angle (land) : 105° vertically × 105° horizontally  
(full-powered flash)

Guide number (land) : 53/16(ft/m) (full-powered flash)

Color temperature : 5100°K ± 300°K

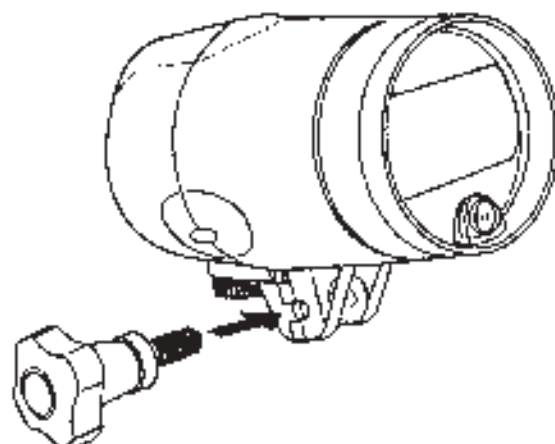
## Maintenance and Storage

1. After use, always rinse the equipment thoroughly in fresh water. Be sure all protective caps and covers are securely in place.
2. Dry with a soft cloth. Note: Do not use heater or hair dryer to dry the strobe.
3. Remove batteries after use. Be sure the battery compartment cover is completely dry before opening. If water penetrates the battery compartment, dry immediately.
4. Remove the sync cord from the strobe and camera.
5. Clean both connector ends on the sync cord, apply a thin coating of silicone grease to the O-ring, and cover the connectors with their plastic caps.
6. When storing the strobe for an extended time, be sure not to expose the strobe to extreme temperatures, high humidity or direct sunlight. Store in a cool, dry environment.



## Attaching the Sea Arm Bolt

When mounting the strobe to a sea arm, make sure that the bolt is inserted in the direction shown in the illustration. If inserted in the improper direction, the strobe may disengage from the sea arm, fall off and become damaged.



# Specifications

<b>Guide number</b>	Full	1/2
(ISO 100 land/m)	22	11
(ISO 100 land/ft)	73	36
<b>Beam angle</b>	105°×95°	
<b>No. of flashes</b> (full power)	Approximately 120 with AA Ni-Cd batteries (at 700mA)	
	Approximately 200 with AA alkaline batteries	
	Approximately 300 with AA lithium batteries	
<b>Recycle time</b> (full power)	Approximately 6.5 seconds with AA alkaline batteries	
	Approximately 4 seconds with AA Ni-Cd batteries (at 700mA)	
	Approximately 4 seconds with AA lithium batteries	
<b>Color temperature</b>	5400°K +/−300 K (full power)	
	5100°K +/−with diffuser	
<b>Power Modes</b>	Manual, TTL, Slave	
<b>Controls</b>	Power switch: OFF, 1/2, FULL, TTL	
	Slave switch: ON, OFF	
<b>Indicators</b>	Ready lamp (red LED lights up when capacitor is charged)	
	TTL confirmation lamp (green LED lights for approximately 3 seconds to confirm a correct automatic exposure)	
<b>Power source</b>	4 AA alkaline batteries (1.5V×4=6V)	
	4 AA Ni-Cd batteries (1.2V×4=4.8V)	
	4 AA lithium batteries (1.5V×4=6V)	
<b>Depth rating</b>	60m (220 ft)	
<b>Dimensions</b>	115×88×160mm/4.5×3.5×6.3 inches (H×W×D)	
<b>Weight</b>	710/26 oz (land), 50g/ 2 oz (u/w) including batteries	
<b>Accessories</b>	4 AA alkaline batteries, sea arm bolt, silicone grease, O-ring, diffuser, TTL operating range decal, manual exposure calculation table decal	

Specifications are subject to change without notice.