# Try Freediving

# Table of Contents

## Welcome

There is an incredible place not far away that is just waiting to be discovered and explored. The brilliant colors, the warmth of the water, the spectacular reef, the incredible marine life and the opportunity to interact with all the inhabitants of this new-found world will become one of the greatest "life changing" experiences you will ever get the opportunity to enjoy and share with others.

## Be Ready For Your Journey

All of our specialty programs are based on our signature training method — the SSI Diver Diamond. To become a comfortable and confident diver, it takes four ingredients:

### Proper Knowledge

As in all SSI training programs, knowledge is power and replaces fears and fantasies with correct information. In this program, you will acquire the specific knowledge related to this Specialty.


### Proper Skills

Repetition is the mother of all skills. Under the guidance of your SSI Dive Professional, you will learn the information necessary to dive comfortably and confidently.

### Proper Equipment

The safest way to dive is in your own personally fitted Total Diving System. For this and all SSI Continuing Education programs, you may need additional equipment to perform these dives.

### Proper Experience

Gaining the knowledge, skills and equipment necessary to complete dives is only one part of the journey. Going diving is the only way you can gain the actual experience needed to become a skilled diver.

## About SSI

Scuba Schools International grew out of the passion of a few avid divers who were intent on making it possible for anyone to learn to scuba dive.

SSI provides education materials, dive training and scuba certification for divers, dive instructors, dive centers and dive resorts around the world. Since 1970, SSI has expanded to 27 International Offices, doing business in 110 countries with training materials in 27 languages representing over 3,100 dive centers and resorts. SSI Certification Cards are welcomed all over the planet, wherever you choose to dive.

Scuba Schools International is clearly a name you can trust in the diving community and we attribute that success to uncompromising standards and a focus on quality, not quantity.

### Involvement


*Seventy-two percent of our planet is covered in water - and with SSI, you can explore this final frontier.*

As well as being an industry leader, SSI is also a founding member of the industry's standards body in the USA and abroad — in the USA, it's the RSTC (Recreational Scuba Training Council) and in Europe, it's the WRSTC and the EU (European Standards — EN 14153-1-3 for divers and 144413-1-2 for scuba instructors). As of June 1, 2010, SSI holds the esteemed ISO certification worldwide. ISO is a nongovernmental organization that forms a bridge between the public and private sectors. Being the world's largest developer and publisher of International Standards, it was the logical step for consistency and SSI's continued growth.

### Reward Yourself. You Deserve It

Becoming certified is an achievement. Be sure to reward yourself for reaching this major milestone with a certification card. This is an opportunity to commemorate your hard-earned accomplishment.

### Where To Go From Here

We are certain that your educational journey will be everything you imagined and more. Don't forget you can always combine other specialties to increase your diving knowledge — the possibilities are limitless. Now, let's go have some fun!

# Section 1 - Your Freediving Equipment

## Introduction

For centuries, the mystery and beauty of the underwater world has fascinated the human race. This strange and wonderful world provides glimpses of new plant and animal life not found on the surface of our earth.

Today, more than ever, we continue our quest for adventure by entering into this new world. We yearn to feel weightless in water, to swim among the animals of the sea, and to admire the beauty of a pristine ocean reef.

Freediving is an exciting activity that everyone, regardless of age, can enjoy with the proper equipment and the appropriate training. No matter where you live, Freediving is an exhilarating, year-round activity. Whether it's exploring a beautiful ocean reef, or a local lake or river, there is a Freediving experience close by.

As you continue your adventures in Freediving, you may become interested in photography or other freediving specialities. There are many activities available to the Freediver and your local SSI diving retailer will help point you in the right direction. You will quickly learn that Freediving is a healthy, exciting, outdoor leisure-time activity whose only limits are those of the imagination.

Let's begin your introduction to the underwater world by looking at the basic equipment and the skills required to be comfortable, have fun, and enjoy the Freediving experience!

## Freediving Equipment

For early divers, the most apparent obstacles were the inability to see clearly, to breathe while submerged, and their limited mobility in water. Three basic pieces of equipment — the mask, fins and snorkel — empower the Freediver by allowing him/her to see, breathe and move around freely in the water. Protective dive wear and the weight system also contribute to the Freediver's comfort and ability.

Owning your own Total Freediving equipment that is personally fitted to you is the best way to maximize your Freediving performance and potential.

The human eye is not designed to work well when immersed in water. Vision is blurry and the field of vision limited. Because the eye is designed to see through air, a lighter and less dense medium than water, a surrounding pocket of air is required in order to simulate the eye's natural environment.

**Choosing a Mask**

There are two basic types of masks; low-volume and high-volume. Freedivers prefer to use a low-volume mask.

The low-volume mask features a smaller air space and has a pocket for the nose. It is favoured by Freedivers because of the ease in equalizing pressure at depth.

The high-volume mask, with its larger internal volume, is preferred by Scuba divers.

Silicone — either clear, colored or black — is the most common material used in mask skirts and straps. Because Freedivers spend considerable time on the surface, their preference is for black silicone that prevents confusing light glare penetrating the sides of the skirt.

**Mask Features**

The important features to look for when choosing a mask are:

**Lens**. The lens should be made of tempered or safety glass. The lens faceplate in a new mask is usually protected by an oily film. This coating must be removed — using a approved cleanser — before applying a commercial anti-fog solution.

The mounting band for the lens should be non-corrosive — moulded plastic composite.

**Strap**. The strap should adjust, and lock in place, easily. It should also be either split at the back of the head, or wide enough to fit comfortably and securely; a narrow single band will easily slip up and down.

**Nose Pockets**. A mask should have a nose pocket or finger wells to allow equalization and prevents mask squeeze.

**Fitting the Mask**

Fit and comfort are paramount. Masks, like facial contours, differ. The objective in finding a mask that fits is to match the mask skirt to the face. The soft material of the skirt should fit evenly and comfortably against and around the face, without pinching.

To check the fit of a mask, tilt the head back and, before strapping it to the head, lay the mask on the face.

The force of gravity alone should keep a good fitting mask in place. Run a finger around the mask skirt to ensure that the entire sealing edge touches the face. Then inhale gently through the nose to hold the mask against the face, tilt your head forward and look straight ahead. The mask should remain in place with only a gentle inhalation. Test several different models to find the one that fits best and is most comfortable.

Fins allow the user to move more efficiently through the water. Conventional swimming is limited by both range of movement and the length of time — given normal strength and endurance — it can be prolonged. Fins substantially increase the power and utility of the bare foot; greatly reducing the energy needed to move the body forward, and enabling Freedivers to move over greater distances for longer periods of time without tiring.

**Choosing Fins**

Fins come in two basic styles: the full-foot and the open-heel. Full-foot fins fit like shoes and come in standard sizes. Open-heel fins come in small, medium, large, and extra large sizes and hold the foot in place with an adjustable heel strap.

In Freediving, the long-bladed, full foot fin is preferred because it maximizes propulsion while minimizing effort. It can be selected and fitted while wearing a soft neoprene sock for comfort.

**Fin Features**

Materials, designs and features vary between the different styles of Freediving fins. You need to understand these variations when choosing fins for your particular needs. The fin best suited to Freediving has a long soft blade that is easy to move through the water and provides better propulsion than a regular short bladed fin.

**Fitting the Fins**

**Fit**. Using a fin that fits well can prevent physical problems, such as chafing and cramps, and keeps the fin from falling off the foot. Neoprene soft socks worn inside the foot pocket will help eliminate cold feet and problems with chafing.

When properly secured, the fins will stay in place. The foot pocket should fit snugly without binding, pinching, or allowing excess movement of the foot. The toes should not jam and the overall fit should not restrict circulation.

As with all equipment, finding the right fins should be a personal decision based on proper fit, comfort and their suitability to your size and strength.

## The Snorkel

The next fundamental skill for the Freediver to master is that of breathing on the surface. The snorkel solves the problem of constantly having to raise one's head above water to breathe while swimming and allows the Freediver hours of relaxed exploration at the surface.

### Choosing a Snorkel

There are several options available when choosing a snorkel, but the two main considerations are low breathing resistance and a comfortable fit.

### Snorkel Features

Breathing resistance is affected by the tube length, its diameter (bore), and its shape. Select a snorkel with a larger bore, gentle curves and a fairly short (no longer than 35 cm/ 16.5in) tube. Long tubes create greater breathing resistance and a larger dead air space. The tube's bore should be regarded as an extension of the user's own airway.

The snorkel should be kept out of the mouth during the Freedive to minimize the risk of breathing in water and to always keep the airways free in case of an accident during the Freediving performance.

## Protective Dive Wear: Exposure Suits

Because water absorbs body heat about twenty-five times faster than air, even seemingly warm water will soon 'pull' heat away from the body. Ideally, the normal body temperature of 37°C should be maintained during immersion. Doing so requires the addition of varying layers — or thicknesses — of protective wear based on the water temperature and the diver's particular susceptibility to cold.

Tolerance to cold varies from person to person. Even between two divers of similar physique, one may feel the cold more readily than the other. As a consequence of these differences in physiology, exposure suit requirements will vary.

Although there are general suggestions as to the type of exposure suit best suited to the various temperature ranges, the amount of protection worn will ultimately depend on personal preference.

## Wetsuits

Your body will still get wet while wearing a wetsuit, but the extra layer of insulation will slow down the loss of body heat and keep you warmer for longer. Wetsuits are available either as one-piece jumpsuits or as separate components in various styles and configurations.

When donning an open cell Freediving wetsuit, you will require lubrication to make fitting easier. Make sure to use an eco-friendly biodegradable hair conditioner or other suitable skin sensitive lubricants. Alternatively don your suit while in waist deep water and make sure to wet all the open cell neoprene.

### Choosing a Wetsuit

When deciding on the most appropriate wetsuit for your Freediving needs, consider the suit's thickness and the coverage that it offers. Material thicknesses vary and are measured in millimeters. Styles range from the limited protection of a wetsuit vest covering just the torso; to the Shorty — with short sleeves and legs — to the full-coverage wetsuit consisting of either a one-piece suit or separate pants and jackets in various styles.

It is important to choose a wetsuit that fits properly. If the suit is too loose, freely circulating water will enter and cool the body; too tight — particularly across the diaphragm — and it will act as a constriction to breathing, circulation and movement, causing the Freediver to exert themselves and expend more energy.

The suit should fit closely to the body without binding or pinching. There should be no loose gaps or sags under the arms or at the crotch. The neck, wrist, waist and ankle openings should be snug enough to prevent water from entering, and loose enough for both comfort and the free circulation of blood. (Your SSI Dive Center or Instructor will help you select the rightfit.)

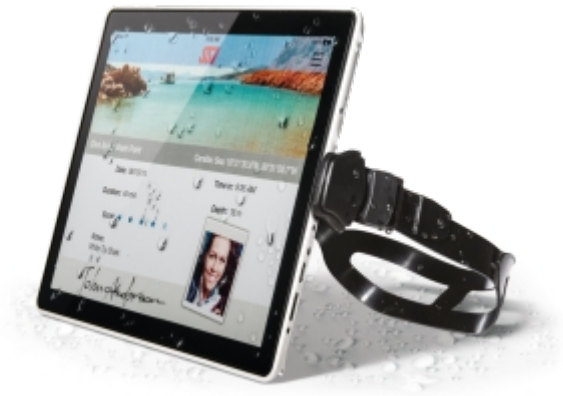
## Weight System

Wetsuits provide protection against cold and injury. However, in solving these problems, they create another. Because wetsuits float they add to the natural buoyancy of the Freediver's body. The weight system counteracts the positive buoyancy of both suit and body and allows the Freediver to comfortably find neutral buoyancy below the surface. This is especially necessary in salt water which further buoys up the body. The objective in using a weight system is to establish positive buoyancy at the surface and neutral buoyancy at depth, a condition in which the body neither floats nor sinks but is suspended in a state of weightlessness. This allows the Freediver to dive and explore beneath the surface while still being buoyant enough to float comfortably on the surface without fear of sinking.

When Freediving you should be weighted to be positively buoyant on the surface.

## The Freediving DiveLog

Utilize your SSI Freediving logbook to keep an accurate record of your training dives as well as your continued experience dives around the world.



## Summary

Freediving is an enjoyable activity once you become comfortable with the necessary equipment, remember the better you become at using your equipment the more comfortable you will become as a Freediver, Proper equipment is one of the major parts of the Diver Diamond.

Once you have your own equipment, your SSI Dive Center will also help you maintain and or repair it, also see your dive center about new developments and new products for Freediving, this will be especially necessary as you advance in your Freediving career and partake in more specialty programs such as monofin freediver.

Get to know your equipment, practice with it and keep it clean and well maintained, soon you will be Freediving like a pro.

# Section 2 - Physiology Of Freediving

## Mammalian Dive Reflex

The Freediver takes a deep breath before the descent and does not breathe at all while remaining submerged. The length of time the Freediver spends under water is determined by physical activity, proper breathing, efficient underwater movement, and training. All of these factors affect the processes of cellular and pulmonary respiration and can determine the length of time the Freediver spends under water. The other major contributing factor in determining the duration of the time spent at depth is the speed at which O2 is used and carbon dioxide (CO2) is released into the body's system. Using more oxygen results in the production of more CO2, the gas responsible for triggering the urge to breath, and the reason why, during Freediving, relaxation is so important.

## The Urge to Breathe

The high concentration of carbon dioxide (the by-product of oxygen usage during metabolism) in the blood is what triggers the impulse to breathe, not the declining level of oxygen.


The extent of the Freediving abilities varies between individuals. Because every human body is different, some people have an inherent gift — a natural talent — for breath-hold diving. However, the body can be trained to achieve better respiration and to deal with both higher CO2 levels as well as lower O2 levels. With proper training, all Freedivers will, over time, experience an improvement in their performance.

The Mammalian Dive Reflex initiates changes that happen to the human body. This can help conserve Oxygen and prolong the Freediver's time under water.


The Mammalian Dive Reflex allows mammals to stay underwater for extended periods of time. Although manifesting itself strongly in aquatic mammals like seals, otters, dolphins, and whales, the reflex is much weaker in other mammals, including humans. Every animal's diving reflex is specifically triggered by cold water coming into contact with the face. Submersion of body parts other than the face will not trigger the reflex. It is always exhibited more dramatically in young people and animals, thus granting them longer survival times in cold water.

## Understanding Pressure

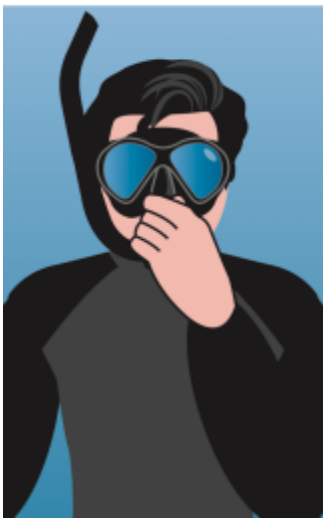
Every time you go Freediving, you will have to deal with the effects of increasing pressure underwater. Therefore it is important that you understand the different types of pressure and the changes on the surface and at depth.

In other words, as pressure increases, air volume decreases, and as pressure decreases, air volume increases.

Because equalization of pressure is one of the defining factors for achieving depth during Freediving, it is important to understand these pressures and the effect that they have on the body underwater.

## Equalization Skills

### The Techniques



*Equalize*
*Image @ SSI*

The Valsalva Maneuver is accomplished by pinching the nostrils together and then blowing very gently into them while keeping the cheek muscles tight rather than puffed out — the 'Pinch & Blow' Method. This method is very effective and is evidenced by an immediate 'popping' and clearing of the middle ear. Because it is very easy to perform, the Valsalva maneuver is usually the first equalization technique learned by new Freedivers. But because it is primarily the diaphragm that pushes the air into the middle ear, it must be performed more gently rather than aggressively.

Equalization should be performed regularly during the whole descent.

Combinations can be performed such as wiggling the jaw and/or swallowing while pinching the nose. Moving the head from side to side may sometimes help move air through the Eustachian-tube during the equalization process.

Equalize the Freediving mask during descent by lifting the thumb off the nose pocket momentarily or by puffing a small amount of air into the mask through the nose.

Never Freedive with a cold, flu or any form of congestion. Doing so increases the risk of Barotrauma and/or middle-ear-infection.

Your SSI Freediving Instructor will guide you through a practical session in equalization techniques prior to entering the water.

## Breathing for Freediving

Proper breathing before a Freediving session should be part of an established routine.

Take time to perfect your breathing for Freediving. Slow down and listen to your breath. Try not to rush the breathe-up before a dive as this may result in over-breathing which can eliminate CO2 from the body. This hyperventilation will then shorten your Freediving abilities. It is best to practice, and perfect, your breathing for Freediving and find the best breathing rhythm that suits your body.


The breathing should be deep, relaxed, deliberate and without force.

The exhale phase of the breathing should be longer than the inhale phase, e.g. (Inhale, count 4 seconds / Exhale, count 7-8 seconds) the exhale can be controlled by pursing the lips, everybody is different so find your own breathing rhythm.

Relaxation breathing is the breathing method that should routinely be performed before each Freedive. The final breaths should consist of no more than 1 – 2 full, deep breaths. The final breath before the dive should be full and complete.

### Recovery Breathing

Following a Freedive, the body will contain less O2 and more CO2, It is critical at this stage to perform proper recovery breathing to refresh both the body and mind. Proper recovery breathing can also help prevent Loss of Motor Control (LMC) and Blackout.

The recovery breathing should consist of a deep, full inhalation, followed by a 2-3 second hold and a passive exhalation.

Your SSI Freediving Instructor will guide you through a practical demonstration until you are comfortable performing proper recovery breathing.

Proper breathing is a key skill for safer and more enjoyable Freediving experiences.

Also known as over-breathing, hyperventilation is caused by rapid breaths or taking in a larger volume in each breath for an extended period of time. This will purge more CO2 from the body than normal. Hyperventilation has many disadvantages for Freedivers, including:

- Fast hyperventilation will raise the heart rate considerably. This will consume more oxygen and disrupt relaxation.
- Hyperventilation will cause cerebral vasoconstriction, impairing blood flow in the brain and reducing O2 delivery to the brain.
- Hyperventilation causes the blood pH to become more alkaline, causing the bond between hemoglobin and oxygen to become too strong and robbing the tissues of much needed oxygen. This is known as the 'Bhor effect'.
- Hyperventilation lowers the body's CO2 levels, lengthens the time interval before the urge to breathe manifests itself, and creates a situation in which a Freediver with seriously low O2 stores blacks-out upon surfacing. (The body needs the urge to breath to trigger the Mammalian Dive Reflex.)
- Hyperventilation delays the urge to breathe, which can create a situation where the O2 level gets too low before the Freediver gets the warning signal for the urge to breathe. This also prevents the mammalian dive reflex to trigger.

**Symptoms of hyperventilation:**

- Dizziness
- Tingling lips
- Numbness of the limbs
- Impaired hearing
- Loss of balance

With a proper 'breathe-up' the urge to breathe manifests itself well before the oxygen drops to a critical level.

## Summary

We have discovered the amazing effects that the Mammalian Dive Reflex (MDR) can have on our bodies as Freedivers, and how we can train and trigger these positive responses.

Pressure affects us, as Freedivers and we now know how to equalize these pressures during descent.

We have also discovered how proper breathing for Freediving will promote a better and safer Freediving Experience, and how the negative effects of hyperventilation will curb our Freediving abilities.

# Section 3 - Freediving Skills

## Freediving Skills

### Duck-Dive

The duck-dive precedes every Freedive performance and is one of the key skills to be mastered.

A properly executed duck-dive will help the Freediver consume less oxygen, be more streamlined and use less energy, resulting in a more relaxed and safer Freediving experience.


The core Freediving skills that consist of the proper duck-dive, equalization, fining and streamlining combined with the correct equipment will give you a more efficient and successful Freediving experience.


### Finning Style

The Flutter kick is very effective and the most common way of finning with stereo-fins (bi-fins.) This style of finning should start from the hip as a fluid stroke whose energy carries down the leg, through the ankle and into the fin. When finning correctly in this style, the shoulders should roll very slightly from left to right. Be conscious of the amplitude of your kicks. They should be unassertive (i.e. neither too large, nor too small) and the knees and ankles should not be overly bent.

### Streamlining

Maintaining a streamlined, hydrodynamic profile when Freediving creates less drag and helps conserve precious energy and oxygen stores. Keep the head in a normal position or slightly bent forward. Keep the equalizing arm tucked in to your chest. The other hand should be relaxed by your side. Shoulders should be slightly pulled forward, and hips tucked in to prevent arching the back.

## Freediving with a Buddy

Freediving is far too special to experience alone. More importantly it's much safer to Freedive with a buddy and a lot more enjoyable.

Freediving really is far too much fun to participate alone. Find a Freediving buddy at a similar level to yourself; you will gain further knowledge of your Freediving buddy's ability and be able to achieve more fun and more safety from your Freediving by participating and gaining experience together.


### Logging Your Freedives

Your SSI Freediving Dive Log will help you keep track of your Freediving experiences and memories, and may even become a vacation travelogue.

By logging your Freedives, you create a valuable reference guide for Freediving sites, including temperature, water conditions, marine life and required skills, such as preferred entry and exit procedures.

## What are Blackout (BO) and Loss of Motor Control (LMC)?

The human body requires a minimum amount of O2 in our body to sustain consciousness.

If a Freediver uses to much O2 by:

- Being stressed (not relaxed)
- Using bad techniques
- Pushing him/her self to far
- Ignoring the urge to breath they are severely increasing the risk of a BO or an LMC

How to Avoid Blackout (BO)/ Loss of Motor Control (LMC) and Minimize the Risk

- Do not hyperventilate — no more than 1-2 final breaths. The exhale phase should be longer than the inhale phase.
- Dive within your limits. A slow staged progression to time, depth and distance in Freediving.
- Perform proper “Recovery Breathing" for Freediving.
- Do not stay submerged until you are desperate to breath. Begin to surface while you still feel comfortable and allow plenty of time to get to the surface.
- Communicate with your buddy and always use the buddy system.
- Rest for several minutes between dives. The resting surface interval should be three times as long as your dive time.
- Wear a well fitting wetsuit of appropriate thickness for the water temperature in which you dive. (Water removes heat from the body 25 times faster than air). Ideally, wear a suit designed for Freediving.

Most blackouts occur after surfacing, the oxygen stores may be so low that the body cannot diffuse the O2 into the blood quick enough and if proper recovery breathing is not performed this can result in Loss of Motor Control/blackout.

- Adjust your weight correctly so that you are positively buoyant on the surface and neutrally buoyant between 10-12m.
- Streamline yourself as much as possible - with long fins and a low profile mask - to reduce energy expenditure.

## Summary

This section is full of great information about the Freediving Core skills such as the Duck-Dive and Finning techniques and Streamlining to conserve oxygen.

**Visualization is used as a means of relaxation and rehearsing for a Freedive**. Remember that skills and experience are key to developing your Freediving so keep practicing all you have learned.