PREVENTION & RESCUE DIVER MANUAL
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Did you plan for everything?

Do you remember your last dive? A beautiful day and a calm sea. The absence of currents and the transparency of the water allowed you to enjoy an unforgettable dive. Everything was for the best, even the new camera equipment worked perfectly and you will certainly bring lifelong memories back home. Sure everything went well because you planned your dive in advance, as you learned from your previous courses.

Maybe you thought: If I had to intervene in an abnormal or stressful situation, would I be able to rescue my buddy or act quickly and efficiently on a problem that may just unexpectedly occur?

Obviously, situations change each time, depending on different factors which we will analyze together during this course and our answers will vary according to the different situations. Previous course learning and diving practice have been fundamental parts of your education as a diver, but your “career” is not over yet. If you just think for a moment that any of us could face an emergency situation at anytime.

In particular, during your prior training programs you learned to dive and you refined your diving techniques. From now on, the desire to learn comes natural and so does intervention for others. It doesn’t mean that every day you will be confronted by emergency situations, on the contrary. It’s desirable that you will always be able to plan the best way to avoid danger and critical situations and that’s why this program’s philosophy, “Prevention and Rescue” as the title suggests, is based on problem prevention.

Therefore, prevention is a diver’s best friend. It’s always better to be prepared in case of unforeseen events that can happen at anytime.

Together we will analyze different scenarios in which a rescuer may have to act suddenly and we’ll practice many rescue techniques in open water, based on real possible situations. This will increase your experience and your preparedness about diving safety because you’ll develop a greater mental attitude towards problem prevention and towards awareness of early stress signs.

The exercises will allow you to acquire the necessary ability to evaluate the proper intervention procedure and, although you’re already good, your water skills and your diving skills will improve, while you’ll gradually find yourself more responsible, alert and prudent under duress.
**ESA Worldwide**

ESA is an international didactic agency whose principal objective is training divers from the beginning level up to professional levels, such as Diveleader and Instructor. To do so, ESA applies the most evolved operative standards in conjunction with a very high degree of safety and proposes to promote underwater activity in its various forms.

The resources of ESA provide all support materials for the different certification levels along with professional instruction. Initial training with ESA consists of developing practical underwater skills in the pool or confined water, with subsequent application and improvement in open water.

Each ESA program or course ends with a final test by the Instructor who will keep a record of the completed evaluation. ESA offers divers initial training and the opportunity for advancement in higher certification levels up to specialization in different areas connected with underwater activity such as marine biology, photography, underwater archaeology, etc.

Once certified through ESA, divers can become professional trainers in underwater activity.

**ESA sets high standards for its training affiliates:** all professional divers possess an ESA Diveleader certification or higher.

ESA Instructors are trained by ESA IC Directors, members adequately prepared and qualified to pass on their training techniques to future instructor candidates.

The complete Instructor training includes all information about diving theory, ESA procedures, psychology and marketing notions, skill development in managing single or a group of divers, problem management, environmental protection, and more.

Valid ESA certification cards are issued only by ESA headquarters and official ESA authorized offices.

ESA also provides their affiliates with updates and variations of existing procedures along with introductions for new procedures. Qualified instructors operating in recreational underwater activity fields can also become ESA affiliates.

Diving centers, scuba diving clubs and shops can, in fact, obtain ESA Point qualification.

Designated ESA IC Point can promote, organize and conduct training courses for ESA Instructors.

**ESA intends to distinguish a particular commitment towards environmental knowledge divulgation, to improve the quality of dives and to create a greater awareness of the underwater world.**

In fact, ESA professionals also go through their training process receiving a solid preparation on environmental knowledge. All ESA training activity is strongly linked to underwater world protection objectives.

**Certification card**

Prevention & Rescue Diver represents the third recreational level
of ESA training and it shows that you have successfully completed all previous training courses, gaining the necessary requirements to access the first level of professional training, **ESA Diveleader**.

The acquisition and improvement of exceptional water/underwater skills, the constant problems prevention education and rescue abilities proven during the accomplishment of this important certification will give you excellent credentials as a trustworthy dive buddy and also for people you will meet in occasional dives, going out on a boat with an ESA Point or another Diving Center.

This educational journey will also highlight your future expectations, maybe discovering a desire towards Leadership’s roles and getting even closer to the Diveleader level.

**Admission requirements**

To access the ESA Prevention & Rescue Diver course you need to satisfy the following requirements:

- Bring proof of possessing the ESA Advanced Diver or equally valid certification
- Prove to have at least 20 open water dives, recorded and countersigned on the logbook
- You are at least 15 years old
- Hand in a valid medical certificate or satisfy local medical requirements

If you have any questions about the validity of your requisites, do not hesitate to contact an ESA Point, ESA Instructor or ESA directly for more information and assistance.

**Course structure**

The course is structured in a flexible manner, allowing both student and Instructor to access the different parts, according to schedule and environmental conditions.

The course is divided in two multimedia training units: the theoretical unit and practical exercises.

**The theoretical unit** is divided in self study, knowledge verification (with minitest and chapter end questionnaire) and theoretical presentations given by the ESA Instructor (use of slides), during which all information about previous chapters will be reinforced.

**Practical exercises** consist of first aid exercises and open water exercises. First aid exercises that will be performed in class (dry) and/or outside in collaboration with other students and the Instructor, will allow you to acquire the necessary familiarity to rescue a person involved in an accident or illness, and not necessarily just in underwater activities.

Open water exercises will be divided in different dives and include exercises to improve personal water skills, self rescue and buddy rescue, leaving a margin of flexibility according to environmental conditions, commitment and schedule.

Furthermore, first aid exercises will be simulated and practiced with other students and Instructors in a safe environment. ESA
will also provide tools such as gloves and protective barriers, so you will get into the habit of always keeping in mind these important safety rules.

Certification requirements
What do you have to do to obtain the certification?
To obtain the certification you need to complete the course in each of the parts, show adequate competence in the different areas, achieve set goals and bring proof of possessing ESA First Aid certification or equivalent.

The structure of the course allows you to satisfy the requisites according to your availability and respecting the time of your learning process.
You will just have to come to an agreement with your instructor the modalities (conditions).
You could also start the course in one place with an ESA Instructor and finish it in another place with another instructor, without having to restart from the beginning.
However, you will have to successfully pass all tests as expected by the program. Only then, the Instructor who conducts your last course part will be able to accord you the certification.
For instance: if you can’t participate in an open water dive, you won’t obtain the certification until you have successfully accomplished it.

Remember that some parts of the course are preparatory to others, so non-participation in any of the activities could prevent you from the possibility to accede to the following part. Your Instructor will guide you as a good coach to help you reach and successfully accomplish all tasks set for the certification achievement.
The certification card will be given to you directly by the Instructor. This way you will be able to immediately participate in other activities: underwater trips, more training phases, dives, equipment rental and so on. However, keep in mind, that the certification card has an expiration date.
Before expiration you’ll be mailed definitive confirmation stickers to be applied to your certification card.
If you have questions or you don’t receive on time your cards validation, do not hesitate to contact ESA offices. Our staff will be happy to offer you all the needed assistance.

Manual’s use
This manual will be an indispensable fellow travel companion during the course and during your entire diving career.
You’ll be able to flip through the pages to refresh your memory, before diving again after a period of inactivity or to deepen things that come back to your mind. Think that if you continue with your diving career, up to becoming a professional, you will also find it useful during the ESA Diveleader or even l’ESA IC (ESA Instructor Course).
The text is intentionally set up to be simple and has been structured in a way to facilitate your studies. Each chapter is partitioned into different topics. For each one you will be able to identify the most important information (what will you learn?), the explanation and verification questions (minitest) with corresponding solutions and at the end of each chapter there is a questionnaire (what did you learn?) which examining you, reinforces content learning. Carefully answer the questions and if you are unable to recognize one or more answer, you can always read again the explanation. Remember that you will have to bring it at your next appointment with your Instructor. If you have doubts, take note and ask for clarifications (to your Instructor). The first six chapters (about information acquisition) will propose the theoretical part of the course. Chapter Seven will illustrate the exercises you will learn during the preparation in open water (or in confined water at the ESA Instructor’s discretion).
Well, what are you waiting for?

Start now! This way you will be able to use your time more efficiently, stay longer in the water with an Instructor and become more familiar with the techniques and rescue scenarios. You can decide to study alone, with your buddy or in group.

Good luck and remember to ask questions every time you feel it necessary!
Chapter One
Prevention

What you will learn
Imagine yourself while you’re getting ready to go out. What would you usually do? You get appropriately dressed. It could be summertime with hot sun or wintertime, maybe raining or snowing. Before leaving, you’ll get your car keys or if you go walking on the street, you will need your wallet and documents. Before crossing the street, you look at the traffic light, look both ways and make sure you are on the pedestrian crossing and no car is coming from one side or the other.

Everyday normal life is a series of rules and habits that each of us put automatically in practice. Often these are prevention rules. We think about it for a fraction of a second but then we stop, before crossing the street. We wear a coat if it’s cold or we give up going out if we don’t feel well. As you know, those who ignore these rules and live a messy life run the risk of accidents, illnesses and stress at a higher level than normal.

Even in scuba diving there are, as you know, many rules. During the first course you learned the principal ones regarding breathing, diving techniques, compensation, etc.

You remember that many of these rules are preventive: you have to stop and ascend a little if you don’t equalize, you always have to breathe deeply and often check your air reserve.

In this chapter you will find a broad list of prevention rules that you will always have to consider when planning a dive and those to put in practice before and during the dive.

Perhaps you already know a lot of things, other things will be new but useful. Training and constant diving practice will make you absorb these rules deeper and deeper. They will be the mainstay upon which your fun and safety will be based.

Planning and general rules
Anna is a very caring and thoughtful mother. She arranged the kitchen cabinets in a way that her toddler cannot open them. Marco has wrapped some sharp, dangerous angles in protective foam rubber and together they have installed safety outlets. They keep medicines and common in-home elements out of reach, detergents and other chemical substances. Do you think this is at all excessive?

Yet, this family lives a normal life. Active and serene, with the happiness and the problems we all face and experience. Anna and Marco are also keen divers and Anna will soon start to dive again. Since her pregnancy, more than a year has passed from her last dive, while Marco has been diving on a regular basis. Rediscovering the diving equipment she had carefully put away,
Anna put on her suit realizing she has some difficulty in breathing deeply. Probably the size doesn’t fit anymore so they decide together to purchase another suit for her. They also drop off the regulators at their local trustworthy shop for regular maintenance. They didn’t use their inflatable boat since Marco proposed to dive with a local diving center, which besides guiding them during the dive, allowed them to come back in time to pick up their baby at the grandmother’s. Don’t you think they have been preventative?

If Anna dove with her old suit, she probably would have run the risk to overexert, even without currents because she wouldn’t have breathed well. Furthermore, since some time passed from her last dive, she wanted to refresh her memory with a guided review of the procedures.

Before diving, the Diveleader explained a lot of things during the briefing and certainly this has been useful to Anna who retained important information about depth, dive time and dive navigation. Recommendations also emphasized equipment inspection, buddy system respect, safety measures and a review of principal signals.

As you probably noticed, these two individuals had a good day because of very simple operations, acting pre-emptively to avoid potential problems. Prevention is better than cure, say doctors and with good sense.

Where do we begin?

Think of this easy acronym, W-H-W, or Where, How and When. With any occasion you should think of these three words when planning a dive or when you are about to rescue somebody. In this chapter we’ll begin from planning.

For sure, you will apply what you have already learned in your first course. That is, you will use the computer or the tables to calculate depth and dive time, surface intervals and eventual repetitive dives. What you have to do before going up on a boat or even better, before leaving your house, is check that the computer and watch work properly and are fully charged. Have all the tables with you and maybe put them in the BCD pocket.

You will also remember how to put your diving equipment aside and make inventory before each dive. If a long time has passed since the last dive, try your suit on at home. You may find out that it has become tight or even too large. If you dive in different seasons or you travel to warmer or colder seas, it may be necessary to substitute the suit you normally wear in the Mediterranean Sea with a more appropriate one. Inquire about temperatures in different periods of the year for the location you wish to go. Obviously, not everybody can afford several suits to wear. So, you could rent one but consider that it is better to have your own diving equipment and you can write off the cost within a few dives.

Many companies offer “modular system” suits in their catalogues. If you have to purchase a new one, consider these models
(which with one expense will allow you to dive in warm waters wearing only the first 3mm layer and in very cold waters simply adding the 5 mm. shorty with hood or also the supplied under-vest if necessary).

**Speaking about cold**, if you want to plan correctly (because you usually dive in lakes or cold places), remember, that the suit is not the only piece of diving equipment you will have to consider.

As you remember from your first course, cold affects nitrogen absorption and elimination. You should consider shortening the bottom time if you expect particular conditions of cold and fatigue. Come out of the water as soon as you feel shivering.

Another important rule concerns the waiting time before flying or going to a higher altitude after diving. You will remember from the first course that besides cold there are other conditions affecting nitrogen absorption like depth, dive time and physical conditions. Since a personal test to verify nitrogen absorption does not exist, (only rules based on mathematical models), it will be important to stay at sea level, as long as possible, before **flying or going to a higher altitude** in order to increase your maximum safety.

Medical indications suggest a waiting time of 24 hours as reasonably safe. Vacations for divers are carefully planned, keeping in mind these rules. In fact, should you happen to go to the Red Sea for a “blue week”, the diving center you will go to, will ask you when your departure date is. This is to allow a reasonable margin of time - 24 hours - before boarding the plane for your trip back home.

**Psychophysical condition and attitude**

What brings you to dive? You could list a number of reasons but certainly this is a charming practice and today many people want to try and experience what only a few decades ago was impossible, like space trips unfortunately still are.

The will is there, but it just could happen that waking up early one morning you realize you are not feeling very well: a cold, a headache or a charley horse from the day before. Would you go play tennis or even to the gym if you were not feeling well? Certainly, physical performance during an illness would not be the best, your fun would also be compromised.

Think about it. You get ready and with a dripping nose you go on the boat, hoping later to be able to equilize. Not paying full attention during the briefing you go into the water only to realize that when you are not feeling well, it seems colder. After a few attempts you realize that one ear is not equilizing and you go up on the boat upset, now you have to wait for the rest of the group to finish the dive, before being able to go back home.

**A medical check at least once a year** is a rule that everybody should observe. Additionally physical and psychic conditions change with time for each of us and even if everything is ok from a cardiac point of view and analysis, you must learn to evaluate your current conditions for each specific dive. Living a healthy life,
eating properly and keeping in shape will allow you the many opportunities to have nice dives, opposed to the few times you make the decision to wisely opt out. Besides the physical aspect, **ask yourself about the purposes of the dive and its characteristics.** While planning, evaluate what you enjoy more and consider your limits. Some people have an Open Water Diver certification, but could have dove hundreds of times. Other people, even with an advanced course, may not have the experience greater than a dozen dives; so the certification may not correspond to the experience. Evaluate if the dive conditions reflect your expectations in conjunction with your experience. **Don’t hesitate to ask for explanations.** Ask the Diveleader, who will come with you underwater, questions about depth, air reserve or currents. It is highly recommended to carefully listen to the briefing and do not hesitate to ask for further explanations, if needed.

**Nutrition:**
Sporting activities represent, with no doubt, the idea of a healthy lifestyle and today we can see a real cult phenomenon. Gyms full of people working out with weights or running in group on modern bicycles on imaginary paths with background music, guided by coaches that constantly regulate the rhythm of activities. Nutrition is widely written about in specialized magazines that deal with fitness, aerobics, health etc. In most gyms there are usually a sport physician and/or a nutritionist available who personalizes in diets. They can provide supplements to gym members who wish to increase muscular mass, loose weight, etc. In reality, the scientific world reports news about the increasing number of illness’ linked to modern nutrition. Diets which are consumed too fast, high in calories and of poor quality. Some people approach scuba diving appealed by the physical activity component, just to realize that is much less wearing than what is generally thought. As a matter of fact, the number of children and older people that are learning to dive is rapidly growing. **Recreational activity** is wonderful but the nutritional aspect should not be neglected. **How are you eating?**
The guidelines for good nutrition are simple. A balanced, complete diet is composed of carbohydrates, proteins, fats, vitamins, minerals and water. We all should prefer eating food rich in fibers (integral) to keep a clean intestine, not to exceed in fats, animal proteins, salt and refined sugar to prevent hypertension, kidney insufficiency and metabolic difficulties. Avoid, as much as possible, sterilized food to keep an active intestinal flora and avoid food treated with many chemicals because these may be responsible for liver and kidney deputative tiredness, intoxications and possible tumors. Avoid excess calories and drink plenty of water every day.
Before diving avoid forced fasting. It is best to have a good breakfast based on cereals (i.e. barley and cookies) and preferably a
lunch with carbohydrates that are a basic energy source. Always avoid alcoholic drinks and those with caffeine. Alcoholic drinks increase nitrogen absorption and decreases attention. Caffeine tends to make you feel colder than usual. The use of medicines are not advisable before diving and it is recommended to remove the patch against sea-sickness before entering the water because the contained active principles can have undesirable collateral effects during the dive.

Weather conditions
There are many ways to inquire about the following day’s weather forecast. If you are thinking of going out in the sea, this is information you must have in advance. The weather bulletin is broadcast on the radio and also provides news about the local seas scale. You can also consult television, televideo or many different internet sites. Meteomarine conditions could change even in a few hours. It is very important to evaluate the weather before going out in the sea and before casting the anchor when you are at the dive site. Sea current conditions and visibility could be different from what you expected. Carefully read Chapter Three of this manual regarding environmental factors.

Protect yourself from sun and heat
To enjoy pleasurable summer holidays or winter vacations in the tropics it is necessary to be well protected from exposure to direct sunlight. People with light skin, or those who are not accustomed to intense, direct sunlight truly risk to spoil their vacation if they don’t take adequate preventative measures. Limit excessive exposure to sunlight, avoiding midday hours and using UV filter creams. Remember, that creams have to be frequently applied. Diving, suit rubbing and perspiration cause the protective layer to slowly get removed.
It’s also important to be covered during boat navigation or when it’s windy (a normal condition for instance, along the islands coasts), this can seem to make you feel less radiation. Avoiding direct sunlight exposure prevents heat strokes and heat exhaustion. You can wear a hat and/or wet your head once in a while. Particularly, scuba divers should not wear their suit too much in advance, perhaps its best to ask the Diveleader when it’s the right moment to do so.

Food prophylaxis and vaccinations abroad
Scuba diving can also offer you beautiful opportunities to travel abroad. You can happen to stay in hotels or to make an incredible scuba diving cruise in famous places like the Red Sea, Maldives or Zanzibar, real diving paradises. Transitory diseases (like traveler’s diarrhea) caused by bacterial infections (Escherichia coli) differ from those found in our usual environment and to which we are used to. These infections could,
if not considered, spoil your vacation forcing you in bed or at least out of the water. It is important to avoid drinking non-sterilized water, milk, drinks, salad or fruit that could be infected by water (sealed, bottled water is fine). You should eliminate foods like ice-cream and other cream products, also cold meat dishes that could have been prepared without respecting principal standard hygiene. In particular, places like Asia, Africa and South America, it’s necessary to vaccinate against diseases unknown to us, such as colera and typhoid fever. In other places like tropical Africa and some Central American countries the vaccine against yellow fever is necessary.

Prevention against malaria is just as important. This is a difficult disease to treat with medicines, being that many strains have become resistant in recent years. **Before starting prophylactic treatments** with medicines that may cause heavy collateral effects, it is better to ask about sanitary measures required by the nation you are going to visit, because different mosquito types and resistant malaria strains can differ from country to country.

**A plan for emergencies**
A simple but accurate plan for emergencies should be part of every dive planning. In an emergency, having all the information gathered in a pre-established plan, allows you to have more time to dedicate to operations coordination, instead of being confused, staring at each others eyes in despair. Principal points to consider when preparing a plan are:

- **plan the dive adequately and communicate the plan precisely to somebody else**
- **be sure to have proper assistance on the surface**
- **prepare efficient communications systems on board (telephone and radio) and useful numbers to call (i.e. First Aid).**
- **localize the closest E.R. and know how to reach it**
- **have readily available rescue equipment (first aid box, oxygen kit, dry cloths, drinking water)**

Let’s see some of these guidelines in detail.

Some equipment parts are easier worn down in time than others. This is especially true for some accessories like **fins and mask straps, mouthpieces and gaskets.** Preparing a spare accessories kit doesn’t necessarily cost a lot of money. Organized, in a small plastic box, it could be precious in case of breaks due to wear or accidental tears.

Being underwater with a worn down mouthpiece that sucks up water is not pleasurable. Furthermore, you would be prepared and of great help if your dive buddy, opening his bag, found out to have a fin with only one strap. Also, the little **o-ring** connecting the regulator to the cylinder should not be **missing in the spare box.** If it breaks and you don’t have a replacement, the dive will be unfortunately postponed.

We can say by experience that these things are order of the day.
They are not so demanding. A minimum of organization and prudence is all you need.
A dive center is usually equipped for these types of little emergencies and it’s easier to find spare equipment on board, but it’s best to check before that your own works well and always have your own spare accessories.

**If you go on a boat with a dive center** ask about the diving equipment and the communications available for emergencies out at sea or for rescue interventions.

Let me guess... certainly you own a cellphone, maybe a tri band. Better to bring it with you on the boat. Usually close to the shore signal is good and many people, soon after diving, still dripping and after a quick hand dry, call home or make business calls. It could also be useful in case of real need, so be sure that the battery is charged. Maybe you can get a waterproof case that you can easily find at a cheap price. A waterproof case will protect your phone from splatters and accidental falls overboard or...in the bucket where everybody washes their masks.

**Put in memory the main numbers** you would call in an emergency and keep a separate, written copy in a little dry waterproof plastic container, which you can find in a nautical equipment store.

A **whistle** will take up little space in your bag and it’s very useful if you are on the surface and you need to rapidly attract someone’s attention. So hang one on your BCD (at mouth range) and put another one in your spare box.

Dive boats usually have a dive flag, well in view. Anyway, if you are diving autonomously, remember the dive marker or the signaling flag, the only device that can identify you when you are underwater.

It’s also useful on the surface, especially in summertime when boats dart one way or the other, sometimes passing even too close to those still or anchored, maybe with divers underwater. On the boat the floating markers are also useful. They can easily be improvised with plastic bottles and a little line wrapped around them. If anybody accidentally lost an object in the sea, even on a moving boat, they can be quickly thrown overboard to mark the spot.

**Binoculars** are always useful on a boat. They can help you to recognize objects or divers on the surface far away, for sure you can find them on a well equipped boat for divers.

Another interesting instrument that every diver should have, especially an ESA Rescue Diver, is the **surface signaling device**. It’s typically used by diver guides in places where dives in current are usual (i.e. Maldives), and it serves to be localized by the boat.

In emergency cases or if you happen to surface away from the boat or from the shore entry spot, this inflatable tube connected to a line, **is highly visible**. It is sufficient to inflate it a little with the safety regulator, cautiously a few meters underwater, before surfacing. You can easily find it in a diving shop.

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**Minitest**

1) If you plan on going out to dive, information you must have in advance includes:
   a. weather forecast.
   b. fishing permit.
   c. the News.

2) If you want to limit excessive sunlight exposure you have to avoid midday hours and
   a. drink water.
   b. eat cereals.
   c. use UV filter creams.

**Answers: 1a - 2c**
A small waterproof bag can easily contain a change of clothes, drinkable water and some snacks like an apple, chocolate or crackers. If you make a shore dive or from your own boat, do not hesitate to buy and organize a first aid kit. You can easily find First Aid kits with basic contents for sale. Consider that a hard, waterproof floating container is best. Check all items, and if necessary add to the standard supply other things that can be useful. Check expiration dates and regularly renew the supply.

On board, besides radio, telephone and first aid kit, an oxygen delivery kit should not be missing. This is an important First Aid measure for underwater accidents, as you remember from your Open Course.

If you wish to purchase an oxygen kit, the one with a demand valve regulator is preferred. A demand valve regulator guarantees a 100% flow without the inevitable air loss like in systems with a flowmeter. The multifunctional regulators allow for different oxygen breathing modalities and for more people at the same time. There are special organizations for dive safety that provide assistance in emergencies through telephone lines, 24 hours a day. Ask where you live or where you want to go to dive if a special hyperbaric medical assistance and emergency transport to an adequate sanitary structure is available.

If you respect the rules you will unlikely need all this, but it's always better to be prepared to assure maximum promptness and efficiency in case of emergencies. For this, write down emergency telephone numbers and always bring it with you.

It's pertinent to know all the kits correct usage and how to manage oxygen, attending a specialty course is the best way to learn. Ask your ESA Instructor or Diveleader for more information.

It may be necessary, during emergency procedures, to administer artificial respiration. In this case, it's appropriate to have adequate barriers to avoid direct contact between victim and rescuer. Gloves and mask are perfect barriers for this. A good mask, one you can find for sale, is the Pocket Mask. This mask is adaptable to the face with a soft silicon profile and it includes the nose, these characteristics make this mask a valid rescuing tool in the water. It will protect the victim's airways from splashes and waves and some models have a coupler which is essential when applying artificial respiration with oxygen enrichment. This type of standard mask may not always be available at all moments. Think that you may be involved in a rescue anywhere.

You can sharpen your ingenuity and use plastic sheets with holes in it to store in your First Aid kit, or make holes in grocery bags, which you can apply as the protective barrier between you and the victim. Also useful, is having latex gloves that you easily find at a bargain in pharmacies or supermarkets. Get the large size, which everybody can wear and is durable. These are handy to have if somebody else needs to help you in a rescue procedure.

**First Aid kit:**
- latex gloves (large size)
- Pocket Mask for resuscitation
- disinfectant
- ammonia and vinegar
- compress hydrophil gauze, different sizes
- 1 package of hydrophil cotton
- bandage rolls, different sizes
- band-aids
- heat pad/cold pack
- 1 antihistamine cream
- 1 package of splints for fractures
A little chat with your dive buddy
As you remember from your Open Course, it’s not advisable to go underwater by yourself. If you don’t have a dive buddy, because your friends have other interests, reserve your dive at a Diving Center. You can meet new people and will avoid diving alone, violating one of the most principal safety rules.

**ESA Points** and all other **Diving Centers** in general are professionally, well managed outfits that offer services as you would expect from a good ski school or other excursion centers. When you make a reservation you are typically asked for your certification card and log-book, so that once on the boat, couples can be formed in accordance with certification levels and experience.

You may ask: **What if I happen to be with a person I don’t know?**
Well, this can be the right moment to get acquainted, a little chat before diving is a good way to familiarize and exchange opinions. At the same time you can observe important details about your buddy’s equipment, like **the alternative air source and its position**, purge button and second regulator mouthpiece. Sometimes it happens that somebody has only one regulator, hopefully this should be rare. You must be firm about this and invite him to connect an alternate air source. This is usually found on board, as a spare, if you dive with a Diving Center. In Chapter Four we will analyze the most common problems you can find with inadequate or poorly maintained/abused equipment.

A word of advice: if you see a person who is reluctant to speak, maybe because they are shy, don’t hesitate to introduce yourself. Hi, my name is Marco, I’m an ESA Advanced Diver and I made x amount of dives, have you already done this one? They say it’s beautiful...and so on.

Remember that your buddy would like from you the same treatment and if you like to take care of others and think of further developing this attitude of yours, start thinking about a future as a Diveleader, you are not far from it!

**Assistance, controls and techniques**
Do you remember how you inspected your diving equipment before dives in your previous courses? Well, this procedure must not be limited to the courses. In your Open Water Diver course you may have learned a word to memorize equipment components to be checked soon before diving. Use the system of your preference, but before entering into the water (if the boat allows that, or when you are on surface) check that your buddy wears his equipment correctly and after checking the BCD, cylinder valves, air, ballast, safety regulator and testing the regulators, ask him to do the same.

Before entering into the water, you must always have the approval of whoever remains in the boat. At this point, having inflated the BCD a little, keep a firm hand on your mask and regulator.
After signaling OK on the surface, wait before going down to the anchor or stern line that your buddy also has entered into the water. You may have your hands occupied by torch and camera or videocamera, so you will pass your arm around the line; this is particularly useful in presence of currents on surface.

**If you suit up in the water, make sure that your BCD is inflated before it’s off loaded from the boat to avoid that it plummets to the bottom.** If there are currents it’s best to have the BCD tied with a little rope and a small snap hook which should be secured to the side and put overboard. Help each other out while remaining close to the boat, then do an inspection before descending. This is a very simple operation but the most intelligent, daily preventive maneuver you can do, like looking at both sides of the road before crossing.

**Now you are ready for the dive!**

Descent signals, as you remember from the Open Course, serve as a reminder for the last phases and include: putting the regulator in your mouth, making sure the computer is on and/or starting the timer. Signal the OK and deflate the BCD, while starting to equalize. If you see that your buddy doesn’t put the regulator in his mouth and starts to descend, stop him at once. This way you’ll prevent him from drawing water. Always observe with total awareness what happens in these phases, a relaxed dive or a stressed beginning can depend on these little interventions. Show, then and there, your pizzazz and your rescue spirit!

While descending, remain at your buddy’s side even if he’s slower than you, keep the same altitude. Remember that equalizing problems usually happen at the beginning of the dive and it is not nice to have somebody waiting at the bottom, with impatience and disappointment, while you would like to quietly equalize. The inevitable stress could induce a forced descent with regrettable consequences on your ears.

Equalize the mask frequently by blowing out from your nose, to avoid that an internal depression causes the squeeze effect. While descending (becoming more negative) inflate the BCD a little to stabilize for the wanted altitude, without touching the bottom.

**During the dive,** keep the planned altitude and **signal often** with your buddy about air reserve, showing the pressure gauge if necessary.

You have to make the best effort possible to avoid contact with the bottom. Consider the environment you dive in as the living room of a friend who invited you. If you see that your buddy constantly touches the bottom, maybe with the top of his fins (lifting sediment, that could stay in suspension for long time), be gentle and invite him to a higher altitude.

Now you are diving. **Relax!** This is one of the most pleasurable aspects. To enjoy it at its maximum, breathe slowly and deeply, move with calmness and **allow the fins to take advantage of the**
propulsion. This will prevent cramps and overexertion. If you have a diving guide, keep close to him. This will ensure you to be able to easily communicate and be ready to observe what has been indicated. Often it’s not easy to identify groupers or dentex even of big size, so stay at the right distance not to make them hide out or rapidly disperse in the blue. Feeding the fish to attract them is not a good habit. Modifying their diet (often with inappropriate food) and their behaviour (as predators) could incur great excitement and competition with dangerous reactions and consequences, like literally tearing food out from your hands and hitting you with their snout, giving you abrasions and punctures, or worst yet, tearing off your mask and regulator. Also avoid exposing reflective mirrors and other shiny objects that can reflect sunlight because this could attract too much attention or even scare some aquatic life away.

As you remember, nitrogen is absorbed and released in variable amounts by our tissues and for this reason it is important to remain within the safety no stop curve limits, using the computer and/ or the tables. Make it a habit of starting the ascent before the time indicated by the instrument goes to zero and not after the indicated time or exactly at zero. When dive time is over, ascend slowly without surpassing the 10 mt/sec ascent rate. It is proved that the safety stop not only decreases DCS risks, but decreases the formation of microbubbles that can stop in circulation. Therefore, before going up to the surface stop at 5 meters for 3 minutes. You will have a grasp bar from the boat or the anchor line, but if you have good buoyancy control you can choose to remain at 5 meters enjoying this time watching what lives at these lower depths, you may have pleasureable surprises. If descent is along the line, ascend the same way. Don’t forget to listen and carefully watch toward the surface before surfacing, because swimmers and even big boats often ignore the dive marker.

When you come out of the water, wait for your turn. With fins on, hold on to the line that will be overboard, avoid being under the ladder when someone else is climbing it, they may slip. Release the ballast system and, when you are holding on to the ladder, take off your fins and hand them to somebody on the boat. While if you are on an inflatable boat without a ladder, take the scuba off but keep your fins on so as to help thrust yourself upward and into the boat.

If it is a beach dive, consider which is best: fins on and off in the water or putting them on and off out of the water. Either way, do not go anywhere you cannot touch/ stand without fins. On the boat, avoid going around with the diving equipment on, it is heavy for your back. Sit on your assigned seat and ask for help to suit off, then help your dive buddy.

**Specialty dives**

If you plan specialty dives (i.e. night dives, deep or photo dives)
first review the principal guidelines in your Advanced manual. If it is non contemplated dive or a dive that needs different planning (i.e. altitude dive), attend the specialty course of that specific interest. Today there are many different choices available among which are dry suit or nitrox, using enriched air with a higher oxygen percentage. With specialty dives you will know and understand equipment components that are not mandatory in normal dives. This could result useful to improve your dives quality, if not even precious in case of rescue emergencies. An underwater torch is a necessity for a night dive and you can also use it during the day if you dive where there are large masses that create shady zones or in cavities that you would like to light up. The compass, (the use of which you have already learned in your first course and deepened during the Advanced) is an instrument for orientation and can prevent problems if you plan dives with low visibility, or it can be very useful to help you in a real search crisis.

Nine safety rules
These are simple reminders that summarize a little of what we have discussed in this chapter.

1. Keep your diving equipment efficient.
Check it or have it checked before leaving for a trip and right before a dive.

2. You have to be physically in shape and psychologically fit.
Physical exercise and an adequate diet will help you to enjoy your underwater activity better. You can keep mentally trained to prevent stress and anxiety by repeating, once in a while, the Open Water Diver Course main exercises, especially if you haven’t had a dive in a long time. Start your dive well rested, warm and hydrated.

3. Dive accordingly to your experience level.
Consider that you may dive in (a) unusual depth conditions, (b) with strong current, (c) in cold water or (d) conditions of low visibility. Therefore it is best that you first receive the necessary training.

4. Plan your dive and follow your plan.
Imagine the potential problems you may face, how to prevent them and how to respond to them. Agree with your buddy on safe time limits, depth, dive navigation and correct signals.

5. Check your instruments and keep a good safety margin.
Although you know your usual consumption, depth conditions, current and fatigue may make you consume more. Do not consider tables or computer limits as absolute, but keep well within limits.

6. During the dive relax and enjoy your self, constantly breath, deeply and slowly.
Once you have reached a good level of comfort underwater, think about what you would like to devote to while diving and pursue these interests. Specialty courses satisfy almost all expectations. Fatigue and overexertion increase your respiration rate and may
decrease your regulator performance. If you feel tired or overexerted, stop, stay calm and breathe, you'll see that everything will be alright. If necessary you can slowly surface.

7. **If you are not convinced, give up the dive.**
The courage of giving up is a difficult endeavour but represents the best way to prevent problems you may be unable to face.

8. **Surface slowly and pause for a safety stop at five meters.**
It is the best way to prevent decompression sickness.

9. **Wait for a reasonable safety time before flying or going up in altitude after diving.**
Consider that after a dive it is best to wait for the most possible time before flying. Wait at least 24 hours.

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**Congratulations!**

You are at the end of the first step. Did you see how many things have to be considered? Since this is not your first course, you are for sure carefully applying many of them since a long time. You understand that safety is guaranteed by a chain of many factors, none of them should be ignored. In other words, sun and calm sea are not enough to make a safe dive. From what you read, the importance of constant dive practice is evident. This allows you to apply prevention rules making them into a simple habit, like when you ride a bike or play tennis. The following chapters will be specific about different topics related to different problems which may arise during a dive.
What did you learn?

The goal of this exercise is to review the most important information of the Theoretical Unit. First of all, to improve your training, but also to better prepare you for your next appointment with your Instructor. Answer the following questions choosing the correct answer among those suggested, specifying if the information is true or false or writing the answer in the appropriate space provided. Give this form to your Instructor, if he finds any incorrect answers he will give you the necessary explanations.

1. Prevention is the best way to:
   a. face problems.
   b. impede that anything can ever happen.
   c. allow you to face any emergency.
   d. avoid as much as possible to have problems.

2. A good pre-dive psychophysical condition is necessary to:
   a. enjoy and have a good time during dive.
   b. face conditions usually considered as dangerous.
   c. both a and d.
   d. dive, keeping in consideration experience and personal limits.

3. True or false? Nutrition is not an important issue in recreational underwater activity.
   a. adopt a correct nutrition prophylaxis.
   b. ask about diseases you may encounter.
   c. know that excessive sunlight exposure may be dangerous.
   d. all the above.

4. If you plan a trip to dive in a tropical zone you should:
   a. adopt a correct nutrition prophylaxis.
   b. ask about diseases you may encounter.
   c. know that excessive sunlight exposure may be dangerous.
   d. all the above.

5. Principal guidelines to establish an emergency plan include:
   a. establishing dive time.
   b. both c and d.
   c. localizing the closest sanitary structure and knowing how to reach it.
   d. writing down useful telephone numbers.

6. An emergency kit includes:
   a. Pocket Mask and a whistle.
   b. first aid kit.
   c. surface signaling device.
   d. all the above.

7. The Pocket Mask is:
   a. a diving mask.
   b. a swimming mask.
   c. a resuscitation mask.
   d. all the above.

Minitest

1) It happens sometimes that somebody has only one regulator, in this case you should:
   a. tell him to stay as close as possible during dive.
   b. invite him to connect a safety regulator.
   c. going out of the water with at least 90 bar of air in the cylinder.

2) Equipment inspection is for:
   a. verifying weight.
   b. verification that all equipment works and is correctly positioned.
   c. planning an emergency plan.

3) Descent procedures include:
   a. something is wrong.
   b. let’s go up.
   c. exchanging snorkel with regulator.

4) Safety stop decreases DCS risks and has to be done:
   a. for 3 minutes at 5 meters.
   b. for 3 minutes at 2 meters.
   c. for 9 minutes at 5 meters.

Answers: 1b- 2b- 3c- 4a
8. If you see that your buddy doesn’t change the snorkel with the regulator while starting descent you should:
   a. stop him at once and signal him.
   b. let him descend along the line and signal him to use the regulator.
   c. never interfere with your buddy’s decisions.
   d. let him descend without signaling anything.

9. To prevent air problems during a dive you should:
   a. use all air in the cylinder only if your buddy’s safety regulator is available.
   b. often check the pressure gauge and signal your buddy about it.
   c. use all air in the cylinder, only in shallow dives.
   d. avoid constant breathing.

10. It is proved that a safety stop decreases DCS risk, preventing the formation of _________ inside _________.
   a. microbubbles – of tissues
   b. microbubbles – the alveolus
   c. slime – of ear cavity
   d. carbon dioxide - the lungs

I declare to have reviewed all answers with my ESA Instructor and to have understood the explanation of those I incorrectly answered.

Signature_________________________date__________
Remember the nine rules because safety and fun are travelling together!
Chapter Two
Stress and problem management

What you will learn
For a diver like yourself, who wants to know more about safety through prevention and wants to be prepared to face most common emergencies related to underwater activity, this chapter has an important role. From Chapter One, you understood that if you carefully follow prevention rules you will most likely make your diving day a safe and pleasurable experience. Then, why do problems sometimes still happen, just when it seems everything has been thoroughly thought over? Reading this second part, you will become familiar with the concept of stress, its causes and individual variability. You will learn that what is a simple routine for you, could be very stressing for your buddy and viceversa. We’ll also see how to manage stress effects, focusing on self rescue and intervention for you and your dive buddy which will be both be compatible for you and the environment. Rescue techniques are quite interesting. The overall diagnosis and the instant choice of procedure to adopt will make for your rescue operation a success without big risks.

It’s true, stress can be a very subtle enemy, certainly the worst one. It doesn’t like to be seen and can be difficult to understand, especially when it acts upon emotional factors. Experience in time will certainly help you more than what you can read and study, although reading will give you significant suggestions for reflection and observation that will allow you to focus your attention on the right place at the right moment.

Generalities
Stress... who doesn’t know this word? We can say it’s a relatively new word. In fact, it was used for the first time by an English doctor only in 1936. Today it is for sure one of the most fashionable terms and maybe not so abused as you may think, since it indicates “any organism reaction under any stimulus action”. It goes from uneasiness to wellness, with all we can imagine: think about a person that has finger pain, a euphoric child playing or even someone who is just driving a car. Children today use stress to address a frustrating and uncomfortable situation - leave me alone I’m stressed,
don’t stress me out, what a stress! -and so on. The analysis could go on for hours but since we are speaking of scuba diving, let’s stay in this field. Psychophysical aspects along with social and individual tendencies bring out different character traits in people, even indirectly. This includes divers who possess the same attributes both in and out of the water, be it responsible, witless, focused, distracted, relaxed or stressed. Consider that human beings also react differently to common stimuli. For instance, two people can be together in a visibly rolling boat and while one prepares the equipment with confidence, the other may not be able to do anything because they are affected by sea sickness.

A stimulus which generates stress can be of all sorts and sometimes it can become a chain reaction. A physical stimulus has both physical and psychological effects, let’s examine a few cases.

**Physical and psychological stress**

Have you ever been cold underwater? It can happen, even after having carefully evaluated environmental conditions. Well, what were you thinking while finning, in a tucked posture, trying to move your neck the very least as possible to minimize water entering your hood edge? Maybe you were thinking about getting out of the water, you were not enjoying yourself, you could care less of what was in front of you while you were swimming. Fish, gorgonians or the beautiful wall covered by sea daisies, none of which was really catching your eye. You were not even watching your instruments, so caught up in the situation. Only two ideas were dominating your mind: signaling your buddy that you wanted to surface before time and the safety stop. Three endless minutes! See? A simple cause of physical stress from water temperature gave you both physical discomfort (because you were cold) and psychological, because of anguish. Two types of stress, both at the same time.

Remember that mind and body are very much connected. Any kind of physical stress will always correspond with a psychological one, but watch, the opposite is also true. If you are still attending or once attended school, you know what exam anxiety is. An unpleasant feeling, that also causes physical uneasiness, such as a stomach ache. Also falling in love has “body related symptoms” such as excited heart rhythms, sudden hot flashes, trembling and so on. More or less, divers can also suffer from the effects of stress. This includes those who are calm, those who are anxious and also those who have years of diving experience. **What is important**
is being able to recognize first in yourself and then in your buddy, the warning signs of stress, which could cause problems.

Origins of physical stress:
- environmental factors: seasickness, cold (temperature), current, nitrogen narcosis
- inadequate equipment
- alcohol and medicines
- illnesses
- physical efforts

Origins of psychological stress:
- physical stress
- environmental factors: visibility, rough sea
- anxiety or panic attacks
- negative mental attitude
- excessive euphoria
- performance anxiety
- buddy's obligations
- involuntary dive buddy separation

Stress effects
In the following paragraphs we will highlight, through easy examples, causes of stress (important from a prevention point of view), stress effects and its behavioral manifestations (important for immediate recognition and intervention).

When a diver is under great stress, his perception and analytical abilities are compromised. This especially regards the surroundings with potentially disastrous consequences. Think about nitrogen narcosis, which can nullify a diver's judgment ability and make him forget basic rules like not letting go of the regulator. Besides personal limit considerations and self rescue abilities, recreational diving emphasizes the buddy system, and not just by chance. This not only reinforces the social aspect (i.e. sharing of experiences) but also guarantees mutual assistance, from suiting up to rescue, if necessary. When the overall capability of a diver's perception decreases, we cannot expect but a little or no reaction. A diver in nitrogen narcosis needs help surfacing from his buddy because he may not be able to think clearly by himself.

The final effect of a stress stimulus chain reaction, which escalates when uninterrupted, is fear and uncontrollable panic. During the exercises of this course you will also practice panic simulations and you will quickly realize that dealing with a diver in this state is much more difficult than it is to learn how to recognize early

Minitest
1) One cause of physical stress could be:
   a. cold
   b. heat
   c. both

2) True or False? A physical stress cause can also lead to psychological stress.

3) When a diver shivers from cold he should:
   a. vigorously move his hands.
   b. go to higher depth and continue with the dive.
   c. end the dive.

Answers: 1c - 2True - 3c
warning stress signs, first in yourself and then in your buddy.
Here is a summary of principal stress signs. They will
give you a better idea, but just remember that you
always have to objectively evaluate the wide context of
any given situation. Watching a diver holding onto the
anchor line is not the same thing as somebody wanting
to climb up, in terror.

Principal Stress Signs
_Rapid and superficial breathing_
_Fixed gaze or look of anxiousness_
_Queck, sporadic movements_
_Difficulty in equipment assembly_
_Entry in the water without fins or mask_
_Mask removed on forehead, on surface_
_Heavily hanging onto the anchor line or to the ladder_
_Irritability_
_No answer to the ok signal_
_Denial of any problem_
_Belief of having unexisting ear problems_
_Belief of having unexisting equipment problems_
_Quick or confused ascent signals_

Pre-diving stress
Plan accordingly to personal limits and experience
Paolo visits Giacomo to propose a dive, a particular one,
in fact. In a pinnacle, with beautiful gorgonian bran-
ches, often with current. The day is great, both friends
are physically fit and the sea is calm, but Giacomo thinks
he’s not familiar enough with that type of dive. He has
doubts about the proposed location because he has
never dove in current before. The problem is, that he
feels sorry saying no to Paolo, who seems enthusiastic
about the dive. Giacomo proposes an alternative but
that is not convincing enough, he doesn’t even want to
say no to himself and feels a certain discomfort due to
all this pressure. **How do you think this day will be?**
It doesn’t mean that everything has to go wrong. If
Giacomo decides to go with Paolo, he may find out that
a dive in current can be very enjoyable. If he renounces,
maybe this would drag out his dilemma of actually
diving in current, if that is what it is, for a longer time.
The fact that Giacomo is thinking all these things, even
with anxiety is positive. He is considering his own limits
and if he decides to give up the dive it certainly would-
n’t be the end of the world.
**What would you do?** Would you go just to please
Paolo? But then again, maybe you wouldn’t enjoy it that
much because you would feel too anxious. Would you
decide not to go for fear that something would happen or would you think that after all it could be a wonderful experience? These are precisely the right questions. You have to evaluate the answers based on the strength of your mental attitude, your own limits and your risk perceptions. You should always have these thoughts mentally ingrained in your mind and certainly, so should those more experienced than you, who sometimes may undervalue important aspects and run into more risks, just because of their excess in confidence.

The day will be beautiful for the two friends. Giacomo decides then to call the Diving Center where his instructor works. He prefers doing the dive in the company of an expert and maybe he will actually enroll in the “Current Specialty Course”. Paolo is equally happy, even though he won’t be going out in his own boat. Furthermore, if weather conditions or safety concerns were an issue, Instructors would have the final objection going on the dive and both Paolo and Giacomo wouldn’t cast hard feelings toward one another. What do you think of this ending?

The possible answers to the stress. Prevention is the direct solution to the problems.
Suiting up:
This process is very important because many times it is possible to perceive early warning stress signs even before entering the water. You are on the boat with your buddy and the Diveleader said that you’ll need around a half an hour navigation.
You are fine. You feel fit and didn’t waste time to have already adjusted/ tighten your BCD to the cylinder. You want everything ready so you can listen to the briefing when the boat stops. You just introduced yourself to your buddy for the first time and suddenly you get the impression that something is wrong and not following standard procedure.
You notice, in fact, that your buddy’s cylinder is still aside without BCD and regulator, while he is already wearing his semi-dry suit. What are his intentions? Today the sun is strong, his suit seems to be new and maybe it would have been better to wet it or at the very least wear it within a reasonable time from diving. While opening the cylinder valves to check regulators and pressure gauge, you think that maybe it’s best to have a little talk with him. At the moment he is struggling with his zipper, not only is he already wearing his suit but he also wants to zip it up.
The boat is very comfortable and provides much shade but your buddy who is visibly sweating and clumsy, has his suit on and stays under the direct sun. This is an important moment. You think he must feel uncomfortable. “So, how are we doing, is everything fine?” you ask. “So so, it’s very hot. I have a new suit but I thought it would be easier to put on. Instructors put these semi-dry suits on in a flash” he says. “Ok, don’t worry but you’re sweating a lot. Stay where you are. I’ll take a bucket of water and help open your zipper a little, you’ll see that it cools you off”. After you slowly pour some water over his head and zipper, he immediately feels better. “I really needed it, thanks, you know it’s been some time since my last dive and today this heat took me by surprise. What do you think, do I still have time to assemble the rest of the equipment?” “Of course, I’ll help you”.

These kinds of scenarios happen, but usually if you intervene promptly the dive won’t be compromised. Anyway, there are real possibilities that on a hot day, a person who does not have the expertise can run the risk of a heat stroke or begin the dive in a very stressful state.
Stress on surface

Floating and panic
Heat exhaustion, sea sickness or dive stress, can lead to unthinkable actions. Sometimes it happens to actually see someone entering the water without fins or mask. If their water skills are mediocre, you might witness some incredible panic scenes with the unfortunate person who, not realizing that he has the BCD on, grabs the anchor line and with all his strength tries vigorously to climb up. Someone who is properly suited up, correctly loaded and with an inflated BCD, most likely will float no matter if he wears fins or not. So, besides the cause which is certainly important to prevent, effects from stress are powerful and can sometimes inhibit rationality and good judgment skills with anybody.

If you are on the boat, you can try instructing him to inflate the BCD (often he can’t even hear you), throw him the lifejacket with line just behind him and tell him to hold on or you can enter the water with fins, mask, mouthpiece and a floating device that he can hold on to (a BCD or a lifejacket) that you can keep between him and you. A diver in panic can be dangerous and will do anything to hold on to you even bypassing you with all his strength and dunk you underwater.

If you are already in the water with the equipment, keep distance and inflate your BCD so you can float but still have freedom to move. Try to make him reason and be ready to use the regulator in case he comes too close.

A panic attack on surface usually is provoked by overestimating possible dangers. This is a big expenditure of energy and generally ends in a short time. If you see the diver floating and not choking or drinking, simply keep your distance until he comes back to his senses. Rarely a person that experiences a panic attack on surface will want to continue the dive that same day.

It’s best to evaluate and recognize someone showing signs of uneasiness, before anything happens and make sure that all equipment is in order. Anyway, you will practice (in open water) with your Instructor the correct approaches to intervene in case of panic.

Equipment inspection
We already discussed about it in chapter One. A prevention rule always to respect, on the boat or on the surface, even if it was the third or fourth dive for the day: every time you must inspect the equipment with
your buddy!
A weight belt may be incorrectly fastened and can open and slip away during the dive. If the BCD buckle is improperly closed, it would allow the cylinder to fall backward. This will require your buddy’s help, unless you take the cylinder off to reposition the buckle, then tighten and clasp it. This is a difficult and uncomfortable maneuver to accomplish while in mid-water. Chapter Four will give you a complete overview on problems related to all the equipment. Equipment inspection allows you to prevent almost all of these problems, many of them due to quick assembly or distractions. Once again, due to stress.
Many times a person brings his stress from home or from the office. Even though, in general, underwater activity becomes a release (when somebody “disconnects” from bills, office, files, etc.). A diver can still be tired or weary and not pay necessary attention to important procedures.
By experience we can say that almost all problems happen on surface. Many of them are caused from haste, while suiting up or forgetfulness, while making the final check. Insist with your buddy if he is reluctant to dedicate the minute needed to check. To inspect one another’s BCD, valves, Air, Ballast, Alternate Air Source location and testing regulators actually takes little time. These procedures should then be followed by descent signals just before descending.
Stressed divers can start the descent with the snorkel in their mouth instead of the regulator and generally they come up quickly from a few meters, some having also breathed in water. This is an error due to stress, not a major one. However, not changing the snorkel with the regulator indicates a clouded head and not having complete awareness of what you are doing. Unlike forgetting the popcorn before going into a movie at the theater. Tension that some inexperienced divers suffer from can apparently lead to absurd mistakes like this. Executing precise descent signals with your buddy before going down is the best system to avoid these types of lapses.

**Stress underwater**

**Descent and Equalization**
Two divers are descending along the line. One of them descends quickly, the other stops having noticeable ear problems. While he tries to equalize, he remembers when he was on the boat and his buddy, (one of those who knows everything) insisted on the fact that the
descent had to be quick so as not to waste too much time. Furthermore, he didn’t do anything else but persist and put pressure on him while they were getting ready, using intrusive suggestions and teasing him about his equipment. Now his ear equalizes, so he descents another meter, but stops again. His buddy gets impatient and quickly comes up. Irritated, he shows him the computer, grabs the top of his fins, and using the line, pulls him toward the bottom. This is not an exaggerated scenario. We often see these kinds of behaviors that usually end up with tympanum problems and infuriated fights.

You wouldn’t believe it, but many of these people are in close relationship with each other, husband and wife, father and son, two brotherly friends etc. The pressure that one person can inflict on another often leads to stress. The most relevant factor for some people is time. In fact, two divers (like two going to ski or play tennis) can have conflicts and unusual reactions due to stress. It could happen that one day you or your buddy both have equalization problems. Remember that they will unlikely be resolved if there is a constraint on time. Only calmness and concentration will allow you to efficiently try again to equalize, maybe going up a meter and trying other techniques that you didn’t think about right away. A buddy’s support is extremely important and the buddy system should not start to be in effect only when descent is finished. Also along the line, reciprocal assistance must be equally shared, otherwise you both risk interrupting the dive before reaching the bottom.

**Cramps**

You already know that a person can have cramps for various reasons: a fin kick against current, a pair of fins too rigid or simply a medical factor, a predisposition. Propulsion is not necessarily an element connected to athletic skills, highly developed leg muscles and/or expensive fins, even if these factors are somewhat relevant. In fact, equipment is important and so is physical fitness, but there are many divers in advanced age or children who dive and, for sure, they are not able to cope with long or hard dives. There are also people who don’t like to move much and often stay close to the boat during the dive, a fin kick just once in a while to watch what is around. It’s not a coincidence that many get passionate about underwater photography or marine biology. A great performance is not needed to take beautiful shots, or discover how many species of sea slugs you can find during a round under the boat.

You are not obliged to limit your movement while you

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**Minitest**

1) True or False? Panic attacks on surface can be caused from over estimating dangers.

2) If you plan repetitive dives you have to inspect the equipment:

   a. every time before going underwater.
   b. accurately before the first dive.
   c. accurately at first and last dive.

**Answers**

1 True – 2a
dive to avoid leg cramps. The important thing is that you evaluate your possibilities and those of the surroundings. Just remember that with all stress conditions, interruption of underwater motor activity is fundamental. Don’t hesitate if you feel that your leg muscles start to pull, Stop! You already know the technique of flexing the fin toward yourself. This is also equally valid if you realize that your buddy has a cramp and cannot solve it by himself. Stop and then help him to gently flex the fin toward himself.

**Overexertion**

Underwater activity is characterized by the fact that there is a lot of equipment needed and some people get stressed only because they have to depend on it. Almost everybody, at least once, have experienced overexertion during a dive, many within the first minute of underwater breathing because they were not familiar with the techniques, others in more than one occasion. There are people with a low stress threshold and struggle to tolerate having to wear the equipment and the bulkiness of all that stuff! Think about how many people avoid the elevator because it’s a narrow, small place and would prefer to work harder climbing steps, not to be trapped in there! Luckily, those who choose to go underwater, usually don’t possess such strong phobias but there are some intermediate level divers who courageously risk that anyway happily practicing scuba diving. Many divers only go in lower depths (10-12 meters) with strong visual and evident reference points. They would prefer a plateau instead of a drop off, a plunge directly on the dive point instead of moving in midwater. You will get plenty of experience during the Diveleader course on these subjects. There are many kinds of divers with different needs and one of the tricks of this job is finding them out and showing them how to have fun! Overexertion, in any case, can also manifest because of efforts, tiredness, inadequate equipment, current, too long of a route, etc. One important thing to know, that will be useful learning to recognize, is that underwater stress, even of different nature, almost always provokes quick breathing, which if not solved, becomes a real air hunger. As you know from the chart on principal signs of stress, rapid and superficial breathing is on top of the list, as the number one sign. You can break a dangerous chain of events that would certainly bring you to panic, by avoiding overexertion or quickly resolving it, once realized. But how can you do it? Having a conversation with whoever will be your
buddy helps you to understand who he is. See if he is calm and exchange some opinions. Take notice if he is visibly nervous, if he talks too much and too fast. If he takes a long time to suit up or if he is too silent and anxious. These are the signs you must learn to evaluate when you are out of the water. This already means a lot (as you previously know), since the one who starts the dive under stress is the one that will easily have problems. How do you avoid overexertion underwater? Remember from Chapter One (Prevention), dive if your mental state is positive and do not try more than you really want, move slowly. Water has a high density and you can get tired, avoid counter currents, or at least learn how to deal with them. You will also receive suggestions in Chapter Three related to environmental factors. Wear adequate equipment and check the load. Overexertion management, self rescue. You are underwater and realize that something is wrong. You are not feeling at ease and particularly feel anxious. You realize that you are breathing faster, like you were out of air. At this point you should not go on finning, you should stop immediately!

As you remember from the Open Course, the advice was, Stop and breath, you’ll see that everything will be alright!

You can hold onto the line or if it isn’t directly available, delicately rest on the bottom. If you are in midwater, your movements should be at a minimum and signal your buddy who can assist you. Now concentrate on breathing, slowly taking a few deeper breaths, and you will soon see that it’s easier to retake control, if you are still. Your reasoning capability will soon become clear again and now you can think of what it is that is creating problems. If your mental state before the dive was positive and you were feeling physically fine, maybe something in the equipment is not allowing you to breathe well, maybe there is current or maybe it was just a transient sensation that now, is gone.

After checking the pressure gauge and there is good air flow coming from the regulator, the suit allows you to breathe well, both load and BCD seem to be in their usual place and environment conditions are favorable, you can go on with the dive maybe swimming slower and ascending a little. But, if your problems persist, don’t force on anymore, maybe it’s best to signal your buddy to go up.

Intervention for a buddy in overexertion
If you see that your buddy is having problems, signals that something is wrong or he doesn’t answer to the ok
signal, look at him carefully. Since being close, you can easily notice if he is in polypnea (overexertion) because his respiration increases, the bubbles come out fast from his regulator and you can see his eyes through the mask. Check to see if he has a calm look, or eyes wide open or if he seems anxious. Invite and help him to stop. Then with slow signals, tell him to breathe deeply and keep contact if it is possible, making him feel your presence and signaling ok for him not to worry. This will be, in most cases, your most important task. So remember that preventing overexertion (polypnea) is certainly the best solution, as we have said many times in previous Chapters.

Environmental factors
Temperature, current and visibility are three environmental factors that can cause stress. These can affect you in singular form (just current), inter mixed (current and visibility) or all together. Certainly, cold is an enemy from which you always have to defend yourself against. Not only during a dive but to avoid hypothermia, as well. As you know, cold increases nitrogen absorption and adding the two factors, you could easily run the risks of narcosis symptoms, besides running into more risks of decompression sickness. Current and visibility are undoubtedly two causes of stress in a diver, but they can easily be reversed to the advantage of the diver if he learns how to correctly manage them. The dive in current, in fact, is a classic example of adaptation to environmental conditions and thousands of people regularly dive in places where current is always present (i.e. Maldives). The night dive is the favored one by many divers and even though you usually can’t see behind the torch beam, many divers affirm that it’s relaxing like in no other dive. Other people (even without having experienced this), shiver and shake their head at the very thought of diving at night. Low visibility or the ideas that you can have about it, may induce stress. But in reality many divers regularly dive or even complete their Open Water Diver Course in lakes, where you can’t even see farther than your nose. Certainly, either in current or in low visibility, you have to keep in account of correct planning, which includes many specific considerations. Therefore the best thing is to receive proper training and preparation beforehand. Another consideration about environmental factors regards sea sickness and the uneasiness this causes many people. Either before or after the dive, or under-
water, where many suffer the billow of the waves, sea sickness is a factor. Many times a diver is forced to give up the dive because his conditions prevent him from doing any kind of activity, thus taking away any chances to have fun. If you are on a boat and suffer sea sickness, you probably won’t feel like diving and perhaps you can’t wait for the moment that the boat begins to travel back to firm land. But suffering from sea sickness can also start to happen once you are underwater because of billow, generally accompanied by low visibility.

When the water is not clear and there is a surge, only a carpet of dead eel grass leafs are usually visible which motion back and forth. Many divers have reported to having had the illusion that the rocks were moving and this sensation is probably at the base of problems with unbalance.

Absence of precise, natural reference points can result in a real underwater condition of sea sickness. If you are in a similar situation, you may easily have dizziness and sickness. Stop and breathe deeply. You may want to lean against a rock or your buddy. Think first to control your breathing. In a sometimes subtle and stressing situation like this one, which can become fast and superficial, could lead you to polypnea (overexertion). Once still, try to focus on your position in the surrounding space. Close your eyes for a moment and then try to change your horizon gaze, take note of other references that are not the bottom, since with these conditions it may play tricks on you.

If you decide to interrupt the dive, communicate with your buddy and go up, respecting the normal ascent rate of 10 meters per minute and stop for the safety stop.

You will also find other useful information about seasickness in Chapter Five on First Aid.

**Buddy separation**

Buddy system is efficient when during immersion the two divers stay close and communicate often with each other. This will offer a guarantee of quick intervention in case of necessity and decrease the probabilities that both get away from and loose one another. If this situation occurs, the anxiety component can also assume dangerous implications and the diver can get stressed and easily be out of breath because he finds himself alone and thinks about what can happen to his buddy. In localities much frequented by divers (like certain places in the Red Sea) sometimes it happens that groups of divers from different boats meet underwater.
and involuntarily couples change or one diver gets unintentionally mixed in another group. Usually nothing happens. Paradoxically, the original buddy is considered “missing” but only at the end of the dive, when he realizes that he came out on another boat and instead of his wife now he has a mustached buddy, but the buddy system has remained efficient. All kidding aside this really happens when there are ten boats with dozens of divers all wharfed to the same buoy. Diving in group or alone, you and your buddy should remember the rule you have learned in the Open Water Diver course, Stay calm and look for each other no more than a minute, then come up. Also, observing the equipment’s color and style can be an easy tool to use for locating and this tool (or trick) is very useful if you go out on a boat with a diving center, you may come to know with whom you are going to dive just ten minutes before diving.

If you get involuntarily separated, carefully look around you to spot your buddy without leaving the point where you are. Also look up, it is often possible to see the air bubbles rising even from many meters away, if visibility allows it.

Nitrogen narcosis
Nitrogen is not the only gas responsible for strange effects. Oxygen toxicity is more dangerous because in its acute phase it will act on the central nervous system, even causing consciousness loss and convulsions. Nitrogen narcosis is the most probable for recreational scuba divers that stay within limits, it can also manifest at a higher depth. While oxygen on the other hand becomes toxic at partial elevated pressures at more than 60 meters.

In Chapter Five (first aid), we will discuss in detail the effects of oxygen toxicity.

Do you remember the signs and symptoms of nitrogen narcosis? The diver can lose lucidity and reasoning abilities, which are two important factors for problem solving. One of the nitrogen predisposing factors is anxiety, so the buddy system has an important double role. The partner can intervene to help the other in case of symptom manifestation, but if you dive in company, you decrease the predisposing factors because the safety feeling increases in both. Dive planning, especially if it is a deep dive, should also include this danger, even though the predisposition and manifestation of narcosis effects vary from one to another.

If your buddy is in an evident narcosis status he could act foolishly, such as going off far away, descending to
an unplanned depth or taking the regulator off his mouth. Intervene as soon as you recognize a sign. Grab his arm, signal everything is ok and slowly bring him up until he recovers and answers to signals. If you have to descend to retrieve him take account of the risks, control your stress level, your breathing, time limit and air reserve.

Air shortage
There is not only one cause, like there is not only one way to intervene in this type of situation.
Causes that lead to air shortage may be brought on by a stress condition that may be caused by different factors. The result doesn’t change, but the way it can happen does. This is interesting for those who analyze stress signs to be able to recognize and intercept in time, before the need of an emergency intervention. Let’s start reasoning. Air underwater is the most important thing we have, so why run out of it? Or, how is it possible to run out of it with all the rules and prevention we put in practice? Even with the fact that it is very easy to check the pressure gauge! If somebody gets to this point he must be massively under stress, if he forgets to check the pressure gauge during immersion. Unless he is a victim of an unpredictable catastrophic event (being trapped) or has decided to hurt himself (but there are more recommendable ways in this case).
It is virtually impossible we can say, that a diver with a good mental disposition, respects the limits and uses efficient equipment can find himself in such a dangerous situation.
Some different examples can include:
One who starts off wrong. Ignoring prevention rules and equipment inspection, also assembling the equipment on an almost empty tank and realizing it only after a while, maybe when he is at the bottom. What was he thinking about while he was on the boat? Dive anxiety can play these unfortunate, paradoxical jokes but it is fairly easy to recognize an anxious person while he is preparing his equipment. There are people that will connect the BCD upside down...and are even able to close it! Furthermore, an anxious diver will easily experience overexertion which we have previously discussed.
It is possible, that an otherwise normally calm person, can get stressed out once he is underwater.
Air management during a dive is for some people a stressful problem, particularly one who has a strong psychological dependence on their buddy. Simple awareness of consuming too much air can put a diver in a condition of consuming even more, even if this problem...
Too often check the manometer is the best method to avoid ending air.

Panic underwater

Panic is certainly one of the most dangerous reactions, uncontrolled fear, the last stages of a stress cycle we
have previously discussed several times. Did you ever see a person reacting in an uncontrollable way at the mere sight of an animal? Reptiles and/or rats are classic examples. Running away in terror is usually what takes place, the desire to be safe. Overreaction from perceived dangers can be easily managed, if not controlled.

In underwater activity, panic episodes paradoxically happen more frequently on surface, and during practice of the “rescue circuit” you will have different practical exercises in water with your Instructor. Panic can manifest in two ways that are connected. Passive panic is a kind of mental block. The diver doesn’t react to stimuli or signals, eyes are wide open and there is the feeling that from one moment to the other something can happen. Stop at a distance and focus for a moment on the scene. Try to stimulate him, delicately take his arm and help him to ascend calmly, making him feel your presence and often signaling ok. It is important to intervene immediately while appearing calm, not to allow the condition (already at the stress limit, per se) to suddenly evolve into active panic. Active panic, that can immediately succeed passive panic or intensify on its own, is a dangerous condition both for the victim and for the rescuer. It can be triggered only by one cause, air shortage or simply the belief that there is an air shortage. As air shortage is rare, active panic underwater is also rare. Prevention and early recognition of stress signs almost always impede that this event happen, but should you have to intervene in this kind of situation, think first about your limits.

A diver in panic will want to solve his situation by rapidly going up to the surface, often spitting out the regulator and holding his breath, basically doing everything that should not be done underwater. These are the worst conditions. You have to deal with irrational and instinctive fears which usually can be uncontrollable and that could involve you in dangerous and hazardous manoeuvres. Stop the diver, trying to slowing him down, if you see that there is nothing else you can do. However, be aware that he could take off your mask and regulator or hook you in his fast ascent. Also acknowledge that because of stress, while you try to stop him, it could be you holding your breath. Because these situations are rare, it is fundamental to acquire the necessary habits in recognizing early stress signs.
Congratulations!
Did you see how many precautions you can use to increase safety? You took another good step forward and now, next time you are on a boat for a dive, try to evaluate stress aspects, trying to interpret and recognize signs.
Little by little, you will build up your pillars for your growing experiences as a diver and you will become a precious and reliable buddy for those who want to accompany you underwater. Just remember try not to be too nagging with your buddy!
What did you learn?

The goal of this exercise is to review the most important information of the Theoretical Unit. First of all, to improve your training, but also to better prepare you for your next appointment with your Instructor. Answer the following questions choosing the correct answer among those suggested, specifying if the information is true or false or writing the answer in the appropriate space provided. Give this form to your Instructor, if he finds any incorrect answers he will give you the necessary explanations.

1. True or False? A simple cause of physical stress while shivering during a dive can cause strong psychological stress.

2. When a diver is under great stress, capabilities compromised are:
   a. perception and analysis of surroundings.
   b. recognizing stress signs.
   c. help intervention to his buddy.
   d. all the above.

3. Principal stress signs include:
   a. both b and d.
   b. fixed or anxious look.
   c. bubbles formation.
   d. denial of any problem.

4. In underwater activity stress signs can manifest:
   a. only during dive.
   b. already during pre-dive activity.
   c. only in difficult dives.
   d. only in deep dives.

5. Rarely a person who has had a panic attack on surface will want to go on with the dive in that day, therefore it is better:
   a. try to prevent panic.
   b. convince him that nothing can happen any more.
   c. early recognize stress signs.
   d. both a and c.

6. True or False? Almost all problems happen on surface and many are caused by divers that quickly suit up and don’t check the equipment with their buddy.

7. It could be one day that you or your buddy have
equalizing problems, remember that they will unlikely be resolved if:
a. you go up a little a try to equalize again.
b. you will use calmness and concentration
c. you have time restraints.
d. you also use other equalizing techniques.

8. If you see that your buddy has problems and signals that something is wrong or doesn’t answer to the OK signal he could be:
a. in overexertion.
b. in passive panic.
c. in nitrogen narcosis.
d. all the above.

9. True or False? It is possible that an apparently calm person, is under stress only once he is underwater.

10. Panic which can manifest in two ways are ________ that ________.
a. normal and passive – are connected
b. active and passive – are completely independent
c. active and passive – are connected
d. normal and passive – are connected (are completely independent)

I declare to have reviewed all answers with my ESA Instructor and to have understood the explanation of those I incorrectly answered.

Signature_______________________date________
Chapter Three
Environmental factors

What you will learn
At Maldives, one of the most famous diver’s paradises, dives are almost always in current. In those places, contrasting the currents that skirt the most beautiful sites is often difficult, or even impossible. So divers let the same current transport them, while the boat awaits anchored in an agreed spot, or follows them on the surface. It may seem awkward but it’s really nice to take advantage of a current for pure fun.
Obviously, this type of dive needs a proper plan that keeps in account rules and special techniques, therefore it’s ideal to first attend a specific Specialty Course. Environmental factors are not only fundamental for a correct dive plan, but also play an important role when managing cases of emergency and rescue operations. Carefully considering local environmental factors can determine the probabilities of an emergency. On the other hand, unpredicted and sudden changes can be a cause of stress with possible, serious consequences, especially if associated with individual conditions in a diver (depending more or less on their water skills, experience and sensitivity).
On the Open Water Diver course you learned to plan a dive considering environmental conditions. You also learned about wind, waves, breakers and surge, currents, tides, rain and temperature. All these factors, if analyzed for dive site or in the immediate proximity, allow you to make an adequate plan when you decide to dive by yourself or with your dive buddy.
However, consider that ESA Points, Diving Centers and Diving Clubs provide this service with their guides and boatmen, sparing you the effort. Whichever you choose, we will now discuss in particular local environmental factors, analyzing concepts that will be useful for prevention and for rescue interventions.

Local environmental factors
The wind
Did you ever wonder how certain people, especially fishermen, can predict the weather? They are able to tell
you immediately which wind is blowing, if it will change direction and at what time. Many people remain speechless when they listen to these people formulate a forecast in five seconds, without any kind of help, just trusting their “nose”. If you notice, when you ask a fisherman, or someone living very close to the sea or a lake, what the weather will be they literally look up and check the wind.

You probably recall from the Open Water Diver course that the wind is a major factor, responsible for the waters movement. You need information about the wind not only to know the sea scale for your dive, but also to evaluate the weather’s stability. If changes in the wind direction are expected (for instance at a certain time), and these changes are in concordance with the boat trip, you will be able to wisely choose the anchorage spot and you will also know which way the wind will blow when you return to land.

If you are not very familiar with winds and their direction, you can make use of a compass and a rose star (you see an example here) as a simple but practical way to gather important information. On a windy day, stay in an open location (open as much as possible) with the wind from behind. Position the compass with the lubber’s line in front of you holding it like you would underwater (do you remember the Open Water Diver and the Advanced Diver courses?). You can already find where it blows from, just read on the display or the window, the degrees or the cardinal points corresponding to the lubber’s line. Identifying North in respect to your position can be useful as well. Hold the compass flat and let the magnetic needle stop to point North. Now close it with the marks on the ring nut and turn until the lubber’s line falls within the marks: you are now facing North. If you don’t have a compass, ask some experts to point North for you, then you can easily observe which direction the wind is blowing compared to it. On the rose star you can find the name of the wind and from this you can get general indications (proximity). Always consider that if a wind is blowing too strong, no matter where it’s coming from, going out with the boat is not a good choice.

Winds that blow from the North are: the North wind at the center, the North East wind from the North East and the North West wind from the North West. Northern winds are usually dry and colder.

Winds blowing from the South are: the South wind from the center, the South East wind from the South East and the South West wind from the South West. They are usually humid and warmer winds. There are also the
East winds blowing in from the East and the West winds blowing from the West.

Without deepening too much into meteorology, this information will be already of great use. At this point, you just have to ask about the dominant winds on your dive location and what their influences are with local meteorological conditions.

General, fair wisdom says that if the wind blows from land, it shoves off. This could make the return difficult, especially for small boats. Keep in mind that the sea can often appear smooth from land, when the wind blows to the sea. Therefore, if you go out on a boat, look back once in a while to evaluate the waves compared to the wind and if you are not convinced, go back before you are too far out.

Observing a common map, you can notice that if you are somewhere in Liguria or South Corsica, wanting to go out, the North wind would shove you off (from North to South). If you are in North Sardinia instead, conditions would be different and you would have the same wind in front, blowing from the sea or completely crosswise.

This would be fundamental if you had to plan a dive in one of these places, even in favorable weather conditions, and simply analyzing the time of the wind. Especially, in case of stable weather, it’s important to know what winds at breeze regime are. These are often reported by bulletins.

Conditions change from day to night. During the day the earth gets warmer. This causes an air attraction (wind) from sea to land. During the night the earth gets colder. This time it will be the sea, having become warmer during the day, to attract air from land. If you pay attention to the time of the winds during the day you will notice that, in coastal zones, between midday and 1pm the wind starts to blow, usually warm and humid, and goes on until evening.

This already gives you information about the best hours to go out at sea and to come back to land. It will also tell you about the best time to dive.

There are also hours during the day when there is no wind, or when it’s weak. For instance, in the morning until midday and in the evening (after 6pm) when it usually gets calm and the sea becomes flat, like a table. In specific times of the day or night a local breeze, even insignificant, could make the navigation difficult (espe-
cially for small boats) and also the choice for the right anchorage point. Almost all diving sites, at least in the Mediterranean, require anchorage. There are only few dives in current where the boat is free and at the moment we are still far away from a legislative plan that provides the use of fixed buoys for underwater activity. As a consequence, the choice for the best diving time must keep in account local winds, besides other factors that we will discuss.

A strange effect provoked by the winds, useful to consider when going out on a boat, is the “Venturi effect”. When, in the presence of wind (even light wind) and you have to pass through a narrow point, (a door, an outside hallway or a small valley), you will notice that in that same point, the wind is stronger just because of this effect.

Knowing this aspect of the wind can help you to choose the right spot to anchor.

At this point, we could say that the best hour to dive is in the morning because there is less wind compared to the afternoon. Maybe not too early since visibility could be reduced, (because the sun is still too low) although you can remedy this inconvenience by bringing a torch. Consider that early in the morning there is less traffic, both on surface and underwater, especially in localities much frequented by divers. If you had to plan a night dive instead, it would be better not to wait too long.

On your way back, late in the evening, you would have the nightly breeze which is cool and often tense, certainly not ideal for navigation at night.

As you read in Chapter Two about stress, weather conditions can play bad tricks. The wind, if particularly tense, can originate more or less big waves that can bother the diver, especially on surface when beginning or ending the dive.

So, the choice of time and the location are important factors. Some places may appear calm even in the presence of
strong wind, but once on the dive site you may realize that conditions are even worse than expected. Depending on the wind, you can decide to dive in one site instead of another, sheltering from the wind and waves. However, it is always proper to get information about local effects, because winds can create conditions different from what is expected. This is common with strong winds, like the North West wind. Those who dive close to the big Italian islands knows this very well and are very strict in deciding time and dive sites. In these locations, the wind is stronger because of straits between the two coasts (continental and island or between two islands), determining precise logical choices. It is always interesting to find out about the effects of environmental conditions. Locals and local operators can provide you with information and advices about the boat trip and the dive. This is also useful when preparing an emergency plan that, as you remember from Chapter One, should always be included in any good dive planning. Usually, those who live in close contact with the sea soon learn to distinguish normal conditions and to report sudden changes in the weather hours/day in advance, based on few atmospheric signs. In some cases, a cloud is all they need to know which wind will blow and with what kind of intensity.

Waves
They are the sea’s movements. The wavers, leaping up, pitching and rolling you feel when you are on the boat, are caused by the waves, which are in minor or major way, an unavoidable condition. There are days when the sea is flat and still (in reality this can’t be true because there is always a minimum of waves/ movement), but as we previously said, even in stable conditions of good weather, at a certain time winds blow and the sea can become choppy or confused. Wave motion assessment is important for both navigation and the dive itself. Those who go with divers during their excursions (but don’t actually dive) should consider these factors as well. People that have to wait for a while on the boat are the ones who more often suffer from sea conditions. Seasickness, (discussed in Chapter Two, speaking about stress connected to environmental factors) has similar affects as car sickness. Only one difference: who is seasick is usually on a boat not in motion and can’t wait to be going again, while one who suffers from carsickness is usually in a moving car and can’t wait to reach his
destination. Divers, as said in the previous chapter, can suffer from billows underwater, but these are rare events. Suffering more likely happens on the surface. Waves can create situations of panic in the water, especially for those who are not used to be tossed around. Rough sea is never a favorable condition for diving or swimming. Even though waves can be more dangerous close to the coast than in open sea on a boat, and for simple swimmers in their bathing suit compared to divers wearing a BCD to float and breathing from the snorkel or regulator, you should never expose yourself to these risks. Being equipped as a diver can be favorable in a situation of emergency, but adventuring in the sea with risky conditions can seriously jeopardize even the most experienced diver’s safety. It could happen, to find yourself in sudden rough sea conditions with wind and a strong current on the surface, especially if these conditions arose during the dive. What to do then, besides carefully planning the dive with due consideration for environmental factors and self limits? Being caught unprepared by sudden tempestuous conditions can cause too much stress for some people, who can easily panic. It is necessary to consult local forecasts and to also follow a few prevention guidelines.

• **Have a floating line astern with a support** (lifesaving device at hand)
• **Get help to enter the water** (it is preferable not to walk wearing fins when the boat is rolling because of the waves)
• **Establish a good, positive buoyancy** (inflate the BCD without exaggeration, so as to not force the thorax and impede respiration)
• **Equipment inspection must be accurate but without waste of time** (participating in several dives is necessary to get better familiarized with every procedure, otherwise inspect the equipment on the boat)
• **Limit time on the surface** (groups or couple that will dive together, ready on the boat or on the surface)
• **Hold on to the line in a proper way** (without hanging on it or grabbing it too strongly, better to let it freely slide in your hand or around your arm)
• **Use a descent line** (consider that in presence of waves and strong wind, there will be current)
• **Ascent to the surface along the line** (checking the presence of waves or gusts of wind, which are easily visible from the safety stop)
• **Follow instruction to go up on the boat** (hold on to the line, do not stop under another ascending person, wait until you are on the ladder and wait for the assi-

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**Minitest**

1) Wind is the major responsible factor for_______.
   a. tide time
   b. the waters movements
   c. visibility

2) In the Northern hemisphere, winds from the North are generally ________, while winds from the South are_______.
   a. warmer and dry – colder and humid
   b. colder and dry – warmer and humid
   c. warmer and humid – colder and humid

3) The best time for diving is morning hours because usually _________.
   a. there is less wind compared to the afternoon
   b. wind is constant
   c. wind blows only from the sea

**Answers:** 1b – 2b – 3a
stant OK before taking off the fins. Evaluate the right moment to put your feet on the first step, do not linger in chats while going up but free the space for other divers and quickly find a comfortable and safe position. During the navigation it is possible to find choppy sea conditions, with waves that are generated in the same place where the wind is blowing from. Or you can find long sea conditions, with waves outside the place where the wind generated them. The further the distance from where the wind is coming, the bigger the intensity of the wave motion will be: this distance is called fetch.

As you can see, the wind is certainly in relation with wave motion. However, you can find even very high and long waves without wind in that moment, or tense winds that form at the maximum small superficial breakers, squirts and sprinkles with low and short waves.

Consider also the spot of the anchorage, usually close to the coast. In case of choppy sea, the boat and who is on it, would receive the arriving waves and those that, splashing against the wall, come back (surge).

Observe the horizon line, maybe using a pair of binoculars. This can help you to understand the sea scale, an important factor for your planning.

In some days, the sea line appears very jagged with high and long waves that travel fast, while from your position on land, the sea is calm. If the navigation by boat is very long, you would risk ending up in a rough sea zone, long waves and surge, inadvisable both for anchorage and dive.

Certain long sea conditions in the offing can last for days, and so can the wind. If the conditions on land are good, the sea is calm and the wind is temperate, you can look for alternative dive sites entering from shore.

Rough Sea and rescue
Wave motion, and the sea scale in general, represent an important factor for rescue procedures in case of emergency. The fact of having to intervene in a rescue indicates per se, that something has been probably neglected.

If the current environmental conditions are critical, there should be trained divers in excellent psychophysical conditions: this is also prevention.

If it is necessary to rescue somebody in rough sea conditions, personal limits must be considered first. Stop, breathe deeply and then decide what to do. In Chapter Six we will discuss rescue techniques and emergency management. You will practice directly in open water many of the most manageable techniques you could
use during a rescue procedure, corresponding to different realities.
If possible, an intervention without entering the water, from the boat or a pier, could resolve many difficult situations. This is always preferable. If the victim to rescue is unconscious, or exhausted, on the surface, it can be useful to enter the water without weights (or with minimum, but in a way to balance the forced position due to the suit), simply with mask, fins and lifesaver device (or something the victim can hold on to and that can keep both victim and rescuer afloat).
In rough sea the use of mask and snorkel is important (for you to be able to see and breath), the Pocket Mask, or other type of mask, for resuscitation and good protection for the victim’s airways.
Rescue techniques generally envisage the learning of reviving a victim with the snorkel. However, in this case, it must be considered that using a snorkel with a purge valve for the water implies the use of other techniques to close the opening during artificial respiration.
Even in case of rescue intervention in the water, it is best to first make sure of having additional and adequate assistance out of the water, including a line, to constantly have in contact or at hand.

Visibility and orientation
Visibility is another factor often affected by the wave motion, which puts sediments in suspension, causing cloudy water. Sometimes visibility is really low, especially with a muddy bottom. Experience in orientation and good psychophysical conditions are required in this type of dive to prevent stress from billow and visibility, which we explained in Chapter Two.
Water movements have to be evaluated depending on where they occur. The following are some specific examples. If the wind, caused by a large fetch, for days and days has swept away waters, even miles away from the planned diving location, visibility could be limited. In fact, if upstream from the dive site along the wind direction, there is a heavily silted bottom or a port where dredging (or digging) activities are regularly executed, or big ships are in transit, huge quantities of sand and slime would be lifted and hung in suspension. The shuffling of the waters would transport all this, even at great distances. The result is cloudy water for days and therefore low visibility. It is opportune, even when strong winds and heavy sea conditions are over, to get information on local visibility in order to choose an appropriate site for diving.
A similar phenomenon can happen when it rains for
many days. In coastal proximities huge quantities of fresh water, dirty with soil, flows to the sea. Checking the transparency of the water from a pier can be useful if diving in the immediate surroundings, but when it rains, it’s best to evaluate what the conditions of visibility are several miles away. Local divers, more reliable than fishermen in matters of underwater visibility, can give you more precise information.

Best visibility conditions, anyway are in rocky bottoms, even though a lot depends on the season. Summertime in the Mediterranean offers the best conditions. In other periods there is an incredible phenomenon of reproduction of microscopic organisms that constitute plankton and are in suspension in mid-waters. In wintertime, water that sometimes appears transparent takes on a yellowish color under the immediate surface. Good diving occasions are however during the whole year. You just need to consider the f.a.l. asking the experts or, with time try dives with a companion, out of season. There is concrete data about dives in conditions of low visibility which are practiced by divers living close to lakes, almost the whole year. The desire of entering the water is irresistible and many, not to miss out, dive with these conditions.

The passion for diving wins, just don’t forget that your safety can never be neglected. Many divers are very skilled in accurate planning, natural orientation, the use of compass and dives with low visibility because they learned and regularly dive in lakes, where these rules are the base of safety. If you are thinking about diving in lakes, or in poor visibility conditions, you may consider it as a good opportunity to attend an ESA Orienteering specialty course. Ask your ESA Instructor for more information!

The time of dive is certainly important when speaking about good or low visibility. When the sun is high in the sky, (around midday) its rays, coming down straight, illuminate much better under the surface and almost all underwater locations receive direct sunlight.

You can verify this phenomenon diving twice in the same spot during different times, once at mid morning, then at mid afternoon. In one case you may perfectly see even at a good distance, having perfect visibility (also in mid-water) being able to sight shoals of dentex that hang out in specific places. In the second case you would have to bring with you a torch to highlight not only halls, but simply a wall side exposed to shade after a certain time.

There are conditions when visibility can be so bad (or too good) it creates problems.

### Minitest

1) Diving in rough sea:
   a. is a normal condition for divers.
   b. can be a very risky condition.
   c. is safe if using a fast boat.

2) In choppy sea conditions, waves ________ while with long sea conditions they ________.
   a. are higher – are faster
   b. push off to the sea – bring to land
   c. are generated from where the wind is blowing – are outside from where the wind generated them

3) To be prepared to sudden changes in sea conditions you should:
   a. arrange a floating line with a lifesaving device in the water before the dive.
   b. prepare rescue flares.
   c. have the surface flag well exposed.

4) In case of a rescue in rough sea, the rescuer should:
   a. consider his own limits.
   b. intervene without entering the water, if possible.
   c. both a and b.

**Answers:** 1b – 2c – 3a – 4c
It seems a paradox, but in the second case you can assist to more episodes of recklessness, negligence about safety rules and pre-diving planning with consequences that may create problems.

Extremely low visibility is usually experienced in lakes, (excluding those in the mountain where visibility is typically great!) which has already been discussed. It is necessary to plan the dive very carefully to ensure safety and also to have fun, there are plenty of occasions for gratifying dives.

In some tropical seas, like certain sites in the Red Sea, visibility can be exceptional.

Many divers report that at 25-30 meters depth, looking down towards deep overhangs, they could quietly observe sharks that are maybe at 70 meters. In favorable conditions, water transparent and warm, life evidently exploding everywhere, sometimes puts a diver in the condition of risking more, day after day at deeper depths. This is often the case of the most experienced ones. Sometimes the risk is high. Diving in depths where the percentage of oxygen in the air reaches too high partial pressure, puts the diver at close contact with risks of oxygen poisoning (you'll find more details in Chapter Five, about First-Aid).

In other cases, visibility can make you forget to check the computer. In some divers, who unwittingly descend too deep, nitrogen narcosis can easily happen. It causes a growing euphoria for the surrounding environment, becoming difficult to manage and dangerous, especially if limits of no-decompression are exceeded.

When visibility is a potential source of problems, it is necessary to follow some general guidelines:

- **Adequately plan your dive** considering environmental issues and getting information about environmental factors and conditions typical of that location
- **Organize proper assistance out of the water**
- **Stick to the dive plan** remaining more conservative in case the conditions are not as expected.
- **Constantly adhere to the buddy system** and have an action plan in case of accidental separation from your buddy.
- **Keep in mind, in every dive, the respect for recreational dive limits**
**Currents and tides**

As you learned in the Open Water Diver course, currents are caused by the wind, the rotation of the Earth and by the tides. You probably also remember the rule about beginning the dive against the current so to have an easy return to the boat or shore without getting tired.

At the beginning of this Chapter, you read about an example of the environment (Maldives), where it is usual to dive even in very strong current. In the Mediterranean Sea, currents are not so impetuous. However, some dives can be more demanding just because these currents are unexpected. Some divers, especially the less experienced ones, often live this experience with stress, noticeable increase of air consumption, and overexertion. Others even quit the dive.

If there is current on surface, usually it is felt soon after entering the water. When the current is very strong it can quickly bring the diver toward the stern and even far away from the boat, if he doesn’t find a handhold. If you dive with a Diving Center, this aspect is usually considered during the briefing and necessary measures are adopted, like easing out a line and a floater astern.

Descent, dive and ascent procedures are also carefully discussed.

If the dive is autonomously done with a dive buddy, make sure to know the current direction first and begin the dive against the current.

As a good rule, have a surface signaling device, shorten the planned navigation if the current is strong or even quit the dive if a strong current direction pushes you toward the offing. Recommend your assistant on the surface (a qualified boatman or somebody that can properly assist from land) to be prompt and alert.

Currents underwater, besides being physically perceptible, are also visible when observing the right benchmarks. Branches of gorgonian vibrate like little trees shaken by the wind, the beds appear to lay down as if a big comb had passed over it, and small sized fish like damselfish (there are many Mediterranean and Tropical species) all position themselves with the snout against the current and also vibrate or so it seems. While in absence of current, the individuals (in a shoal) may appear spread around facing different directions. If you observe these details while descending along the line, you can have a realistic
idea about the current, which may not be present in the first meters from surface. As you would shelter from the wind, you can also look for points underwater that are sheltered from currents. Once established (presence and the direction of the current) and you realize that this is too strong, find protection behind some big rocks or unexposed walls. You can also dive in a location that is not reached by the currents in that day (ask for information before).

A situation similar to the Venturi effect (we mentioned it when discussing the winds) can also be experienced underwater. It happens often to pass in between big rocks or to cross big channels similar to real canyons as wide as a road. Currents in these passages can be really strong, just because the water is channeled like in a river. If you decide to cross, consider that the center is the point where the current is at its maximum strength. You probably noticed this while crossing a bridge on a river. The current tends to abate on the sides while in the center it can be really strong. The strength of a current is invincible and trying to fight it is useless and counterproductive. Traversing abeam, both on the surface (in positive buoyancy!) and underwater, is helpful to reserve stamina. In case you have to rescue and tow an exhausted diver, carefully consider these possible dangers.

Tide excursions can be a cause of current, even though they are never occasional. Tide tables, which you can consult on sailing directions, give information about tide time. Know that in the Mediterranean Sea this phenomenon is not so evident like in other seas and oceans. Tides, as you remember from the Open Water Diver course, are movements generated by the attraction of the Sun and the Moon, the celestial bodies that influence the Earth, and when they are in line these movements are more evident.

Local Diving Centers know the timing well of tide excursion and their dive planning has to keep this phenomenon into consideration. Sometimes, little problems may delay the return in which boats are forced to wait, even for six hours, until the water re-enters the lagoons from which it has retreated, to cross the pass that goes to the pier. If you dive with a dive buddy without using a Diving Center, evaluate anyway the local environment with these outfits, at least a couple of times. Get good information about tidal excursion to avoid the risk of running up against currents at first, (due to water retreat or return), and then being dry with all the equipment maybe at several meters off shore.
Temperature

In Chapter Five we will talk about First-Aid. Also, as a topic of discussion will be the pathologies associated with heat and cold. For what concerns the dive, you know that you have to properly protect yourself from the cold and the first signal sent by your body – shivers – are to be considered real alarm bells. The choice of a suit has to be made based on local water temperature and it is not absolutely correct to associate summertime-5mm suit and winter-dry suit.

It also depends on when you dive, but mostly where and how this is going to happen.

Fun is certainly the scuba diving purpose, beside those who work underwater which is outside of recreational diving.

Relaxation and fun, many times have been said and recommended in our courses, is ensured by prudence and no factors can be neglected, including diver comfort during the dive. How to know which is the proper protection?

Water temperature is one of the repeating factors, with very few variations, every year, every month, the same. Keeping a log book up to date is also for this. Note down the temperature given by the computer or by electronic integrated devices, then check the variations that increase in summertime and decrease in wintertime, this information can give you a better idea for the suit needed. This is important in sites you regularly go to during the year and, with interface programs actually available for computers, performing a research through past years dives is also easy and fun.

You can access the electronic log book to have any kind of information that had been transcribed, including temperature in and out of water.

This is also valid if applied to trips in far away localities. You may come back many times to the Red Sea or to the Maldives for your diving week and it may be useful to review your notes on your underwater database (log book).

For sure you observed or "felt" at least once, thermocline. If you remember, it was described previously in the Open Water Diver course as a sudden temperature change. This is an interesting phenomenon because, besides perceiving the sensation of a sudden temperature change, you can also observe it. A layer of warmer
water, usually above, clearly separated from a layer of colder water, reveals a thin shaking line between the two.

You can even stop at mid-water (you have already a very good buoyancy) and enter with your hand in the layer below, like you see in many films with special effects, when the actor penetrates a liquid metal wall and enters on the other side. Temperature variations can even be of many degrees. Therefore, you could be cold even after a brief time. You can continue your dive comfortably remaining within the warmer water. There are other possibilities to dive in cold water, which is a condition often present in the Mediterranean during wintertime. It is the case however, to dispel a myth: you won’t get used to warmth loss, especially if this happens in an environment (water) different from the one we are used to (air). Perhaps Eskimos are used to a “tempered occidental” cold, but it’s also true that they know very well how to properly cover themselves. If you would like to have a confirmation, ask the Instructors and underwater guides, for they dive several times a day and are always well protected, even when water is warm (it’s not unusual for them to wear a 7mm suit in water that is 26 degrees).

If temperature goes below 20 degrees you could get cold quickly. A good choice to comfortably continue to dive when water is colder is to wear a dry suit. This topic is very interesting and offers opportunities that were unthinkable until a few years ago.

Prices are now more affordable, due to wider model availability, and divers demand is constantly increasing. To know the characteristics and the correct use for the dry suit, refer to the ESA Dry Diver course. Ask for information at an ESA Point or ask your ESA Instructor.

Regarding temperature out of the water, it is necessary to always have a windbreaker when you go out at sea (it can be light, if it is warm) and in general, be adequately dressed. When it’s warm, you should also consider humidity (weather can be from dry to very humid). Cover yourself in any case, avoiding direct sun exposure and choosing loose, comfortable, light color clothing. During some seasons abroad, for example in Egypt or the Mediterranean in full summertime, it is advisable to wear white and to protect your head with a hat or white foulard to prevent heat strokes. You’ll find information about First-Aid in case of hyperthermia in Chapter Five.
Congratulations!

As you can see, it is important to get information about local environmental factors as close as possible to the dive site. General indications can only properly determine weather or sea conditions concerning wider areas. However, simply being a little more on the North or the South, even in a limited area, can represent an incredible difference with weather conditions that are important for the dive.

It is also important to remember that you must not over exceed certain limits and fun should not be pursued in challenging natural elements. Don’t forget that you shouldn’t expose yourself to conditions that are not optimal for the dive, while you have to be prepared to unforeseen occurrences that may catch you by surprise.

We also discussed comfort during the dive. A dry suit if correctly used, allows you to safely and comfortably deal with cold water conditions, usually considered non-favorable for a normal dive.

Minitest

1) If you plan to dive in current you should have ___________ and begin the dive___________.
   a. a rear expanded BCD to facilitate buoyancy - against the current
   b. a surface signaling device to be used if needed – against the current (if possible)
   c. a pair of very stiff bladed fins to fight the current – against the current

2) How do you know which is the most proper suit to use in February?
   a. Since it is not possible to determine water temperature, it is proper to always use a 7mm suit.
   b. In that month it’s better to always use the dry suit.
   c. Get informed about local and seasonal temperatures.

Answers: 1b – 2c
What did you learn?

The goal of this exercise is to review the most important information of the Theoretical Unit. First of all, to improve your training, but also to better prepare you for your next appointment with your Instructor. Answer the following questions choosing the correct answer among those suggested, specifying if the information is true or false or writing the answer in the appropriate space provided. Give this form to your Instructor, if he finds any incorrect answers he will give you the necessary explanations.

1. Some helpful tools to understand wind’s direction are:
   a. the compass.
   b. the rose star.
   c. a waving flag.
   d. all the above.

2. When planning a dive you should know:
   a. which are the dominant winds.
   b. which local meteorological factors can determine principal winds in the zone.
   c. which are the atmospheric pressure values in hPa.
   d. both a and b.

3. Venturi effect can increase the intensity of:
   a. sound.
   b. the wind.
   c. oceanic currents at the offing.
   d. the surge.

4. True or False? Rough sea does not represent a favorable condition for underwater activities.

5. Not to be caught off guard by sudden tempestuous oceanic and atmospheric conditions it is necessary to have at least:
   a. a floating line astern.
   b. be sure to have proper assistance on surface.
   c. surface along the line.
   d. all the above.

6. Having to rescue somebody in rough sea conditions it’s necessary:
   a. to act as fast as possible, without thinking.
   b. to consider the wind’s direction.
c. to consider personal limits.
d. to risk everything.

7. True or False? In rough sea conditions, if possible and with adequate equipment, it is better to prefer a rescue intervention without entering the water, from the boat or pier.

8. If you dive in current with the boat anchored, a valid system to signal your position is:
a. being fit to fin against the current.
b. to correctly use the surface signaling device.
c. to correctly use the compass.
d. to correctly use the safety regulator.

9. True or False? Visibility can depend on suspension, bottom and rain.

10. Good planning should never expose the diver to objectionable diving conditions. Anyway, a diver should always:
a. be prepared to fight rough sea.
b. be prepared to unexpected events that could happen.
c. have an exceptional survival ability.
d. be trained to physical activity.

I declare to have reviewed all answers with my ESA Instructor and to have understood the explanation of those I incorrectly answered.

Signature____________________ date___________
Think the future.
Protect Ocean Life
Chapter Four
Diving Equipment
Role

What you will learn
In this chapter you will find an analysis of the equipment components with related problems. This will be very useful for you to dive with equipment, always efficient, which is fundamental to guarantee safety and fun.
Inadequate or non efficient diving equipment can be a source of stress and, as you read in Chapter Two, this can also be very dangerous. You will also find important advice for correct maintenance, which for some equipment’s parts must be specialized and periodical.
Do you remember our magic acronym, W-H-W? Here too, you have to know where to begin, how it has to be done and when it is the case to put the equipment into the hands of experts.
Without the proper knowledge and improvising repair of damages or scuba unit regulations, features provided by the manufacturer will no longer be guaranteed. Therefore the responsibility of any improvised repair, falls on the one who does it improperly, but at first on whomever uses that diving equipment.

The story
Have you ever watched an old movie on a space trip, walks on the moon and astronauts that hop on that arid soil? Without that fitting those seals would be impossible. And who could have said that, after thirty years, space trips would bring us to Mars? Someone is already selling lots on that planet saying it’s a great investment for the near future. Without going so far, you can imagine that if a man of only hundred years ago can see what we do today for relaxation and fun (going underwater), he would say—it’s impossible! You have to know that in reality many centuries ago man was already diving. In Roman times the Urinatores (men that go underwater) were holding their breathe diving to recover parts of a shipwrecks load, equipped with a sander lead to descend fast (who knows if they were equalizing!). However, it’s only during the last part of the twentieth century that the equipment developed has allowed diving to become a fun and recreational activity. We are certainly well equipped, or at least we should always be, looking pretty much like astronauts. Actually the two activities have something in common. For example, the fact of moving in a different element and adapting to it and the use of similar equipment (at least for breathing and keeping body temperature). While “recreational astronauts” will have to wait
some time to cut down transportation expenses, the sea, a lake or a pond have always been more at hand. This plays in favor of underwater activity and the consumers demand has been growing, thanks also to the modern didactics.

Big manufacturers are discovering new materials and today they feature anthropomorphic robots that stamp thousands of fins a month, always more efficient and with catching designs, certainly less expensive than before, at the same level of efficiency. Speaking about money, the initial cost for diving equipment is still high, but sooner or later everybody will eventually have their own. Undoubtedly, this also brings some advantages in terms of safety, so we can say it’s well spent money. You understand what we are talking about, if you have your own equipment. In little time you can get attached to it, you get more confident and learn to use it better. Just to give an example, you wouldn’t change your BCD buoyancy, but here it is also important not to get stuck to it.

If you maintain your equipment it will last for years, and this also means financial savings. However, as advice, if you have the opportunity and with the due precautions, try different fins, mask or even a BCD once in a while from yours. You may find out interesting details and get even better.

**Maintenance and problems**

Philosophies of ESA courses are based on problem prevention. You certainly have noticed this important aspect. All rules you have read about since your first course, including those about equipment care and maintenance, translate into advantageous practical aspects: safety and fun, instead of waiting until something happens and then having to intervene.

You chose to enroll in this course, therefore you probably have leadership qualities and you could soon become a good Diveleader. Once in this role, while giving your students much advice, you will also have to be an example for them. Equipment maintenance is not based on disassembly, regulations and improvisations.

Simply, it is necessary to put everything away after rinsing it with clean, fresh water and keep it away from the sun. Some parts need technical maintenance, which means that periodical check-ups by competent, trained technicians at a shop is needed. Consider that you may take a great interest in attending a Course on Equipment Maintenance. This way you will learn about practical aspects and equipment components that will expand and improve your diving horizons. Even a foggy mask is a hassle and sometimes you hear: “Today it really didn't go well. The glass in the mask was constantly fogged, I spent half a dive flooding and clearing the mask, but nothing worked!” This it is not a dangerous situation but it is stressful and affects the dive. Luckily now, thanks also to the efforts of the Instructors, who work efficiently during their lessons focusing on little inconveniences that can be avoided, the majority of the divers have fun and are satisfied.
Let’s consider equipment related problems that are most common or that could happen, without having to always speak about accidents.

**Basic equipment**

Did you know that the majority of equipment sold is the one for Snorkeling? Lots of people use mask, snorkel and fins even if they just swim on the surface. These three tools are becoming of common use for beach activities and that means that the usage ability increases therefore their diving problems can decrease.

**The mask:** do you remember from the Open Course the rules to choose an adequate mask? Ok, let’s go over some more details. Do you like the one with a transparent silicon frame? If you want some advice also try a black one. It may cause less reflection that could bother you or maybe you would prefer the first one anyways because this last one gives you too much sensation of closeness. Then check the strap, the quick adjustment one is better and some cheap traditional masks don’t have it. Also, in the same day of buying the mask, buy a replacement strap for it.

Fogging up: a new mask easily fogs up underwater, this is well known, so it is best to do something to avoid it. There are many treatments, especially when the mask is new, even though you weren’t aware that there are also non-fogging masks, more expensive but they work. You can use dish detergent (which has a good degreasing action), toothpaste (slightly abrasive) or carefully fumigate the glass inside with a lighter and then wipe it with a clean, dry cloth. Also still valid, is the habitual procedure of spitting on the glass before diving (it is more efficient when the mask is dry), rinse it and wear it, possibly without taking it off until the end of the dive.

Mask equalization: The squeeze effect is not pleasurable and you will find more information about it in Chapter Five (First Aid).

You have to get used to considering equalization as an important maneuver both for ears and for eyes, since barotraumas effects are dangerous for both. Advice: descend slowly along a line, in front of a wall or along the bottom, this will help you to concentrate on these simple procedures.

Breaking of mask or its loss: Lens breaks usually happen because the mask gets crushed when somebody leaves it on the bottom of his dive bag, otherwise it’s a rare event. Many have a little protective hard box to put the mask away. If you check the strap before diving it’s improbable to loose your mask. Yes, the strap can break underwater. If this happens it is probably because it was already frayed. Only those who prepare their bag and suits up in a hurry, doesn’t check the equipment in water or soon before entering it, seriously runs into this risk. Loosing the mask typically happens on the surface for those who enter the water with a giant scissors or duck dive without securing it with their hand.

Flooding: In general, a lock of hair or the suit’s border can be responsible for mask flooding. Also, a partial disassembly of glass
and frame, often imperceptible, causes flooding. Before diving, check that the mask, while inhaling, sticks to your face without strap and has the frame free from hair or other obstruction. Know that you can find a one piece mask, where glass and frame are welded together with ultrasound and cannot come apart, this is not a problem. Obviously if the lens breaks you have to buy another mask.

The snorkel: Those who don’t use one often regret it because on surface one has to swim constantly keeping their mouth out of the water to breath. With current and breakers it is indispensable, but there are also those who think, using the air tank is the same thing, it’s not.

It is certainly better to save air (in the cylinder) for the dive and have the snorkel. It is true, some models are uncomfortable to clear and water tends to remain in the curve before the mouth-piece.

Market surveys show that today almost everybody prefers to purchase models with the self draining barrel. Actually they clear well, you just have to check before entering into the water that the feature is there (it often gets lost). It has to be free from sand or other impurities otherwise the snorkel would be unusable.

Loosing the snorkel: sometimes you’ll find a snorkel, or two, at the bottom of the sea. Most people usually loose it while going up on the boat because it was not well secured. There are many models with clips and slots you can use. Find one that is reliable and always check that it is well attached at the mask strap on the left side, before entering into the water.

Fins: maybe the item, that more than others, undergoes quick changes in time. Joking a little bit and without going into particulars about design and hydrodynamic studies, let’s say that we should be allowed to try them on before the purchase. The foot pocket (that can be “full-foot” or “open heels”) hasn’t changed much during the years. This is different for the spade. The new composite materials and blades with different shapes, allow comfort and performance, once unthinkable. However, there are a few things to evaluate.

Cramps: a blade which is too stiff requires more effort, with consequent risk of overexertion and cramps, especially in subjects that are not trained or predisposed.

If the blade is too soft, such as play fins for children’s snorkeling, it could collapse from a vigorous kick and have a scarce performance. A reliable shop, an instructor or Diveleader will help you choose the proper fins for your requirements.

If you take a current in the wrong way a cramp can always happen. Do you remember the techniques to remove a cramp, from the Open Water Diver Course? Generally, divers suffer from cramps at the tricep muscle of calf or thigh and in both cases it is usually enough to stretch/extend the contracted muscle. You can do it by pulling your fin blade toward you or helping your buddy flex his blade to the inside: The important thing is to stop if you
were finning.
You will again try these techniques in the second part of the course.
Loosing the fins; fins with open heels, as you know have straps, therefore rules about prevention, maintenance and care have to be considered. Before diving, make sure that both straps are there and that they are not broken, also make sure that you are wearing your fins. It seems awkward, but once and a while somebody jumps from the boat without fins because he forgot to wear them. A strap may open during the dive and you may loose a fin. It is important to maintain calm, recover your fin if possible and try to swim using the one leg swimming technique which you will learn during the practical part of this course.

The Wet suit
With mask, snorkel and fins, which are commonly used with non-diving activities, the suit is the piece of equipment that a diver thinks about buying as soon as he completes a Scuba Diving course. This is a necessary requirement to protect divers from cold and abrasions. You know what the heat loss effects are while in the water and you also know that you need a suit, even in warm water. In Chapter One we spoke about cold prevention, now let’s see what kind of problem a suit can cause. Almost all serious problems can be pre-emptively solved: the wrong size can cause overheating and prevent steady or regular blood circulation if too tight, or can cause cold and excessive water circulation if too large or of insufficient thickness. Sudden rips or tears generally happen during a hurriedly suiting up or suiting off.
In the first phase it is important to cautiously pass the limbs through the parts that can easily break, wrists and ankles. In some cases it is useful to wet the suit before putting it on, especially arms and legs, allowing it to slide on better. When you suit off do so sheltered from wind, slowly and carefully, otherwise you risk damaging the suit from haste. While descending the first meters, a hood can adhere to your face, thus preventing water to penetrate, pressing the ear drum. Check that your ears are flooded and if necessary move the hood border, so that they are. If the suit becomes too tight but the size is right, the water may not be sufficient enough inside because the wrists and ankles are too tight, causing a squeeze effect that you can quickly solve enlarging the suit from the neck or wrists.

Dry suit and inflator hose
Dry Suit use requires a little more practice, but offers unquestionable advantages if you dive during the year in places with noticeable thermal excursions or if you live in places that are always cold. If you already used it from the Open Water Diver course, your Instructor prepared you to its use and possible problems. If you never used one but would like to, consider attending the ESA Dry Diver course. It would be the easiest solution, since you would
practice often and also analyze in depth the problems related to the use and maintenance of dry suits. In this context we won’t speak about problem solutions, since this is part of the Specialty Course’s specific program, but we’ll provide a few suggestions. Paradoxically a dry suit can be colder than a wet suit. Get information about the many models available and estimate further expenses for also purchasing the proper undersuit. Most common problems are related to inflation, deflation, flooding and buoyancy.

The inflation button can jam or stick, causing continuous flow, the exhaust valves can malfunction and bring the diver to dangerous uncontrolled ascents. A button can also get stuck, impeding the entrance of air which is needed for suit equalization, thus, squeezing it against the body during descent. Water entry in a dry suit happens because of a large or broken neck/ wrists, a hole or because of improvised repairs.

If there is complete flooding because of large tears, the suit will lose all air and it will then be necessary to use the BCD to ascend. The use of a dry suit can also affect buoyancy. In fact, the ESA Dry Diver course also includes these and other specific exercises. Air can accumulate around the groin area and unbalance the diver who can find himself with legs up during ascent with difficulty in air release. Do not get scared. Equipping a person that has never dove, without basic knowledge (not holding their breath or how to equalize) and then throwing them in the water, could easily lead to catastrophic situations. For you the majority is done. You have in front of you the attractive horizons of specialization and the learning of prevention and rescue, which we are studying together in this course. Speaking of rescue, if you have never used the dry suit but have to rescue somebody that regularly dives with it and you are in this kind of situation, remember that the suit is connected to the diver by the inflating hose and that you have to disconnect it, to take off the equipment. Generally the bayonet connection is like the BCD low pressure hose. If your buddy uses the dry suit, ask how he disconnects the hose. It may be unnecessary to disconnect it, until the injured diver is at shore or next to the boat. Once inflated, the dry suit provides good buoyancy, and won’t lose air even if the hose is disconnected.

**The ballast**

Many would like to do without it. If you ever dove in warm water with a very light suit, maybe you didn’t have the ballast (weight belt) and no doubt you realized the change in comfort. The necessity of a suit implies a ballast system and the more cumbersome we become, the more we have to add to be neutral. Problems due to ballast systems can be a cause of stress. Difficulty during the descent and during the safety stop, difficulty to find the position during the dive, consumption increase, risk of overexertion and panic can all be caused by insufficient or excessive ballast, poor positioning, loss or inability to get free from the ballast.

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**Minitest**

1) Equipment maintenance is not based on:
   a. putting the equipment carefully, away from direct sun.
   b. regulator adjustments and improvised disassembly.
   c. accurate rinsing in fresh water after each dive.

2) To avoid the squeeze effect it’s enough:
   a. to inhale air from the nose during descent.
   b. to blow air from the nose during ascent.
   c. to blow air from the nose into the mask during descent.

3) In a person who is not adequately fit, very stiff blade fins would probably:
   a. favor cramps.
   b. serve to fight a strong current.
   c. be more expensive.

Answers: 1b – 2c – 3a
Neutral weight and positioning: you already know this, you have to float on the surface wearing the equipment, holding a normal breath, and have the water at eye level. Do you know how to correctly position the ballast? Let’s specify that there is not only one system. Luckily somebody invented the weight system integrated with the BCD. Many overweight people or with back problems were unable to continue diving because of the traditional weight belt. If this is your case or if you anyway want an integrated system, you can be handed the ballast to be inserted in your pocket when you are already in the water with your BCD on. Pockets are on the sides and in front, but try different kinds in a shop because sometimes the balance changes. Weight should be evenly distributed on the sides and front to favor ideal buoyancy, no matter which system you use. If you use a traditional belt, you can use the round weights (they press on you less), then divide the kilos in equal denominations and position them on both sides and in front, without compromising the quick release buckle opening or fastner. The buckle is what allows you to quickly release the ballast with one hand in case of necessity or simply before going up a steep ladder or an inflatable boat. If you have to release an integrated system instead, you have two grips. They are usually red, exactly in correspondence of the pockets and by pulling the grips they will release the weights from underneath. You will try to release yours and your buddy’s weight system during the rescue exercises in the water, while practicing artificial respiration. This is actually easier than what it seems! If you use a dry suit, the same rules concerning weight apply. To keep legs neutral (where water can accumulate) it may be necessary the use of ankle weights. Many prefer to avoid wearing additional weights and solve the problem wearing the traditional belt a bit lower, such as a bullet belt for holding cartridges. This lowers the pelvis and can be enough to keep the leg in the correct position. You can try both systems, but be sure to have necessary practice in the use of a dry suit and maybe attend a course.

Loss of the ballast: if you correctly close the buckle it is rare to lose the ballast. Avoid anyway releasing it during the dive if not strictly necessary. If you have to release it, make sure you are in a favorable position. Deflate the BCD and grab the belt on the opposite side of the buckle to avoid loosing the weights. The weight distribution has to be done before diving, but if it is really necessary, you can do it delicately leaning on the bottom, where you won’t cause any damage. Deflate the BCD and lean forward, opening the buckle and have the belt rest on your back. If you rescue somebody who is tired or in panic on the surface, invite him to inflate the BCD and try to localize the ballast system he uses. Find the buckle or the grips of the integrated system, and be ready to intervene if necessary. Remember that most of the problems happen on the surface. Approaching a diver in trouble is included in the water exercises of Chapter Seven, and they will familiarize you with this type of problem.
BCD and the low pressure inflator

Maria and her dive buddy are waiting astern the OK from the Diveleader to enter the water. It’s a beautiful day and the briefing was very interesting. They will observe, on a wide plateau at 12 meters, hundreds of Tridacne, the infinite graduate shading seas-hells that look like gems on the bottom. In Egypt this dive is called “Allah’s garden” and it will be important to keep good buoyancy. “It would be a great relief not to have the cylinder weight and to be able to swim like a fish” — says Maria, but Giorgio answers back: “Well, if you had known, like I did, times when the BCD didn’t exist, you wouldn’t complain today” Maria inflates her jacket a little, and says: “Yeah, I read something about it. Before the last twenty years only a few people used the BCD. Boy, diving must have been hard back then!” “Oh yeah” - Giorgio answers – “one of those few cases when I don’t miss the good old times, like my grandpa used to say”: “Look, we are ready. Bye, have a good dive. I’ll see you on surface” -

People were diving, not so many as today, but they were. The BCD is really a diving turnaround invention and today, thanks to this invention, that millions of people dive. You know its characteristics and you probably remember if it seemed to be easy early in the beginning or if you were a bit uneasy. Are there problems, in your opinion, that can be caused by this device? We can say that, being an important part of the diving equipment, its proper functioning also depends on the care and maintenance, besides the techniques for perfect buoyancy.

The size: did you choose a model and size which is optimal for you? The wrong size (too tight or too large) can make your breathing difficult and even cause overexertion. We discussed about this in Chapter Two (stress). Modern BCDs have adjusting shoulder straps and a good shop can give you sound advice about the right size. Before your purchase, ask your Diveleader for information about different models – jacket-style or back mounted – buoyancy control, air volume position (in front or back).

Inflation and deflation button: as you know they are close and sometimes a diver (not so much an expert) presses one instead of the other, inflating instead of deflating and vice versa. You have to get familiar with the buttons. The best advice is to have your own BCD that you will come to know after some use. Problems with the mechanical functioning of the buttons concern the inflating one, which can get stuck, with the inconvenience of constantly inflating the BCD, causing buoyancy variations up to a blow-up, if not controlled. Usually they are not violent inflations and you might not be aware of the problem at the beginning. Only when you purged once or twice and you are positive again, then you realize that something is wrong. At that point, it may be best to deflate and disconnect the low pressure inflator. If the purge button gets jammed, the deflating operation is useless, but remember that now almost all BCDs have the rapid purge button. Don’t hesitate, stay in vertical position, head up and pull the hose
downwards!

LP inflator: even with perfectly efficient buttons, the BCD can inflate by itself. Think that the LP inflator could cause the problem, disconnect it. Once disconnected, air is blocked by a small sphere, so you can check if there is an emission of bubbles from the inflator. Probably you found the problem, so don’t connect it again. These are operations that can be done with relatively calmness (it takes a moment to disconnect the inflator) but always think about buoyancy and ascent control. Button system maintenance includes internal rinsing but once a year it is best to bring the LP inflator at an appropriate shop, as you do for regulators.

Air, cylinder and valves

How many divers have their own tank? Not many. Mainly because Diving Centers rent them and they are included in the dive cost. Bulky and cumbersome for traveling and they have to be periodically checked as well as tested. Maybe it is also because the average number of dives per person is still low (around 15 in a year) so many postpone this expense, even because the most important thing about the tank is what is inside: air. How many times do you try or smell the air before entering the water? It is rare but not impossible to breathe contaminated air. See related information in Chapter Five, First Aid (breathing contaminated air).

Content and consumptions: This characteristic is seldom considered by those who don’t own a tank. Most people can manage a 45 minute, multilevel dive at 20 meters with a 15lt. cylinder and have enough air for the safety stop, this is true, but there are even considerable differences in consumption. Some are not experts, some wear much weight, others have a larger lung capacity, not to mention those who experience overexertion. They are often obliged to exit the water before the others, even at half dive. Generally, with more experience there is less air consumption, even though there are still differences in each individual because of physiological factors.

Here is the advantage of having a personal tank. It can be bigger for personal needs and to be free by last minute requests that sometimes cannot be met. It is important to ask, in advance, what kind of tank is locally used by Diving Centers and on boats (today you usually find 12 lt. on Italian boats while in Red Sea locations 10 lts. are mostly used).

Valves: You should know by now, that there are two types of valves, K or normal and J with alternate source. The first one can present the inconvenience of being incorrectly open. When this happens, usually a diver blames the regulator for not delivering air or he thinks of having a broken pressure gauge because the needle visibly rattles/shakes while he is breathing. During the equipment inspection with your dive buddy you have to pay attention and completely open the valve, going back half round if necessary. It would be good to repeat the sequence aloud and maybe, before
entering the water, check the breathing to see if the pressure
gauge shows strange signals. Certain country regulations, request
that you have a J valve even if you may not use it. Besides the
usual knob it consists of a lever that activates an alternate mecha-
nism. The risk is that it accidentally trips not alerting that you rea-
ched the reserve level. If you happen to use it, be sure to have the
pressure gauge connected to the first stage of the regulator. Air
loss and o-ring: a valve can also start to leak even if it seems well
secured. For example, after recharging it, while the cylinder gets
cold. Usually you can hear a whistle, but check if the cylinder is full
before leaving your house or before you set up your equipment.
It could have discharged during the night, obliging you to look for
another one if you planned a dive. Even if you don’t have your
own cylinder, you have to check the o-ring both for international
(Brida) and DIN connection, even if it’s common opinion that the
DIN connection is safer against possible gasket expulsion because
this is internal. In case the o-ring is spitted out, the air loss is sud-
den and violent and certainly you will have to finish your dive.
Therefore, check for the presence of the o-ring and its condition.
Correctly screw the first stage on so that it sits on the o-ring
without pinching it. If seating the o-ring properly, it will be impro-
bable to loose air from the cylinder. Observe and signal your
buddy any possible leaks from his valve. If they are not excessive,
like a bubble thread, interrupting the dive is not necessary. Both
of you must remember to frequently check the pressure gauge
and respect the buddy system.

**Pressure gauge and high pressure hose**

Sometimes divers, finning in one direction, surpass the half tank
level and can’t complete the return navigation, forcing their
buddy to ascent far away from the boat. These ascents are often
faster than the standard (therefore dangerous), without a safety
stop and having to share air with their buddy.

Generally this happens because the pressure gauge is not check-
ed sufficiently enough. The use of this instrument doesn’t imply
any special techniques, just a frequent check. You don’t have to
set it up, regulate it or anything else. Yet, once in a while there is
somebody that has to grab his buddy’s alternate air source becau-
se he’s out of air. The rules regarding emergencies, due to air shor-
tage are learned since the Open Water Diver course. However it
is desirable to avoid this kind of situation. It is obligatory to have
the pressure gauge but once and a while air management is not
properly planned.

**Prevention rules and control**

You have to connect the pressure gauge to the fist stage. If you
are not sure, know that the high pressure seat is marked with HP
and the hole is wider. You can also ask your Diveleader for help or
at the shop where you purchased it.

Turn it upside down and don’t look at it while you open the air,
which comes at high pressure, then check that the needle shows

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**Minitest**

1) A suit hood, too tight, could _________ therefore you could _________.
   a. cause squeeze – move your jaw and swallow repetitively
   b. cause uneasiness or tympanum damage – move the suit edge to enlarge the ears
   c. impede a good circulation – massage the ear zone.

2) If your dive buddy has the dry suit inflation system in continuous flow you can help him to:
   a. disconnect the BCD low pressure inflator.
   b. disconnect the dry suit valve.
   c. connect the dry suit low pressure inflator.

3) If a diver is in trouble on surface, to help him you should:
   a. stabilize a good positive buoyancy and identify your ballast system location.
   b. invite him to inflate his BCD and identify his ballast system’ location to release it quickly in case of necessity.
   c. identify his ballast system location and release it.

Answers: 1b – 2c – 3b
the charged pressure. Try to breath a couple of times from the regulator, the pressure gauge needle must remain still. Now you have to fasten and position the pressure gauge in a way that is visible while you swim underwater. If you see the needle visibly vibrating while you are breathing (down during inhaling or pressing the purge button), the cylinder valve is probably not completely open. You have to check the valve during the pre dive inspection. The pressure gauge, like other instruments, can break or get out of calibration. In this case it could show even 40-50 bar more than the reality. Always ask about the charging pressure and if you find discrepancies assume your instrument is broken and do not use it. Besides the normal rinsing procedure, have it checked once a year, together with the regulators.

High pressure hose: its particular feature is that it has to resist the direct pressure of the air coming from the cylinder. Therefore it is built not to explode in case of break. You can observe with the naked-eye or with a lens, hundreds of little holes covering the inflator’s external heavy-duty sheath. The holes avoid explosions and upheavals, favoring the air’s gradual expansion in case of break. The effect is similar to a common aquarium oxygenator, forming thousands of little bubbles. Should your HP hose break, you will have reasonable time to surface together with your buddy. Anyway it is a rare event, mostly due to an inflator hose that previously “worked” for hundreds of dives. The inflator hose can also wear out in the same area (of where the o-ring is) that connects it to the pressure gauge. In this case you will see underwater, a bubble thread coming out of the junction or the instrument shell.

It is necessary to have a specialized shop replace the o-ring. Beside regular rinsing and yearly controls, correct maintenance consists of packing it correctly in the bag, without twisting it or with any forced bending. For this reason many divers use a specific bag for the octopus apparatus.

**Regulator, alternative air source and inflator**

Did you ever see pictures of depth divers that detain the record reaching more than 250 meters? Besides gas mixtures, they have equipment that make them look like beings of other worlds and incorporate rules sometimes very different from recreational scuba diving. Many of them, for instance, think that the presence of a companion is an additional responsibility, so they dive absolutely alone. Our goals are different. We count on the buddy system for planning, prevention or rescue: having a dive buddy and an alternate air source is fundamental. You certainly chose your regulator based on the advice given in the first course or by your Diveleader, a regulator with excellent breathing performance. Another simple, but practical advice regards safety design. Ask the retailer (or manufacturer) about troubleshooting malfunctions and other functioning feature operations, just in case. Interestingly enough, and not possible until years ago, is the pos-
sibility of consulting the manufacturers’ catalogue on internet. In this case, if you don’t understand technical features, better ask your Diveleader for explanation (maybe printing the page of your interest). You can also consult a Diving Center, or Assistance centers of the brand you want to purchase, where you live or usually dive, to have qualified support at hand.

Consider also the ergonomics of the equipment you want to buy, just as you would do with a pair of fins. You would weigh them in your hand, compare the differences between the major or minor effort needed from one model to the other, furthermore would simply not just consider the propulsion characteristics. In other words, how good would be that regulator be for you physically? Try to put it in your mouth and feel the weight. How hard is it for your jaw and how difficult would it be after an hour dive?

Alternate air source: an alternate stage could be of the same model as your primary one or different. Connect it to your first stage, or if you want, use two first stages. In any case, the same maintenance rules apply and we will discuss them later. The important characteristics concern the positioning, its accessibility and your buddy’s respiration comfort, which also depends on the length of the hose and of its starting point (location). You can ask the retailer for a hose for the Octopus. He’ll give you one at least 30 cm longer than the primary one, maybe yellow, more visible, as with the alternate second stage cover. You will place the alternate air source perfectly visible in the chest area, possibly secured with a corresponding accessory that allows your dive buddy to easily pull the regulator free in case of necessity. Now decide the direction. Know that there is a rule. If it comes from your right and you have to give the regulator to your buddy, the hose will suffer a twist when turning the deflectors downward and pulling it will make movements uncomfortable. If the hose comes from your left, you will be able to swim with your buddy on your side or ascend in front of him with fewer problems. You can always try the two solutions and then decide. If you have second stages with knobs for air flow adjustment, remember to also open the safety regulator’s knob. A stressing situation, like air shortage, could become worse if receiving little air from the alternate second stage.

Regulator flowing continuously: regulators, as you know, are designed to deliver air and not to block it in case of breakdowns. This is due to the downstream system, a valve system always at the end of a critical point, which allows the air flow in case of malfunction. It is like when a window breaks, air always flows! Do you remember the ESA Open Water Diver, the exercise when you pressed the purge button and learned to breathe from a regulator that is continuously flowing? Generally this can happen because of valve wear (first and second stage piston) which needs to be replaced because it is worn out. They may also need an adjustment or maybe there is sand and debris stuck inside the second stage box, preventing the delivery lever from operating
properly. Connecting a second stage to a first stage of different brands can cause continuous flowing as well, because of different regulation settings. It’s best to have an octopus (if this is the system you use, or two first stages) with equal regulator or regulators that work with the same intermediate pressures.

Air leaks in case of continuous flowing, are usually minimal, like a bubble thread, rarely serious as in emitting profusely. Avoid guessing the causes and don’t improvise adjusting screws or disassembly. If your regulator flows continuously, have it checked!

Care and maintenance: at this point, advice on equipment maintenance is probably bouncing in your head, but remember: there is never too much. Sea water, when dried, rapidly crystallizes because of the salt and will make everything crusty. The regulator is the tool most technologically complicated. Even though the mechanism is relatively simple compared to an engine, it can malfunction because of incorrect maintenance. It is important to keep it wet (the octopus in general) until you can rinse it in fresh water, to avoid salt crystallization. In days of Northwest wind this can happen quickly, so disconnect it from the cylinder and put it in your bag.

The mouthpiece: easily can get ruined, especially when using the regulator mouthpiece biting it excessively. Stress, even minimal for the dive, makes some divers grit their teeth, often unconsciously, so even a new mouthpiece may be for the trash after only one dive.

Many use anatomic mouthpieces, with a shape that can take the whole bite. Others, with a small mouth, refuse this kind of mouthpiece. No matter which one, try to avoid biting the mouthpiece too much, and keep the mouthpiece of the safety regulator efficient as well.

The dust cover: somebody forgets about it and rinses the regulator without the dust cover, others rinse it incorrectly. You can dry the dust cover of the first stage with a towel. Don’t use compressed air because you could possibly shoot unwanted mist in internal places of the first stage that have to always be dry! Rinsing has to be done by soaking in fresh water, after firming the dust cover in place and without using pressure pumps on the second stage: you could tear the membrane or flood the hose by pressing the purge button. A regulator, precisely the alternate second stage that always hangs, can scratch or gather grains of sand in the box where the membrane is, causing in some cases continuous flowing. For this reason it is best not to touch the bottom or as least as possible and to check the regulator for sand intrusion, that during the dive can be in suspension because of someone finning in front of you.

Exhaust deflector: probably you know that their function is to
divert air bubbles out from view, usually to the mask sides, but some work better than others. This is a feature you can unlikely change (you can't replace a regulator's exhaust deflectors with those of another model).

You can consider the idea of trying a regulator before purchasing it paying attention to this particular feature. Sometimes it happens to loose the exhaust deflector because it is positioned incorrectly. It is true that with some models, one must possess high manual skills and with precision, maybe have somebody teach you how to connect them correctly. Remember anyway that if you loose your exhaust deflector, it doesn't usually imply the end of your dive. You would have the constant annoyance of bubbles in front of your eyes.

**Supplementary air delivery systems**

The use of a spare regulator for each diver, connected to one or two first stages, is the most efficient way to manage an emergency due to air shortage during a recreational dive. Both you and your dive buddy are protected from the risk of not being able to breathe. There are also supplementary systems, like a mini tank with regulator and mouthpiece, which guarantees autonomy for an emergency ascent and many divers are used to bringing it with them. This method didn't have big success, at least on the European market, maybe because the buddy system is still the most widely used practice in diving safely and the majority prefers to not overequip. The most common method to have supplementary air is the spare bottle hanging at 5 meters with connected octopus.

It is usually used in deep dives, when a safety stop is highly recommended. Problems to avoid are related to use and system maintenance (of course!). If you have a regulator for this function, make sure that it is always efficient. It’s best to check the bottle’s reserve every time with a pressure gauge and also the quality of the air, which has to be renewed even if not used. Agree with your buddy on the supplementary air system procedures, mutually agree about positioning and if you will leave the valve open or closed.

**Depth gauge and timer**

If we pay attention to Murphy’s law (always in ambush) we should think that only one instrument, even if it is a reliable one, sooner or later will break. Therefore using only the computer could not be enough because we will incur serious risks of breakdown or emergency.

Jokes aside, risks of breakdown are rare. However, it’s a good idea using the computer as a principal instrument and maybe having a integrated electronic system functioning as a timer and depth gauge.

Usually these instruments don’t even need to be manually switched on, because this happens at the contact with water. In addi-
tion, they keep in memory at least 10 dives and offer you a lot of data (depth, maximum depth, dive time, water temperature and alerts when there is an excessive ascent rate). This instrument has a long battery life allowing you to use it for hundreds of dives. Because of this wide range of features, it can safely and completely replace the traditional depth gauge and timer, which you can always continue to use.

**Underwater computers**

Today, there are many of those who would gladly send the old tables into retirement. It is like for other things that have been put aside, the dear old pen (kept only for minor tasks) or the typing machine (now disappeared and replaced by the PC). Everything is computerized. In a while we’ll have electronic books and the fridge will order groceries by itself through the internet as it becomes empty. In scuba diving many have known the non-computerized era, but all are certainly happy about the evolution that followed. The majority take for granted the use of this instrument for recreational, sportive and professional diving. In reality, speaking of computer or tables is the same thing. Computers, like tables, calculate nitrogen, residual nitrogen, repetitive dives etc. Some of these terms are not even correct. In fact the computer, like the tables, based on mathematical models, doesn’t know how much nitrogen you accumulate, it simply calculates time and depth data obtained by the sensor. Underwater computers are basically, electronic tables with calculation ability, built-in integrated timer and depth gauge. In other words, they are just computers. It could be a good choice to keep a table in your BCD pocket. The ESA Computer Diver course offers more information about underwater computers.

Planning: a mistake that has to be absolutely avoided is relying on computers to plan a dive. It is like wanting to publish a book or an article thinking the PC can write for us. Even the most sophisticated car can crash against a wall if the driver is distracted or goes too fast. We are anyway happy to take full advantage of this new application of computer science. It is maybe the most innovative one for us recreational and non-recreational divers, after the BCD invention, which made a real difference in modern diving (we are not mentioning the regulator, without which we couldn’t even breath underwater, at least for now).

Even the use of a computer doesn’t change the rules about prevention and correct planning. Like the table, it doesn’t know how old you are, if you are fit or if you will be cold. In other words, it doesn’t know how much nitrogen you are really accumulating. We could actually say that if you use the computer you have to
pay more attention. The advantages coming from its use may turn into excessive relying that could cost you dearly. The advantages are unquestionable in a multilevel dive and are in real time thanks to the computer, the instrument’s models of calculation are tested, but in reality a computer doesn’t offer you more safety than a square dive profile. Once again, it is a matter of using good sense and risk evaluation. If you take a computer, you tie it up on a line and send it down from the boat to a deep point, let’s say 70/80 meters, what do you think it will do? Certainly it’s not going to tell you “What are you doing crazy one! You know that you can’t go so deep, ascend immediately!” etc. It will simply calculate the same thing he calculates at 20 meters, that is nitrogen, curve, decompression stops etc. Potentially, you could even make that dive, with that instrument, but what would you probably risk? Let’s just mention hyperoxia and convulsions, DCS and AAE (in Chapter Five, First Aid). On the manufacturers’ side, there is no difference between recreational and professional diving (we use the same computer as coral divers). Therefore it’s very important to follow the same rules as for the plastic tables, after all we said they are the same thing. Keep in mind that if you dive, at the limit of maximum time you risk more. If you go deeper than recreational dive limits and you don’t have adequate training, you are probably a good candidate to update statistics.

We don’t have to repeat here the Open Water Diver rules, but let’s try not to forget them!

You can prepare the dive profile planning with your buddy using the tables, the same as you can do using the computer, given that each of you has his own. Consider that it could be interesting to confront two different instruments and verify if there are discrepancies about time. In this case respect the most conservative one. In any pack you always find the instructions manual that you have to study out of the water. Check the autonomy given by the manufacturer – charge status is anyway reported on the display – and get information about battery change procedures. Get used to the instrument with your Instructor or Diveleader, who will be able to help you also about tuning, principal features explanation, planning and care.

Jams and breakdowns: instruments available today have been severely tested with real dives or in a hyperbaric chamber. We can say that they are safe, both on dive management (most of which use models of mathematical calculation which are even more conservative than the standard US Navy tables), and on the possibilities of breakdowns or jams. If your computer gets stuck, flooded or you can’t understand the message you see (i.e. Err), you have to interrupt the bottom time and ascend with your dive buddy at the 10 meter per minute rate. You can regulate the rate with the integrated instrument and stop at 5 meters, prolonging the stop according to air availability. A good habit, besides checking the air with your buddy, is confronting once in a while your instruments parameters, depth, time and no-decompression time.
The future
Today we have an advance in standardization of equipment and it is now obligatory to have BCD, pressure gauge, alternate air source, timer and depth gauge (at least during courses). Soon we will be witness to further changes. While also for recreational divers the perspective of breathing underwater at close circuit, wearing masks with ears or driving underwater vehicles is approaching, the equipment world is constantly changing in style, esthetics and accessory supplies. There is personalization that is very welcomed by the scuba diving public, and that time ago was not possible because of the relation costs-low demand. Equipment maintenance practices won’t decrease, at least for now.

Keep yourself well informed about the latest news and if you can, try new equipment to verify new performances and comfort levels.

Prevention remains the most useful strategy to guarantee safety and fun, welcoming the help of technological innovation, so that problem solutions don’t have to be tied one way by rigorous rescue schemes.

Minitest
1) To avoid continuous flowing in a regulator you should:
   a. disassemble it and replace downstream valves.
   b. avoid the intrusion of sand and debris in the second stage and have it regularly checked by a qualified technician.
   c. rinse it after each dive with high pressure water to clean it from sand or debris.

2) Before putting it away and securing the dust cover on the first stage you should:
   a. dry the whole regulator, the pressure gauge and the hoses with the air tank.
   b. rinse the regulator in fresh water.
   c. dry it with a towel or cloth.

Answers: 1b – 2c

Some models of underwater computer
Congratulations!

You have reached this Chapter’s end. Probably, you will put into practice what you have learned already at the next dive or you are already going to check the equipment in your bag. Maybe you didn’t purchase everything yet, but keeping in mind all this advice, you will make wise choices that will also allow you to easily receive specialized assistance any time you need. Now you know that you don’t need too much and it is really worthwhile to dedicate some time to correctly maintain your equipment, this way securing years of pleasurable and safe dives.

Minitest

1) For recreational dives it is recommended:
   a. to dive with a spare tank if diving without a diving buddy.
   b. to dive at least in two and each diver has an alternate air source.
   c. to dive at least in two and each diver has a good regulator.

2) True or False? If the dive has been planned with a computer, each diver should have his own and the most conservative one should be taken into account.

3) If your computer jams, is flooded or you can’t understand the message you see, you should:
   a. interrupt the bottom time and ascend with your dive buddy at the 10 meters/minute rate and stop at 5 meters, as air will allow.
   b. interrupt the dive, ascend, dry it and switch in on again.
   c. continue the dive with your buddy’s instrument and stop at 5 meters as air will allow.

Answers: 1b – 2 True – 3a
What did you learn?

The goal of this exercise is to review the most important information of the Theoretical Unit. First of all, to improve your training, but also to better prepare you for your next appointment with your Instructor. Answer the following questions choosing the correct answer among those suggested, specifying if the information is true or false or writing the answer in the appropriate space provided. Give this form to your Instructor, if he finds any incorrect answers he will give you the necessary explanations.

1. Equipment care and maintenance mean advantageous practical aspects, some of these are:
   a. safety and fun.
   b. economical saving.
   c. promptness in rescue.
   d. all the above.

2. True or False? It’s more stressful having a flooded mask than having a mask constantly fogging up.

3. The wrong size of suit could cause:
   a. cold.
   b. overexertion.
   c. both a and d.
   d. more heat dispersion.

4. Some advice to prevent overexertion is:
   a. using a neutral weight during dive.
   b. not eating or drinking before diving.
   c. breathing deep and slowly from the regulator.
   d. both a and c.

5. The correct use of the pressure gauge consists of _________ to avoid _________
   a. switching it on before diving - checking it.
   b. switching it on during diving – battery consumption.
   c. checking it often during the dive – air shortage.
   d. checking it often during descent – air shortage.

6. Regulator rinsing should be by soaking it in fresh water:
   a. before securing the first stage dust cover.
   b. after securing the first stage dust cover.
   c. after plugging the second stage dust cover.
   d. before plugging the second stage dust cover.

7. While choosing a regulator, besides breathing comfort, there are other features you should consider, these are:
   a. design safety.
   b. ergonomics.
c. unbreakability.
d. both a and b.

8. The most common method to have supplementary air in case of necessity is:
a. having a bottle hanging at 5 meters with a connected octopus.
b. having spare tanks under arm.
c. having adequate air reserve on surface.
d. having adequate air reserve at midwater.

9. Between two computers, during the dive, it is better to rely on the:
a. more stable one.
b. more conservative one (prudent).
c. more ergonomic one.
d. more detailed one.

10. Underwater computers are reliable instruments because:
a. they are tested for many years.
b. they are guaranteed proof against DCS.
c. they keep individual factors in account.
d. they are safer than the tables.

I declare to have reviewed all answers with my ESA Instructor and to have understood the explanation of those I incorrectly answered.

Signature____________________ date____________
Chapter Five: First Aid

What you will learn
This chapter will give you a comprehensive outlook on most typical pathologies, more or less frequent, related to recreational scuba diving, snorkeling, beach and sportive activities.
Each subject will be briefly described in its most common manifestation. We will also give useful advice on First Aid and prevention.
See again how this word shows up. As we have repeated several times, prevention tends to eliminate problems or at least it statistically decreases their occurrence and possible complications. A prudent diver will be safe and alert, while relaxed. Carefully read the entire chapter because you’ll find much more information on prevention and also answer the minitest, which will immediately confirm your understanding of what you have read.

Statistics, accidents and pathologies
Besides pure fun, which is the first reason for its practice, any recreational or sport activity can imply potential risks. These can be more or less serious and are connected to many different factors. Most are common to several activities: for example think about cramps that can occur in runners, swimmers or in those who fin but also in those who, after months of inactivity, march off for a country excursion. Skiers more often suffer limb fractures and head traumas, tennis players risk injury at the joints, hand blisters and eyes traumas. There is also the “apparent inactivity pathology” which involves those who use wrong posture in front of the computer, causing a painful, stiff neck.
Recreational scuba diving, just as other popular hobbies, has its own psychopathological chart. Some problems are not totally consequent to diving, even though correlated (seasickness). Others are principally due to underestimating or neglecting the principal rules concerning good sense and prevention (diving without adequate planning or not respecting limits). Other problems are incidental and happen even respecting prevention norms. Statistics provide reassuring numbers, today recreational diving with regulator is represented by specific pathologies and
accidents in equal (bowling) or minor (tennis) percentage compared to other popular hobbies.

It is important to be prepared in prevention, following first of all the main rules and evaluating them depending on specific cases. You are probably changing your awareness, this is normal. You are now developing a keen eye which is critical for particular evaluations that perhaps before were a little abstract, because you were focused on the learning of basic diving techniques. Don't fret, you will receive all the specific information about teaching and professional aptitude if you frequent the Diveleader ESA course, ESA Assistant Instructor and ESA Instructor Course.

In recreational scuba diving serious accidents are rare. For this reason it is appropriate for most divers, now self sufficient in diving techniques, to also learn about first aid procedures. This is important because chances are that there will unlikely be a doctor in each boat that goes out, two or three times a day, in the world of scuba diving excursions. Assistance in the sea is fundamental because it usually requires quite a lot of time before the arrival of a doctor.

It can even happen on the streets, in towns, where usually the intervention of medical assistance is fully organized and is not set back by the characteristics and the conditions of the environment. Generally speaking, before intervening to rescue somebody you have to evaluate environmental risks. Streets, a room on fire, a place saturated with gas, rough sea, a crumbling building are just a few examples of potential dangers for the rescuer. Furthermore, prevention procedures also have to be applied when you come in contact with the individual needing rescue. In fact, in case of accidental contact with blood or other body fluids there is the risk of being exposed to infectious diseases. Don’t hesitate to wear gloves and always protect yourself with adequate masks, standard or even improvised.

For clarity in your reading and because it will be useful to you when you will try rescue techniques or will be in the water with your Instructor for rescue exercises, we will make use of a new terminology. We will use the word “victim” for the one who needs rescue. From the moment you start to take care of him, he will become a “patient”, while we’ll call the one who proactively responds in the assistance, “rescuer”.

You will portray the victim, the patient and the rescuer in open water, alternating tasks and roles while trying the rescue exercises with your buddy during the course.

**First Aid**

First aid techniques are described, taught, tried, applied and learned during the ESA First Aid and ESA Oxygen First Aid course that you may have already attended before you enrolled in the ESA Prevention & Rescue Diver course. If you don’t have the ESA First Aid certification (or an equal one), your Instructor will encourage you to attend the ESA First Aid at the same time as the ESA
Prevention & Rescue Diver course, so as to satisfy the requisites necessary to obtain this certification. In this course you will have a good review of the fundamental techniques. For primary examination procedures, BLS techniques and information about diseases, traumas and wounds, you can refer to ESA First Aid and ESA Oxygen First Aid manuals. In the following sections, we will discuss conditions which are more specific to scuba diving activity, snorkeling and beach/sportive activities.

**Seasickness**
Causes: the boat’s pitching and rolling, even minimal, are the principal causes for this uncomfortable pathology that can seriously affect those who suffer from it. They often have the phobia of being sick and sometimes take medicines that could have negative side effects for diving, because they cause sleepiness and attention decrease.
Signs and symptoms: paleness and general uneasiness, nausea and vomiting.
First Aid: if conditions allow it, have the patient lay outside in the center, lengthwise to the boat, out of the sun, water, wind and exhaust fumes (if the boat is in motion), avoiding excessive temperatures (hot and cold). Conditions often get better if he enters the water and floats, wearing the suit (no weights) and with proper assistance. This is a preferable choice if the sea is calm and if the boat has to remain anchored for a while. The person also will get better after vomiting but it is best not to administer medicines, food or drinks for this.
If a diver complains about seasickness for a long time, this could be a sign of Decompression Disease.
Prevention: avoid drinking orange or grapefruit juice that may favor seasickness. Before using medicines it is best to consult a specialized doctor, who can provide appropriate instructions. You can also ask your doctor for advice, informing him about your underwater activity.

**Barotraumas and Otalgia**
Causes: as you know from the ESA Open Water Diver course, the external and middle ear is separated by a membrane (the eardrum) that is usually subjected to equal pressure on both sides. You can equalize your eardrum with proper procedures to prevent uneasiness or damages due to a variation in the pressure during descents and ascents. An obstacle to the flowing of air in the Eustachian tube (like mucus or a deviated airway) during descent or ascent can cause lesions in the eardrum. You need to know that very small skin lesions in the external ear, due to maceration of the skin in contact with water (more frequently hot
water) or to the rubbing with q-tips, can leave free space for fungus and bacteria, which cause painful infections, often mistaken with barotraumas.

Signs and symptoms: discretely observe the presence or the lack of blood coming from the ear. After some time you could observe a narrowing of the external ear canal, more frequently just on one side, that indicates swelling. Pain can manifest instantly or be delayed, while it is frequent the feeling of fullness at the ear.

First Aid: reassure the patient, avoid touching the ear but rinse it with bottled drinking water, at room-temperature. Do not administer medicines, even locally, because they could be improper in case of eardrum perforation or in case of allergies to some substances. Leave the ear free, avoid stuffing with cotton or other objects, and protect it from the wind and water. If it doesn’t resolve during the day, it is best to refrain from diving and maybe consult a doctor.

Prevention: integrate the delicate normal cleaning of the external ear with bottled water, rinsing the ear before and after the dive. You can also use a saturated boric acid solution that you can ask a pharmacist for.

Regularly have your ears checked by an ear doctor. Dive when you are healthy and never with a cold or flu, also avoid using spray’s and nose decongestants before the dive.

Don’t use ear plugs underwater and protect ears and head from wind and water exposure (for example during the boat navigation).

Make sure that the water enters the external ear and move the hood if necessary. Equalize as soon as your head is underwater, frequently and slowly. If you can’t, try again using different techniques together, like simulating chewing and swallowing. If you have problems, interrupt the descent and don’t force equalization.

After consulting with your Instructor and a specialist, you can consider the use of particular protections, designed for scuba diving. Besides limiting the contact with water and possible organisms (which may be cause of pathologies and pain), these protections facilitate equalization procedures.

**Mask barotraumas**

Causes: as you remember from the Open Water Diver course, equalization concerns all air spaces. If you don’t equalize your mask (by blowing inside it from your nose) while you are descen-
ding, it squeezes on your face because of the effect of the increased pressure. It’s a problem that can usually happen to anxious and less experienced divers who forget to equalize frequently or tighten their mask too much.

Signs and symptoms: the eyes suffer the “squeeze effect” because of decompression inside the mask and air is attracted towards the outside. The effort causes a spasm, the corneal capillaries break and the sclera becomes very red. Also the areas around the eyes can appear black-and-blue, hematomas form like after a trauma (pronounced dark circles). The eyes burn and ache.

First Aid: you can apply an ice bag or external compresses of chamomile. Avoid bright light as much as possible and wear sunglasses. Consult a doctor.

Prevention: use a mask that includes the nose. Always descend slowly so you can equalize your ears properly and you should always remember to blow inside the mask. You can also recognize if your dive buddy is not equalizing his mask because the soft part of it will tend to shrivel up on his face. Stop him and signal him to clear his mask: he will equalize it.

**Stress from mouthpieces**

Causes: Some people can manifest uneasiness and problems at the jaw and mouth after a dive. These effects are thought to be caused by tension from anxiety or a mouthpiece that is too big, anatomically not adequate for the size of the mouth. The temporomandibular joints (connecting the lower jaw to the skull) and surrounding structures are affected. Also dental pathologies, interventions and dental braces can cause discomfort.

Sings and symptoms: headache and possible neck ache after the dive.

First Aid: symptoms can also appear after some time, applying a light massage to the joint with a small circular motion can also be useful.

Prevention: people with a small mouth and those who are a little tense during a dive should choose their mouthpiece and regulator with careful evaluation, preferring the smaller size. They should also use relaxation techniques to massage and concentrate on the area with their fingers for a few minutes before and after a dive.

There are special mouthpieces that, through a particular procedure to perform before their use, assume anatomic conformation of the diver’s mouth, all to his advantage and relax. Being strictly personal, it is not advisable to connect this type of mouthpiece on safety regulators or to regulators that are used by different people.

**Wounds caused by marine organisms**

Causes: in general, fish and other marine organisms do not attack people. Lesions are possible and usually related to the disrespect of prevention rules and incorrect diving behavior (touching everything, disturbing fish in their holes, feeding or attracting fish with
blood or food, wearing shiny jewelry, invading the reproductive territory, etc.). Walking on sand or rocks without protective sandals cause accidental contacts as well. Jellyfish have slow movements and are carried by the current, so the diver, who can’t see them in mid water, can get hurt hitting them. Corals are sessile organisms (non-moving, adhering to the substrate) and a diver can get injured from rubbing against or literally falling on them.

**Fish punctures** (weever, hog scorpion, scorpion fish, stingray, etc.)

Signs and symptoms:
- intense and immediate sharp pain.
- localized swelling and redness that can even spread far away from the puncture (i.e. from the foot to the whole leg). The swelling can last for a few days.
- wounds, lacerations, penetrating stingers that stay.

Signs and symptoms can vary depending on the quantity of poison injected (usually proportional to the fish size) or to individual oversensitivity. In case of oversensitivity like for insect punctures, anaphylactic shock and death can result.

Wounds caused from larger fish can cause serious life threatening blood loss.

**First Aid**

As a first step, to ease the pain, you can soak the wounded region in hot water (as hot as the patient can bear it) for a few seconds. The pain should ease because toxins in a fish’s stingers are usually thermolabile (neutralized by high temperature). If pain reappears repeat the hot water procedure. In case of serious wounds or stingers, which have penetrated, look for medical help and consider the possibilities of internal bleeding. There are specific products for soothing the pain (ask for information in a pharmacy) it could be useful to keep them at hand in your personal First Aid kit.

**Jellyfish, actinia and fire corals**

Signs and symptoms:
- ulcers, sores and blisters similar to burns.
- inflammation and swelling.
- intense burning and itching.
- the stinging cells (cnidocytes) tend to remain active inside small abrasions or under the skin for a long time and the acute conditions can reappear even after a few months.

**First Aid**

Remember to use gloves to remove possible parts of tentacles that are still attached, either working on a patient or on yourself. The rinsing of the wounded part has to be done with the same
water in which the contact happened (fresh or salt water). Apply a water/vinegar solution or ethylic alcohol to deactivate stinging cells (cysts) that are not yet closed. You can also use vinegar for a compress to ease the pain. There are specific products for soothing the pain (ask for information in a pharmacy) it could be useful to keep them at hand in your personal first aid kit.

Sea urchin punctures (and other echinoderms)

Signs and symptoms:
- pain and localized swelling.
- broken spines tend to remain under the skin, lodged. They can cause infection if not disinfected, reaction to a foreign body and cyst formation at a later time.

First Aid

Thoroughly clean the little punctures with gauze and disinfectant (clorexidine). Stings are visible because usually the black point of the sting is out. With patience, it is better to extract them all to prevent a foreign body reaction and a following cyst formation. There are specific products for removing stings and curing wounds that can be really effective (ask for information in a pharmacy). It could be useful to keep them at hand in your personal first aid kit.

Prevention: avoid touching everything and always look where you put your hands before leaning over. Always use protection, even in warm water. Observe fish remaining in mid water, don’t call their attention with food and don’t bring shiny objects or wear jewelry underwater. If you walk on rocks or on sand or even out of the water during low tide, wear sandals or protective boots because some poisonous organisms stay alive out of the water even for several hours, half-hidden in the sand. Listen to warnings and carefully respect advice given by guides and instructors. Consider attending ESA Hover Diver and ESA Ecodiver courses.

Breathing contaminated air

Causes: When air is compressed inside the cylinder it passes through active carbon filters that normally retain impurities like oil vapors and other polluting agents. Poor maintenance of these filters by some filling stations (luckily sporadic) implies the risk of breathing oil vapors, polluted air or pollen, dangerous for those who suffer from seasonal allergies.

Signs and symptoms: paleness and general uneasiness, headache, nausea and vomiting. Those who are allergic and breathe pollen that is damaging for them, run the risk of respiratory problems and asthma attacks during the dive. Since pressure proportionately increases the effects of a gas, high concentrations of pollen (in tank) will also be in high proportion of what is inhaled.

First Aid: if you or your dive buddy experience any kind of respiratory problem or bad air taste, interrupt the dive, proceed with normal ascent at 10 meters per minute and once out of the water

Minitest

1) To ease a seasick patient’s condition it is better:
   a. to give him water and fruit juices.
   b. not to administer anything to drink and make him lay on the boat center, possibly outside.
   c. to call a doctor at once.

2) To prevent barotraumas in the middle ear it is better:
   a. to use a very adhering hood
   b. to try to position head down and swallow.
   c. to equalize as soon as putting the head underwater, frequently, slowly and constantly, and interrupt descent in case of discomfort.

3) If you suspect that a descending diver is not equalizing his mask:
   a. stop descent.
   b. indicate to him to blow from his nose, as to clear the mask.
   c. both a and b.

4) An anatomically inadequate mouth piece could cause:
   a. tension and jaw pain.
   b. tension at quadriceps muscle.
   c. tongue charley horse.

Answers: 1b – 2c – 3b – 4a
breath fresh air (possibly delivered oxygen). Immediately alert the compressed air filling station of this problem. In case of an asthmatic attack, a medical visit is necessary.

Prevention: Today, with thousands of people that dive everyday, compressed air stations are certainly well controlled. But check the air in the cylinder before connecting the regulator; smell it, put a white cloth in front of the valve, open the flow and watch if it gets dirty and also try the air when you test the regulator. Those who suffer from seasonal allergies should pay even closer attention to this unusual aspect of pollen contamination. At the compressed air station, clarify that you have an allergy to pollen and ask for information about the status and maintenance of their compressors and filters. If you suspect having contaminated air in the cylinder, completely discharge it and have it checked by a qualified center.

Pre-drowning
Causes: water entry in the airways and lungs or strong spasms of the glottis that compromise respiratory function. Generally this happens because of illness, fainting in the water, panic due to floating and swimming inability, sudden low temperature exposure, etc. Divers, who generally have good water skills will most likely not run into this problem, although this can happen after episodes of panic, hypoxia or serious illnesses during the dive with loss of regulator. Airway occlusion in consequence of spasm of the glottis or lung alveolus functionality failure because of water entry compromise gas exchange causing hypoxia (lack of oxygen), which depending on seriousness and length can cause death.

Signs and symptoms: coughing, vomiting, unconsciousness and in the most serious cases, death from hypoxia.

First Aid: if the patient can cough, simply assist him. If unconscious evaluate vital functions, cardiopulmonary resuscitation (CPR) may be necessary.

If conscious after resuscitation, administer oxygen and have him brought to the hospital even if he looks completely recovered, respiratory damages can lead to it worsening, putting the patient’s life in danger even long after the rescue. Do not try to remove water from the lungs.

Prevention: consider psychophysics and local marine meteorological conditions before diving and swimming and respect danger signals. Those who cannot swim should attend a course, have a lifesaver and adequate assistance. Wear a lifesaver during navigation. Respect safety rules during the dive, prevent stress and overexertion and avoid pre-established maximum depth limits.
Decompression sickness

This term DCI groups important overpressure pathologies that include Pneumothorax, Pneumomediastinum, Subcutaneous Emphysema, Arterial Gas Embolism (AGE) and Decompression Sickness (DCS).

AGE and DCS can have many characteristics in common. Symptoms can be similar and not easy to differentiate, especially for a non-expert of scuba diving medicine. Let’s analyze principal causes and symptoms of these most important and serious pathologies, repeating again that the best way to avoid trouble is to always carefully respect prevention norms, since these accidents can also happen in minimal depths.

Arterial Gas Embolism (AGE)

Causes: holding breath during ascent or any kind of airway obstruction can cause an alveolus overextension and break. These are in direct contact with the blood capillaries and it is in this site (alveolus) that gas exchanges happen, the oxygen ties with red blood cells while carbon dioxide goes from the blood to the alveolus to be eliminated during exhalation. In case of an alveolus break, air can enter as bubbles, in the arterial circle and move toward the heart and brain, where it can obstruct or break a blood vessel, causing necrosis in surrounding tissues and invasive damages. Other causes, rare but with the same consequences, can be an inverse lung jam and the overextension of a lung aerial cystis, one or more gas cavities, congenital or acquired after a lung abscess healing, tuberculosis, etc.

Signs and symptoms: they vary depending on seriousness but are generally immediate and similar to a stroke. Blood from the mouth, respiratory deficiency and sound (gurgling breathing), also pain at the thorax. The victim can have sudden, more or less complete arrest of all brain activities, with loss of consciousness and voluntary mobility. Paralysis can happen and one limb or the face can loose muscular tone appearing flaccid and drooping. In most serious cases death can happen.

First Aid: even though the situation may appear extremely serious it is important to keep yourself together, therefore check vital functions. After primary evaluation, if the patient can breathe, accommodate him in the safety position, as soon as you can make sure medical rescue is alerted and if the victim is conscious help him to breathe oxygen possibly, at 100%. Recovery at a specialized center may be necessary.

Prevention: never hold your breath during the dive and ascend no more than 10 meters per minute, stop and descend again a few meters if you feel inverted squeeze symptoms. Do not dive with a cold, flu or other respiratory system illnesses and have a medi-
Other lung overpressure lesions

Besides AGE there are other conditions that can manifest following a lung tissue laceration from overpressure. These are: the pneumothorax, the mediastinal emphysema and subcutaneous emphysema. The insurgence of any of these pathological issues indicates a lung lesion and during first aid it is better to always suspect a form of AGE and behave as described above.

Pneumothorax: Lungs remain expanded inside the thorax cavity thanks to a negative pressure existing between the lungs and internal thorax wall, inside the pleura. If this pressure is altered, because of a lung lesion or pleura laceration, the lung can collapse.

Signs and symptoms: bluish skin color (cyanosis), lips and nails, over breathing sensation and thorax pain, a difference in shape, dimension and movement between the two thoracic sides (left and right) is noticeable. Usually this condition is not life dangerous and may not require hyperbaric recompression. In any case the patient has to be immediately brought to the hospital emergency room to receive adequate care.

Mediastinal Emphysema: air that exits the lungs because of a tissue break could penetrate the space between the two lungs (mediastinal pleura) which goes from the diaphragm to the neck and also includes the heart and other major arteries.

Signs and symptoms: difficulty in breathing, change in voice, over breathing, thorax pain under the sternum and fainting.

The patient has to be brought to the hospital and left under observation to check other signs of lung overpressure.

Subcutaneous Emphysema: air exiting a wounded lung can get trapped under the skin, generally at neck level.

Signs and symptoms: swelling at the base of the neck, difficult deglutition, crackling sensation when compressing the skin with your hand, swelling and fullness feeling at the base of the neck, change in voice. An emergency treatment is not required but the patient has to be checked by a doctor, also to evaluate other over-pressure conditions like AGE.

Decompression Sickness (DCS)

Causes: bubble formation during and after ascent from diving, caused by excessive absorption of nitrogen or other gas into the bodily tissues. Causes are imputable to different factors, singles or concomitant, (and this is understood from the fact that) also people that have been underwater respecting correct diving profiles have had DCS as a result (although statistically minimal).

- Dive’s profile: nitrogen absorption for prolonged time at depth during the dive, repetitive dives mistakenly planned, excessive ascent rate.
- Diver physical conditions: age, obesity or excessive thinness, wounds, stress.
- External conditions: water’s temperature, a demanding dive,
alcohol consumption, smoking, medicines or drugs.
• Inadequate equipment: malfunctioning instruments that provide wrong data, regulators that cause forced respiration with accumulation of carbon dioxide. The bubbles can form anywhere and mechanically obstruct a vessel and cause inflammatory and coagulation. There is no rule that can assure the impossibility of DCS symptoms manifestation, even scrupulously following a safe dive profile (there is a individual susceptibility), but studies and statistics certainly orient recreational diver toward specific tables, prevention and dive profiled more prudent compared to maximum limits indicated by tables and computer.

Signs and symptoms: they manifest with an average time between 20 minutes and two hours after the dive and vary depending upon bubble localization. Some cases had symptom manifestation after several hours or days. It may be skin redness, paralysis, balance loss, speech disturbs, different pupil diameters. Prostration and general illness sensation, itching, articulation pain, tingling and numbness, dizziness/nausea and uncontrolled sphincter.

First Aid: generally there is no life hazard but sometimes extremely serious damages caused by the bubbles, like paralysis, can be permanent, therefore it is important to promptly intervene and help the patient to breathe oxygen at 100 % as soon as possible. Hyperbaric chamber treatment is often necessary. Therefore, medical intervention is fundamental, continuing oxygen respiration, in the meantime. In any case a person has to never be brought back underwater for recompression.

Prevention: always dive in optimal psychophysical conditions, planning your dive with dive tables or the computer. Use equipment that has been regularly checked: regulator that allows easy breathing, the right size suit and BCD that does not oblige a forced respiration. Avoid excessive efforts during the dive, widely respect maximum time and depth limits and ascend slowly (10 meters per minute) from any depth. Keep always enough air reserve for a safety stop at 5 meters, which you have to make independently from time and depth. Once out of the water, postpone physical exercise, avoid diving in apnea and respect flight time after diving rules.

Oxygen poisoning
Causes: as you remember, air is a gas mix made essentially of approximately 79% nitrogen and 21% oxygen, which partial pressures at sea level correspond to 0.21 bar. During the dive, gas percentages don’t change because the air is the same, but partial pressures do, mainly because the environmental pressure increa-
ses. You can easily calculate oxygen partial pressure increases, multiplying by the atmosphere you are in (i.e. at twenty meters you have 0.21 by 4 equals 0.63 oxygen atmospheres). Oxygen presents toxicity characteristics above partial pressures of 1.6 atmospheres (if you calculate it corresponds to 66 meters depth). Accidents, often deadly, happen to those who dive close to this depth using simple air in the cylinder because oxygen dangers at this depth are not evaluated, in fact many people consider nitrogen more dangerous, causing this last one narcosis, which in reality can be easier to manage and ascending, doesn’t leave a trace. Teaching agencies always recommend not to exceed oxygen partial pressures of 1.5 atmospheres.

Signs and symptoms: in acute phase the nervous system is the most interested and symptoms go from experiencing vertigo to shaking, nausea, loss of eyesight, up to convulsions (frequent) that can suddenly manifest without other minor symptoms and lead to drowning.

First Aid: generally, emergency measures start in the water, putting to use real rescue procedures because a diver with convulsions will easily loose the regulator, inhale water, and it is easy to foresee a pre-drowning syndrome. If you have to descent to recover somebody, keep in account your limits and correct procedures, including depth, dive time, air reserve, ascent speed and decompression stops. On surface you can free yourself and the victim from the ballast and perform a primary examination. You can start artificial respiration, often necessary, in the water with the techniques you will learn with your ESA Instructor. On the boat, cardiac massage may also be necessary and check vital functions until medical aids arrive. In case of resuscitation, if possible, perform ventilation with oxygen administration, connecting the pocket mask to the regulator in continuous flow. Techniques and information about oxygen use in underwater emergencies can be learned attending the ESA Oxygen First Aid course.

Prevention: never overpass depth and time condition as reported by the dive tables. Don’t refill the cylinder with pure oxygen and if you would like to dive with Nitrox, consider the possibility of attending the ESA Nitrox Diver course asking your ESA Instructor or ESA Point personnel.
Congratulations!

In this Chapter you learned or reviewed the intervention sequence in First Aid; familiarity with resuscitation maneuvers will come when you try the exercises with your Instructor, using the dummy or your buddy. You found much information directly connected to underwater activity or anyway to situations that may happen on a boat or at the sea shore.

As you may have noticed, even though the water is a more complex environment to perform a rescue (compared to others) it allows, depending on conditions, you to perform even pretty difficult procedures (like artificial respiration while floating, something that would be almost impossible inside a vehicle or at a crevasse bottom). Anywhere you are and at anytime, you will now be able to think at least to open a victim’s airways (probably already saving his life) and perform the correct steps of BLS procedures, in the right sequence.

Minitest

1) True or False? AGE and DCS are caused by holding your breath in ascent.

2) True or False? Both AGE and DCS are treated helping the victim to breathe oxygen 100%, possibly with a demand regulator.

3) To prevent oxygen poisoning:
a. don’t dive using cylinders filled with pure oxygen.
b. Both a and c.
c. don’t surpass recreational dive pre-established depth limits.

Answers: 1 False – 2 True – 3b
An example of hyperbaric chamber

In the ESA Nitrox Diver course are deepened the notions and the techniques are learned for preventing the Hyperoxy.
What did you learn?

The goal of this exercise is to review the most important information of the Theoretical Unit. First of all, to improve your training, but also to better prepare you for your next appointment with your Instructor. Answer the following questions choosing the correct answer among those suggested, specifying if the information is true or false or writing the answer in the appropriate space provided. Give this form to your Instructor, if he finds any incorrect answers he will give you the necessary explanations.

1. Underwater activity risks are principally due to:
   a. hour of the day.
   b. under evaluation or not observing principal good sense and prevention norms.
   c. diver’s age.
   d. diver’s height and weight.

2. True or False? Prevention measures have to also be applied coming in contact with the victim.

3. Among the following, which place could be dangerous in case of first aid intervention?
   a. The street
   b. A room on fire
   c. Rough sea
   d. All the above

4. During this course, for convenience, a person to be rescued will be called ________ while, from the moment care has begun, the same person will be called ________.
   a. victim / patient
   b. patient / rescuer
   c. patient / victim
   d. unfortunate / disperse

5. To prevent mask barotraumas:
   a. use a mask with exhaustion valves.
   b. use a mask that include the nose, ascend slowly and equalize the mask blowing inside it, air from the nose.
   c. use a mask with an overpressure valve.
   d. always descent head down.
6. Decompression Sickness is a condition that can involve ________ and there is formation of ________.
   a. all bodily tissues – gas bubbles
   b. bone tissues - particles
   c. only muscular tissues – gas bubbles
   d. only soft tissues – gas bubbles

7. Arterial Gas Embolism is caused by:
   a. holding your breath during ascent.
   b. holding your breath during descent.
   c. air bubbles that enter in circulation.
   d. both a and c.

8. First Aid measures for AGE and DCS consider as fundamental:
   a. fresh air administering.
   b. oxygen at 100 % breathing.
   c. carbon dioxide respiration.
   d. both b and d.

9. True or False? Symptoms of DCS and AGE can get easily confused, therefore it is necessary to carefully distinguish to tell them apart and apply the correct first aid procedures.

10. In case of DCS it is necessary to:
    a. get medical assistance as soon as possible.
    b. breathe oxygen at 100 %.
    c. recover at a specialized center.
    d. All the above.

I declare to have reviewed all answers with my ESA Instructor and to have understood the explanation of those I incorrectly answered.

Signature____________________ date____________
Chapter Six
Rescue Techniques & Emergency Management

What you will learn?
Quite probably you have already tried some rescue techniques with your ESA Instructor. Now we will discuss about interventions from the boat, what to do if a diver is declared missing and what to do if a diver is found unconscious, underwater or on the surface.

In the last part of this chapter, you'll find an emergency scenario, with all the procedures that follow the moment a diver is declared missing. In particular, it will be an opportunity for you to focus on the elements you have read about until now and tried in the water with your Instructor, leaving you the freedom to imagine other possible scenarios that could happen in your usual dive sites. This will help you while preparing emergency plans in your dive planning, as many times advised, even though we all hope you'll never have to put them in practice.

Risks related to rescue activity
If you ask a non-diver, or to someone with poor water skills (just swimming at seashore on vacation or not even that) what is the best thing to do when somebody is in a critical situation or in danger while in the water, the first answer you usually receive is: get in the water and pull him out as fast as possible, at all costs. In many cases this could be true. Underwater environment or water in general, in a situation of danger or rescue, is not easy to move in. It is best to consider any emergency as a unique event, which needs the proper intervention. This has to be chosen in base of different factors and knowing that there is not only one way to solve a situation. So we will say that there is not only one way to face an emergency and to intervene to rescue somebody.

Unfortunately chronicles often report multiple accidents involving victims and also rescuers, who act instinctively without thinking about their own safety, not solving the emergency but even making it more complicated (creating a worse situation instead of solving a problem).

It is important to consider that some factors (environment, stress, a situation greater than the rescuer's limits), may prevent or limit your intervention, but could also save your life.
Rescue procedures from boat or shore.

If a person is on the surface and signals for help, what is the best thing to do? We saw that many people think that it is necessary to jump immediately in the water to rescue the unfortunate (the victim) but this is not always the right solution. Before any intervention (both from the boat and from shore) you always have to consider environmental conditions. Rough sea, water’s temperature, a plunge soon after eating or when it is too hot are all limiting factors and every year we hear about heroic acts ending with drowning, also or paradoxically only on the rescuer’s side.

Stop for a moment and mentally focus on the scene. This will help you to consider your resources and your limits. Yes, the choice of entering the water is a possible one. If you decide that this is the fitting solution, it is best to do it wearing fins and having a floater that you can pass to the victim to hold on to. Any object that can properly float can be useful, often in rescue procedures you need to be creative.

In a diver boat, it shouldn’t be difficult to find a pair of fins and a BCD. The fins are very important for the rescuer if he decides to enter in the water, they are fast to wear and very helpful for swimming also, the BCD can be a valid support both for the victim and the rescuer.

The law obliges to have on the boat equipment that includes individual lifesavers and the doughnut. The doughnut, also called ring, has to be available on any craft with an engine, but maybe not everybody knows how to use it.

Preemptively, it is best to connect a floating line to the doughnut, long enough for a person to launch it at a considerable distance (norms suggest at least 25 meters) and it is wise to secure the end of the line before launching the doughnut. Tie it to a ring or a bollard, but also a pier bank, or firmly step on it with your foot or have another person assist it to remain stationary are all possible solutions. The line will facilitate the victim’s recovery by simply pulling it slowly towards the boat.

Obviously the victim has to be conscious and must have the capability to hold onto the lifesaver. This is a good way to rescue without getting wet.

You can also enter the water with the doughnut, toss it out to the victim and both hold on to it. You will practice these procedures during the course’s exercises.

It’s ideal to prepare the doughnut with a floating line in the water every time, before the dive. In conditions of strong wind and current on the surface the doughnut will allow you to hold on to the line before the descent and after the dive, when you have to wait for your turn to go up the ladder.

There are also tools designed to launch a floater connected to a line at considerable distances. One is commonly called a rescue pack, and consists of a sort of bag, heavy but floating, containing the floater line ending with a strap. To use this device you have to fix the strap to the rescuer’s wrist and, grabbing the bag by the
handle, throw it with strength to the victim. This instrument’s features allow longer, efficient and precise launches. Furthermore, being soft, there is no risk to injure the victim by accidentally hitting them (like it could happen with the doughnut). A surfing board can be another solution to proceed in a rescue, because it is a floating support that, pushed with the fins or arms, allows you to cover considerable distances in a short time and today you can find it at any frequented beach.

**Missing diver searching**
A search procedure is necessary when it is known/established that a diver is actually missing and rescues will take time to arrive. There are many methods that have to be properly chosen based on environmental conditions, safety and time. Certainly the easiest one is to involve more people remaining on the surface. Equipped with suit, fins, mask and floater, with a dive marker, teams formed by three or four people stay parallel, a meter from each other, and are able to cover wide areas close to the shore without problems of air reserve. In good visibility, they can get a glimpse of a person lying down on the bottom even at a twenty meter depth. A diver wearing the equipment should remain on the boat with the boat man, ready to dive if it is necessary to recover the victim. The limits of this type of search are dependent upon visibility and depth. If the missing person is not visible from the surface because of environmental conditions, it is possible to organize an underwater search. The level of experience for the rescuers has to be carefully evaluated, adopting procedures as well.

It is best to leave the less experienced people out of the water. They could be useful for other tasks like keeping radio contact with the base, preparing the first aid kit and the oxygen. The most experienced person, usually the one with the higher level of certification, can take charge of the search. If there is a captain on board, he will take care of the boat’s ordinances and choices related to boat conduct. For best results and to guarantee safety, a good coordination between the rescuer in charge and the boat commander is indispensable.

Those with an Advanced certification or higher, especially those who are familiar with diving specialties, such as orientation, search and recovery, could be useful in a search both underwater and on the surface. Safety rules for rescuers have to be reviewed during a briefing before the dive and they have to always be put into practice with the buddy system. Safety rules must include air management (calculating also the return navigation to shore or boat), dive tables limits, computer, depth and time. Beyond these limits the search has to be suspended, waiting for specialized personnel to resume it. Also cold, tiredness and unfavorable environmental conditions should induce to abandon the search. Those who dive have to keep the same instruments, if this is a multiple dive. Using a pre-established navi-

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**Minitest**

1) If a person on the surface is signaling for help, the first thing to do is:
   a. launching the life saving doughnut.
   b. jumping immediately in the water.
   c. evaluating environmental conditions and personal limits and if possible intervene without entering the water.

2) Before launching a doughnut you should:
   a. secure it with a line.
   b. check that a line is connected.
   c. both a and b.

Answers: 1c – 2c
Navigation can be useful to accurately explore the whole chosen area, both from the surface and underwater. The compass is an instrument that can facilitate these operations, if used with the right technique. Divers with experience in the use of the compass could take charge of the navigation while the others could focus on sighting the missing diver, besides time limit, depth and air reserve. Any person willing to deepen the aspects of an emergency in underwater activity should also learn about search procedures and compass use, attending the ESA Orienteering Diver course.

Rescuers safety should never and in anyway be jeopardized. A small chart puts in evidence the principal rules that should be followed during an emergency when an underwater search is needed. Because these situations are rare, it is necessary to keep trained in emergencies to avoid being overwhelmed by haste and hazardous choices.

**General rules**
- The captain of the boat has decision making power on board.
- At least one person with sufficient experience should always be on board.
- The highest level of certification should take charge of underwater operations.
- It is appropriate to evaluate the participants’ certification level and experience.
- A briefing, including safety rules for the rescuers has to be done before operations begin.

**Rescuers safety rules**
- Divers always have to be in pairs.
- Each diver must wear standard equipment, calculate the dive using dive tables or computer, respect limits.
- Each couple has to respect the safest attributes for the dive.
- Each couple has to evaluate environmental conditions before and during the dive.
- Each diver has to manage the air properly.
- Each diver has to exit the water with at least 30 bar of air in the tank.
- The search dive has to be suspended if divers are cold, if environmental conditions are unfavorable (i.e. a sudden wind storm) and because of air, depth or bottom time limits.

At this point, somebody could ask “We usually dive alone, my dive buddy and I. If during the dive we get lost and there is nobody else around, then what?”

We often repeat the importance of respecting the buddy system. However, while planning a dive it is also very useful to prepare an emergency plan which will include a person on the boat or ashore, to be available for assistance and to participate in the operations. Those who suddenly realize to be alone during the dive and
cannot locate their buddy, after a minute of searching unsuccessfully, should surface and alert anyone on surface. A solitary search in condition of great stress can seriously compromise the safety of a diver, who is probably not experienced, because he neglected the buddy system and the prevention rules of having assistance out of water. Therefore the advice, once again, is to consider prevention as the most recommended method to “not get in trouble”.

**Search and recovery of a missing diver**

If there is a search in action, probably and hopefully the missing diver will be found. Cases can be different. The diver found underwater could be breathing and be conscious, breathing and be unconscious or not breathing at all. In any event the first thing to do is to stop for a moment and observe the scene, taking a mental shot.

If the diver has the regulator in his mouth and he is breathing, the bubbles coming out of his regulator, even with a minimal respiration, will be easily noticed. Looking at him, you can realize if he is entangled: a piece of fishing net or a piece of nylon almost invisible. This could be dangerous for you as well if you quickly rush to the victim. He may not have his regulator in his mouth, but this doesn’t mean that his lungs are full of water.

It is absolutely necessary to recover the diver, but don’t put your safety in danger.

Check his level of consciousness by tapping on his shoulder with your hand. If there is no reaction, take hold of him by reaching out your arm behind his head with your hand close to his face.

If the regulator is in his mouth leave it there. Keep it in position, leaving free the exhaustion deflector, and hold the victim’s chin up: this will keep his airways open during the ascent. If the regulator is not in his mouth don’t try to put it back. By opening his mouth you could let water in. In this case, you can keep his chin up with one hand and with the other one, always from behind, you can grab the victim’s BCD corrugated hose to control the ascent. Try to inflate the BCD with a series of press and release actions on the inflation button. If the BCD is not inflating you can assume that the victim is in air shortage, think about removing his ballast. If the BCD inflates and there are not entanglements, the body, becoming neutral, will float by itself from the bottom.

Keep hold of the diver from behind, holding his regulator and his chin with your right hand and the BCD command with your left hand, starting to ascend slowly, ready to deflate, as usual during a dive. Remember that you will also have to act on your BCD to regulate your buoyancy. If the victim is not breathing, his priority is certainly air. However, consider that an excessive ascent rate would put both of you in danger for Decompression Sickness risks. Once again calmness and concentration can play an important, positive role.
Primary examination on surface

If you have to cover an area on the surface to reach somebody who needs to be rescued, carefully consider your limits. By finning too energetically, you could get tired and experience overexertion. This way you wouldn’t be of great help and you could also put yourself in a critical situation. Evaluate environmental conditions and proceed with your head out of the water so you don’t lose sight of the victim. When you are within earshot, try to call. An unconscious person will not answer. However, you have to be really sure that your intervention is opportune and that it is not somebody that maybe is quietly floating on the surface looking at the bottom.

You may be in the situation of rescuing somebody on the surface who doesn’t give a sign to be alive. Or, as in the example of the previous paragraph, you may be reaching the surface with a victim recovered underwater. The victim is close to you. You tried to call but had no answer. When a person doesn’t answer it is proper to assume he is unconscious. Immediately alert rescuing help. If he is facedown you can turn him up grabbing his hands or wrists with your hands, crossing your arms, then remove the weights and inflate his BCD, being careful not to exaggerate but assuring the best buoyancy. Consider the possibility of weights inside the BCD or tied to the cylinder, which could impede good buoyancy. Sustaining the victim’s head under the neck and taking off his mask you can evaluate if there is any respiratory activity.

Opening the airways with a hand and getting close with your face to the victim’s mouth, look towards the thorax, listen and see if there is respiration (look, listen, feel technique) If you suspect trauma to the spine or neck perform the look, listen, feel technique without overextending the head. If you don’t see any respiratory signs try again, delicately overextending the head with controlled movements, without exaggeration.

If he doesn’t seem to be breathing and you have the Pocket Mask with you, position it on the victim’s face and start artificial ventilation, making sure that the water doesn’t enter from the edges, nose or mouth. If you don’t have the pocket mask, remember that you have to pinch his nose while blowing air with the “mouth to mouth” system and release it during the pause. After you have ventilated the victim for a minute and he doesn’t resume breathing, evaluate the distance from the boat or shore. If the navigation requires less than 5 minutes keep ventilating during the transport. If the distance to reach a back up point or the shore is more than 5 minutes, perform another minute of ventilation and then transport the victim in a dry place, as quick as possible.

Certainly, a stressing situation like having to perform artificial respiration can be even more difficult in the water, while wearing the equipment, but remember that the most necessary thing for a presumed victim of asphyxiation is air and its well-timed administration. Several studies have demonstrated that in most cases,
if ventilation happens within a short time, it is possible that the victim restarts to breathe within the first minute of intervention. You will become familiar with these techniques in open water with your ESA Instructor during the Rescue Circuit, an important exercise included in the ESA Prevention & Rescue Diver course. Also consider that with adverse environmental conditions or if you are sure that the victim is unconscious for more than 15 minutes, it is preferable to quickly transport him where it is possible to practice cardio-pulmonary resuscitation (CPR).

**Exiting the water with a victim**

It is unlikely that you are alone with a victim in a far away place. When going out on a boat, you know that it is better to have a boatman, if you dive with a Diving center there will be someone with experience on board, while from shore there could be hundreds of people in and out of the water. If you had to help your tired buddy, towing him to shore or to the boat, you have to make sure he gets completely out of the water, therefore you have to help him (maybe by sustaining him under his arms) to go out on shore or up the ladder. If he can’t go up by himself, ask the boatman for help and, one step at a time, both get on the boat.

If you practiced artificial respiration or swam a long distance, maybe towing the victim, you will reach the boat ladder or the shore, most likely tired. This could physically prevent you from bringing somebody out of the water, especially on a boat with a steep or tubular ladder. A limp person (dead weight) or one that cannot collaborate much, is heavy and cumbersome. If somebody can help you (and this should be planned) it will be easier to take him out of the water. If you are alone in this situation, don’t despair and keep calm. An inflatable boat or boat edge which is not too high can serve you as a support for the victim’s arms. While keeping the arms stable over the edge, fin kick and you can get on the boat. Then securing your feet, firmly grab his arms and pull the person up, using as much as you can to your advantage the buoyant thrust. Thrust the person enough to have him balance (around waist) on the edge making sure he doesn’t fall back in the water and rest for a moment, then try to pull a bit more. If you can reach and grab a leg or grasp the suit, this will help you accomplish the last heave. If the person is not too heavy, it is possible to bring him back into the boat this way. Consider to always leave a floating line outboard, secured to a stable point of the boat. This can be used to tie the victim before going up on board. If you are close to the shore and you are practicing artificial respiration or you simply have to go out of the water with an unconscious (but breathing) victim and environmental conditions allow that, you can try the following method. After taking off ballast and BCD of both you and the victim, continue toward shore until you can touch the bottom with your feet. When allowed to walk, stop, remove fins one at a time (if you don’t wear boots evaluate bottom’s conditions to avoid being

**Minitest**

1) When a diver is declared missing:  
   a. an immediate search in the deepest area of the dive should be made.  
   b. medical aids should be immediately alerted and a search plan should be made.  
   c. it is useless to attempt searching operations.

2) In a search for a missing diver, one of the most used systems is:  
   a. the comb search.  
   b. the search with trained dogs.  
   c. the search with the use of underwater vehicles.

3) Having to rescue an unconscious diver underwater you should:  
   a. bring him back to the surface as quick as possible.  
   b. bring him back to the surface considering the correct ascent rate.  
   c. bring him back to the surface repositioning the regulator in his mouth.

4) If the victim on the surface doesn’t answer it is proper to:  
   a. assume he is unconscious.  
   b. immediately alert medical aids.  
   c. both a and b.

Answers: 1b – 2a – 3b – 4c
injured. If you are practicing artificial respiration try to proceed as much as possible without interruptions.
Take the victim’s arms and from behind drape them over your shoulders (one on one shoulder and one on the other) and hold them on top of your thorax. Slowly exit with the victim as if you had a big bag on your shoulder with two strong and long handles. This way it is fairly easy, even for a feeble person, to get on the beach with an unconscious victim. You will practice this and other methods to exit the water with a victim during the exercises in open water with your Instructor.

Primary care administration out of the water
Primary care procedures and BLS are treated during the ESA First Aid course and, unless you already did it, you will practice them again during this course. Rules to follow are the same; you have to simply consider that an injured diver, once out of the water, is a victim like any other so the first thing to perform is the primary examination.
Execute the look, listen, feel technique and, if the person does not breathe, resume as soon as possible resuscitation, avoiding to waste time. If it is necessary to free the diver from his suit, that could be in the way, consider that with all due precautions the suit can be also cut.
Theoretically, resuscitation can be continued until the victim recovers. It is true that the longer it takes, the possibilities of a recovery diminish, but there have also been scientifically documented cases where the heart started to beat again even after more than one hour of resuscitation maneuvers.
When available, and if he has the proper preparation, somebody else can help by taking over who is already administering resuscitation. In Chapter Five you learned the most frequent pathologies a diver can face and this could help you to understand signs and symptoms but, unless you are a doctor, this could paradoxically result in a waste of time. It is best to dedicate your time-resources management to what we just said and to make sure that prompt intervention of medical aid is facilitated, besides the preparation of oxygen unit that, as you recall, is a first aid measure of fundamental importance in underwater pathologies.
These situations can also happen in uncomfortable places (inflatable or small boats) or even on rocks and, at the same time, they can be even more strenuous because of unfavorable marine conditions.
The evaluation of these aspects can lead to disputable (controversial?) decisions, like the choice of waiting for medical aids or quickly setting sail to reach the base. In any case, the safety of the rescuer and other present people must not be jeopardized by choices made in haste, dangerous environmental conditions or pressures from others.
Organizing transportation
After a possible resuscitation, the victim of a sea accident may need immediate specific care like recompression in a hyperbaric chamber. After providing first aid necessities, calling medical aid, starting oxygen respiration and establishing a connection with a medical center, it is possible to depart with the patient and transport them to a medical center, if aids are not going to arrive soon. The patient has to be constantly assisted (even during navigation) and accommodated in a comfortable position so that he can easily breathe and not be shook around.

It is possible that a helicopter can be used to transport the patient to the closest medical center. In this case it is necessary to wait for instructions from the aircraft, without exposing you or the patient to dangers from contacts that may result in electrostatic discharge, propellers and landing.

If a line is dropped down from the helicopter, a body harness or a stretcher, before touching it, it is good practice to wait that it touches land or water, this way discharging electrostatic energy.

Generally, crews are aware of emergencies they that may confront. It is important anyway to reinforce the necessity of maintaining the lower possible flight pattern to avoid risks of DCS or to worsen the victim’s conditions.

Respiration with 100% oxygen is also recommended during air transport.

Useful element collection
In an emergency setting, this procedure is precious for medical aids and also to establish the circumstances of the accident by the investigators.

Everything can be noted down on paper or using a white board. The useful collection of elements for doctors regard the modalities of the rescue and the entry of signs/ symptoms detected at the moment of the rescue or later, if there were any changes.

If the patient breathed oxygen, modality, hour of administration and its duration should be noted down. As we mentioned in the Chapter about First Aid, it is also important to recommend oxygen respiration during the transport to the hospital.

It is important to record names and contacts of all who are present and all principal phases of the intervention, with times and a brief description. The useful elements necessary for the dynamics of the accident can be obtained from the victim’s equipment. If available, this has to be conserves as found. It doesn’t have to be disassembled (scuba unit and cylinder) or tampered with (computer and instruments) until an authorized person takes possession of it.

This way, important data can be established, helping the (operation of) verification of the accident’s causes (i.e. if the victim still had air, if he was out of a no-decompression curve, if anything didn’t work correctly etc.). Those who assisted or had been involved in the rescue operations should send a report to their own insurance and to the organizations for underwater accidents.
Emergency management: scenario

On the boat there is a lot of activity, everybody is busy preparing their BCD’s, regulators and suits. There are also a lot of cameras. Someone has a disposable camera, while someone else must have spent a lot more money and fully accessorized, for the dive, his Reflex or his new digital camera. Paolo is occupied with the last check to the o-ring before switching on the camera and closing the cover. His dive buddy is Andrea. They have known each other for a long time but they did only a few dives together. Andrea won’t take pictures. He agreed with Paolo, who asked him for this dive, to stay close to him so he can try his new photographic equipment. Both have an advanced level certification, Paolo has fifty dives of experience, while Andrea has about twenty dives recorded on his log-book.

The dive guide has explained during the briefing the characteristics of the pinnacle. It’s a rocky cone that protrudes a few meters from the surface, with 35 meters depth on one side and more than 40 on the other side. Safety rules have been highlighted and principal signs have been reviewed as well. Divers will find a horizontal bar that can be taken as a reference point for the safety stop. There will be plenty of opportunities to take good shots, so the two friends decide to go underwater without any companions to quietly dedicate to their photographic adventure. They didn’t make an accurate planning. Paolo simply tells Andrea to follow him and to point to possible interesting things to photograph.

He chose to set the camera in Macro mode, hoping to be able to capture very small and rare subjects. On the surface the two guys inspect each others equipment and, after the final ok, they descend (under the boat) in a cloud of damselfish that fan out, adding more magic to the wonderful environment.

While the guided groups dive away for the pinnacle tour, taking different directions, Paolo signals his buddy to descend further and they reach 15 meters, always remaining close to the bottom that steeply slopes in the depth. Paolo is wrapped in taking shots of a Flabellina’s best pose (a sea slug mollusk) that Andrea saw shortly before. Andrea fins away a bit more, hoping to find other interesting subjects.

Going away, once in a while Andrea checks the long bubble thread streaming up from Paolo’s figure. Suddenly, he sees a big willowy octopus, hiding in a hole, behind a big rock. Andrea wants to make it come out and call his friend, but Paolo is too far away and busy, so he goes behind the rock and begins to move empty shells, stones and a white slate to attract “his octopus” out of its burrow.

Finally, after a few dusty minutes and cursing, with clouds of ink, the octopus slips away, quickly disappearing. Andrea remembers about his friend, but looking up, he can’t see the bubbles anymore. Finning fast, he turns around the big rock, but Paolo is no
longer there. Andrea looks around disoriented; he doesn’t know what to do and fears Paolo is very angry. Panting, he moves from one side to the other. He feels his leg trembling but he won’t leave his friend in danger, so he starts to descend along the bottom looking for him. Where could Paolo be?

On the boat, obviously. After waiting for more than two minutes in the same spot, Paola decided to ascend, thinking that Andrea would have the same idea.

The boatman convinced him not to descend again, alone, to look for him. In the meantime, the group of first divers is ascending and maybe Andrea could be with them. Forty minutes have passed from the beginning of the dive. The first Instructor comes out of the water and, immediately informed about the situation, decides to organize a search. After a briefing on safety measures, three couples of divers are ready to patrol the area, remaining on the surface with fins and mask, because they just finished a dive and the visibility is optimal.

They will follow the pinnacles profile in circular expanding tracks and they will have surface marker buoys and bottom markers. Meanwhile, on the boat, somebody starts to organize the space and prepares two full cylinders. One diver from the staff is ready to suit up and will enter the water as soon as Andrea is in sight.

While divers on the surface make wider and wider circles, the case with the oxygen kit is also opened and the first regulator stage is connected on the small green bottle. The long hose rolled up in the kit’s case, is now fully unrolled, it doesn’t show any signs of wear or crushing and it is screwed to the regulator, while the little silicon mask perfectly adapts to the regulator’s second stage. The valve is opened for a check, the little needle of the pressure gauge clicks on the green, indicating that the cylinder is full, and then the valve is closed again. Finally, the small bag of the optional mask is unrolled (it’s always best to have it at hand). These operations are carried out with great ability outside the cabin. They choose a space which is sheltered but also wide enough for possible resuscitation procedures, if necessary.

Paolo, the photographer and Andrea’s friend, is visibly worried. The staff tries to reassure him telling him that all first aid measures are ready and, even if it is not certain that something serious really happened, the medical center is in phone contact on the emergency line.

After 10 minutes, the diving couple that is on the surface more externally shout they saw a shape. It is slowly ascending at the pinnacle’s more external area, stopped at a few meters from the surface and, looking up, signaled ok with both arms. The signal is immediately conveyed to the boat, now Andrea has been recognized and probably he stopped for the safety stop. One of the divers above him signals the pressure gauge, but Andrea indicates again the ok. After a five minute stop he slowly comes up on
the surface. The first thing he says is that he’s fine but his buddy is missing and it is necessary to organize immediately an emergency intervention. Before the guys can reassure him, from the boat a cry is heard and Andrea finally sees Paolo signaling ok with his arms. Once on the ladder, Andrea goes up the steps and on the boat they suit him off and make him sit on the bench. Explanation will come later. Now it is necessary to know of he is exhibiting any symptoms, but Andreas affirms he is fine. He just feels his legs weak, the fear of having lost his friend in who knows which abyssal depth, is now pouncing on him, now that everything is over and the two friends can finally hug each other. Andrea will sit anyway quietly until landing, without making any effort. The day has been already agitated enough.
What could have happened?
It is clear that the two friends dive planning was erroneous right from the start.
Paolo, having more expertise, should have discussed with his dive buddy time, depth, air reserve and procedures in case of separation. He should have not pressed Andrea too much for his assistance during the whole dive while he was quietly spending time taking pictures. Probably this pressure made Andrea feel he had to look for his friend without even considering that he may have already been out of the water and he didn’t consider suspending his search after a previously agreed time. Andrea also made mistakes. The first was leaving his friend alone, although he did it not to disturb him. The second mistake was starting the search alone, instead of surfacing and alert immediately whoever was on the boat about the emergency. In reality Andrea admits to know diving rules, but in this case the psychological tension for his friend prevailed, preventing him to think clearly, so he prolonged the search more than the recommended minute. Only when he saw that he was surpassing air reserve and decompression limits, he decided to surface. Safety rules and consideration for personal limits have been put into practice, even though they were late. Andrea didn’t surpass decompression limits. He slowly ascended and also thought about prolonging the safety stop at 5 meters. Awareness allowed a happy ending for the two friends’ adventure. They will have to review a few things, discuss a lot and apologize to the staff members, who went through a bad moment, though making an example because they showed adequate professionalism and control, proper to their job.
The issue didn’t pass by unnoticed in the two men’s eyes, who, after the due clarifications, decided to enroll in the next ESA Prevention & Rescue Diver course.
Congratulations!

You will have opportunities to try many rescue techniques during the exercises in open water with your Instructor. This will allow you to verify what you just read, developing your rescue attitude. Maybe you will adapt some intervention procedures, more congenial to you, in base of different environmental conditions or for the simple fact that there is not only one way to solve a problem. Remember that the guidelines of this course are principally about avoiding the necessity of a rescue intervention, by trying to prevent problems and causes of stress. Thousands of recreational divers dive everyday in the world and accidents are proportionately few. You have understood that accidents usually happen because of omissions, neglecting or lack of comprehension in the first place. Of course, absolute security does not exist, things happen with any other activity, work or hobby. But usually there is a reason that can explain the facts. When speaking about a recreational diver, analyzing an incident can serve as a base to be better prepared in the future and the goal of the scenario described in this chapter is to involve you in situation for discussion. This will teach you to avoid leaving out even those rules that are apparently less recurrent (of less use) by judging them as superfluous. In this case they were the rules to put into practice when loosing your buddy. Just because they are not often practiced (because usually separation is prevented when respecting the buddy system) they risk to be put aside on the “back burner”, so to speak or possibly even forgotten.

Dive alone is not advisable even in emergency situations

Minitest

1) The useful elements collection during an emergency regards:
a. rescue modalities and the entry of signs and symptoms detected at the moment of the rescue.
b. the conservation of the victim’s equipment without disassembling it.
c. both a and b.

2) What did the two friends in the described scenario not consider?
a. Discussing procedures in case of separation.
b. Buddy system.
c. Planning, buddy system and discussing procedures in case of separation.

Answers: 1c – 2c
What did you learn?

The goal of this exercise is to review the most important information of the Theoretical Unit. First of all, to improve your training, but also to better prepare you for your next appointment with your Instructor. Answer the following questions choosing the correct answer among those suggested, specifying if the information is true or false or writing the answer in the appropriate space provided. Give this form to your Instructor, if he finds some incorrect answers he will give you the necessary explanations.

1. A rescue intervention in the sea can mean:
   a. intervening without entering the water.
   b. intervening by entering into the water with fins, mask and regulator.
   c. intervening with the scuba unit.
   d. all the above.

2. A search for a missing diver has to be:
   a. adequate to visibility conditions.
   b. a, c and d.
   c. adequate to rescuers limits.
   d. adequate to sea conditions.

3. To correctly recover an unconscious diver underwater you should:
   a. ascent quickly to the surface with the victim.
   b. surface with the victim respecting speed and correct ascent procedures.
   c. keep the victim’s airways open.
   d. both b and c.

4. Once on the surface with an unconscious victim you should:
   a. perform primary examination.
   b. practice artificial respiration.
   c. practice cardio massage.
   d. all the above.

5. True or False? Since artificial respiration in the water is more difficult, it is advisable to blow every 7/8 seconds.

6. First aid out of the water for a victim of an underwater accident includes:
   a. provide shelter for the patient.
   b. perform primary examination.
   c. administering 100 % oxygen.
   d. all the above.
7. Organizing emergency transportation for a diver includes that:
a. the rescue transport doesn’t fly at too high an altitude.
b. both a and d.
c. constant oxygen administration, until at shore, is guaranteed.
d. constant oxygen administration, until arrival at a medical center, is guaranteed.

8. The useful elements collection during an emergency regards:
a. noting down information about witnesses of the accident.
b. noting down the patient’s signs and symptoms.
c. both a and b.
d. noting down each diver’s birthdates.

9. Emergency management consists of:
a. having a plan to follow.
b. improvising rescue.
c. an alert for rescue.
d. both a and c.

10. Problems are easier to manage when considering:
a. prevention as the best solution
b. to exclude panic
c. both a and d
d. that underwater they rarely happen

I declare to have reviewed all answers with my ESA Instructor and to have understood the explanation of those I incorrectly answered.

Signature_________________________date___________
Let's GO!
Chapter Seven
Exercises

What you will learn
You reached the most enjoyable part of this course. It is the moment to roll up your sleeves and try the rescue techniques! The first part of the exercises will be a series of tests in the dry, in fact you may happen to intervene and rescue somebody that had an accident or illness anywhere. The test will regard interventions on conscious people, breathing or non-breathing unconscious people, and people in cardiac arrest. You will also learn, after performing the Primary examination, to take care of a conscious patient while waiting for medical aids, checking principal health parameters (among with temperature and pulse) and you’ll learn to note down information for medical aids.

The second part of the test will be in the water. The exercises will have to be performed in open water, to simulate the most possible real conditions you may experience during a rescue intervention. At your instructor’s discretion, you may try some of the techniques in confined water or in the pool. You will find the list of exercises to learn divided by dive. You will be able to individualize the exercise name, the standard to reach (in bold) and a simple description of the exercise. By reading each specific part in advance you will have an idea of what you will do in the water. If some exercise appears complicated don’t worry: usually it is easier than explaining. The demonstration of each exercise by the staff and your instructor’s experience will help you to easily reach the goal.

The program for the exercises is comprehensive: a review of techniques (probably already known from the Open Water Diver) to reinforce once again your water skills and intervention capability.

You probably remember how to solve a cramp. Progressively you will become familiar with more demanding situations like evaluating the correct approach to put in practice when having to intervene on a panicking diver.

A beautiful exercise, during which you will apply the resuscitation techniques, will be the “Rescue Circuit”, during which you will rescue on the surface a non-breathing unconscious diver. The last part will be a practical summary of evaluation skills and intervention techni-
ques learned during this course. You will work in an imaginary scenario: a kind of an emergency’s dry run (trial) during which you will be able to decide, under the supervision of your Instructor and Diveleader, intervention and First Aid modalities to adopt in base of circumstantial environmental conditions.

It will be an exciting experience for you!

**Intervention and patient care general rules**

- Before a rescue intervention, always evaluate your limits and environmental conditions. These could be dangerous, like environments contaminated by gas or chemical substances, potential electrical shock risk, water, fire and poor oxygen supply. Use proper protections and precautions to prevent any contact with blood or other bodily fluids.
- During First Aid procedures don’t act in a way that can worsen the patient’s conditions and move him only if necessary.
- Always take a positive approach, use the “Rescue Sentence” and verify the level of consciousness (always speak to the patient with kindness and affirm you are trained for rescue even if he seems to be unconscious or if he could be in respiratory or cardiac arrest)
- Always alert emergency medical aid if you deal with an unconscious victim and patient in shock or if you think you’re having problems to deal with a rescue situation and don’t know how to proceed.
- Consider signs and symptoms reported in this manual as simple guidelines to recognize abnormal situations and remember that the interpretation of signs and symptoms for drug prescriptions are strictly of medical competence.

**First Aid skills**

**Rescuer protection**

Evaluate the intervention in base of environmental conditions and use barriers and adequate precautions to protect from any accidental contacts with the victim, blood or other bodily fluid. As a rescuer, it is important to make a careful evaluation before an intervention. Consider the conditions you may find in dangerous environments (i.e. a thoroughfare, an environment saturated with gas, or invaded by fire or water, dangerous people or animals, falling buildings, etc.). It is also important that before your intervention you protect yourself with adequate personal barriers to avoid as much as possible direct contact with the patient. The most efficient barriers are gloves, which you have to get
used to wear before intervening, and masks for resuscitation. If standard supplies are not available, you can use improvised barriers, like sheets, bags, napkins and plastic tubes. Always discuss with your instructors and buddies some scenarios in which you may assume the rescuer role and evaluate the precautions you would use to correctly approach a victim in danger.

**BLS techniques practice**
Repeat correctly BLS procedures, described in the ESA First Aid manual
Under your ESA Instructor guide, repeat all basic techniques provided by the ESA First Aid course and described in the ESA First Aid manual:
- Rescuer protection primary examination (BLS adult – normally breathing patient)
- Airways obstruction (conscious)
- Airways obstruction (unconscious)
- Rescuer protection and primary examination (BLS adult – non breathing patient)
- Rescuer protection and primary examination (BLS adult – Asphyxiating)
- Bleeding
- Shock treatment
- Secondary examination: deseases
- Secondary examination: traumas

**Debriefing**
Listen to the Instructor’s comment
Here is another opportunity to advance in your learning process!
Interrupt any activities and carefully listen to comments about your performance, suggestions and recommendations offered by your instructor and staff.
Take the chance to improve and don’t hesitate to ask questions!
Open Water 1

Briefing
Listen to the description of activities to perform and ask questions for further explanation.
In Open Water briefing is particularly important, even because it is not convenient to ascend during the dive or exiting the water to ask for clarification. It is best to listen carefully, descend and dedicate yourself to the exercises. This way you will have more useful time for possible repetitions.
The acquisition of the rescue techniques is more efficient in a serene environment, trying the exercises in team with other divers and the staff. The Instructor will explain to you what to do – where, how and when – therefore it is important that you suspend any other activity and pay full attention.
Once in the water, with your dive buddy, carefully observe the Instructor and Staff demonstration; it will be slow, to give you the possibility of watching the exercise in every detail.
Do not hesitate to ask questions if something is not clear, the Instructor or the Diveleader will be glad to help you.

Equipment preparation, wearing and check
Prepare correctly all the diving equipment, wear it with your buddy's help and check it reciprocally.
As you usually do when you dive, you can connect the BCD and regulator to the cylinder and check that this is full. Suiting up can depend on the boat and you can complete it either on the boat or directly in water.
Checking, as you certainly remember, is the last thing you can do best to prevent problems related to equipment.
You have to perform this phase carefully and alert the Instructor or Staff if you or your buddy detect any problem with some equipment part.

Entry in the water
Enter into the water using the proper technique according to the characteristics of the site.
Instructor and Staff will provide useful indications for a correct entry according to the characteristics of site and boat. You may enter into the water using the backward roll or the giant stride or enter from the shore. In any case wait for the invitation and the Staff signals for your entry. Once on the surface wait with your buddy for Staff instructions about the exercises and the descent.
Weight check
Check for correct ballast before starting the descent
Correct ballast is fundamental to reach good buoyancy control, ideal comfort during the dive and even more if a rescue intervention is needed, when it is often necessary to keep the ballast on. Make it a habit, each time before diving, to consider all these aspects, to prevent any problem related to an incorrect weight system.

Personal water skills
Cramp removal, on surface and underwater
Solve a cramp problem on oneself and buddy, both on the surface and underwater
Vigorous finning, too stiff fins or inadequate fin size can cause legs or foot cramps.
This exercise provides that the divers take turn, on the surface and underwater, simulating the victim and the rescuer role, acting on oneself (selfrescue) and on the dive buddy on Instructor’s invitation. To solve a cramp on yourself you just have to grab the fin and extend the leg and foot’s muscles. To help your buddy, you will have to bend the fin blade towards him with an open hand.

One leg swimming
Underwater, swim in horizontal position for at least 15 meters, using only one leg, or both arms, in neutral buoyancy.
It can happen that a persistent cramp at one or both legs prevents you to fin, even after trying to solve the problem by stretching the muscles. You can use one leg or both arms to get close to the ascent line.
This exercise provides that the divers, on Instructor’s invitation and taking turns, in the victim’s and dive buddy role, cover an underwater horizontal navigation, finning with only one leg or with both arms. The buddy’s role will be simply of escort or possible assistance.

Surface signaling device use
Underwater, correctly use the surface signaling device
It can happen to lose your dive buddy, or the group, and you may not know how to go back to the boat. Or you may be forced to surface far away from the boat or frequented sites, because of a contingency. The surface signaling device will signal to who remains on the surface of a diver’s presence and will allow necessary assistance.
This exercise provide that the divers, underwater, have the surface signaling device and, on Instructor invita-
tion, release it inflating it a little using the alternate air source. Particular attention has to be paid to the connecting line, which will have to be preventively arranged on a reel or unrolled enough before inflating, so to allow the device to reach surface without pulling the diver up.

**Rescuing a conscious diver – on surface**

**Managing a tired diver with scuba unit**
On the surface and wearing the scuba unit, provide proper assistance to the tired buddy
First Aid procedures on the surface with the scuba unit on could be comfortable enough since you may already have it on because you are ready for the dive or you just surfaced. Taking off the scuba unit and securing it to the boat, or on shore, could waste some precious time. This exercise provides that both divers, on Instructor’s command and taking turns, play the victim and the rescuer’s role.

The correct approach must consider intervention’s limits based on environmental and rescuer conditions.
In the rescuer role, you should always fin slowly towards the victim with your head out of the water, looking at him and without loosing sight, until you have reached him. Encourage him to assume good positive buoyancy, possibly help him by inflating his BCD (releasing the ballast if necessary). Allow him to breathe deeply and rest, then help him by pulling him to the boat or shore. Evaluating environmental conditions and protecting his airways if necessary, you can tow the victim by grabbing his cylinder valve, an arm or you can pull him by grabbing his legs, while the victim can rest on his back until reaching the boat or shore.

**Managing a tired diver with fins, mask and snorkel**
On the surface and wearing fins, mask and snorkel, provide proper assistance to a tired buddy
If you were on a boat or on the beach and a diver signals you for help, or you notice he is in trouble because exhausted or ill and you couldn’t avoid entering into the water, one of the most comfortable way’s to proceed is
wearing only fins, mask and snorkel and, if available, a floater. This exercise provides that both divers, on Instructor’s invitation and taking turns, enact the victim and the rescuer’s role. The correct approach must consider environmental conditions and rescuer’s limits. The victim will be at 25 meters from the boat or from shore and will signal for help. At the signal, as a rescuer, you will wear fins, mask and snorkel and, if available, a floater, then will enter into the water. Keeping your head out of the water, you will have to fin towards the victim according to your limits until you have reached him. Encourage him to assume good buoyancy, maybe help him by inflating his BCD (releasing the weights if necessary) and handing the floater. Invite him to breathe deeply and rest, then help him by towing to the boat or shore. Evaluating environmental conditions and adequately protecting his airways if necessary, you can tow the victim by grabbing his cylinder valve or an arm. You can also pull him by grabbing both legs, while the victim can rest on his back until the boat or shore.

**Approaching a diver in panic on the surface**

On the surface, evaluate the correct approach and provide proper assistance to a panicking diver. A panicking diver on the surface can represent a danger both for himself and for the rescuer. During a panic attack, the victim wastes a large amount of energy, soon getting exhausted. It is necessary to proceed before he inhales water or sinks.

This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. The correct approach must consider environmental conditions and the rescuer’s limits. The critical part in this exercise consists in the correct approach the rescuer must adopt to avoid being involved in the panic attack.

You will position at 25 meters from your buddy and the victim will simulate a panic attack. As a rescuer, evaluating environmental conditions, you will get closer to the victim, keeping the right distance and ask him to inflate his BCD, stop and breathe deeply. You can use the technique of swimming in circles around the victim, without getting close and waiting for the right moment (when the victim is distracted or exhausted). Then grab the valve from behind with your right hand and his cylinder between your legs, with your left hand inflate his BCD and keep hold until the victim starts to think clearly again or is exhausted. This exercise ends towing the victim as in the previous exercise.
Assisting without entering the water
Provide adequate assistance to a victim without entering the water.
If you are on a boat or shore and have a doughnut or similar device, you can help a victim in need without entering the water.
This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. The victim will be at 10 meter distance and signal for help. As a rescuer, launch the doughnut several times trying to cover a good distance, possibly reaching behind the victim, who will be able to grab the line and the lifesaver. Then, pulling slowly, retrieve the doughnuts until it is close to the boat or at shore. Before launching, make sure the line is fixed to a bitt, a hook or hold it firmly under your foot.

Exit with a tired diver
Provide proper assistance to a tired diver during the exit.
If you proceeded to rescue a tired diver, it is important to make sure he exits the water completely to rest; but he may not make it by himself.
This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. As a rescuer, close to the shore or the boat ladder, help your buddy to take the equipment off and to exit the water holding him by his arm. Help him to go up the ladder steps or, if you are close to an inflatable boat without ladder, getting further help to pull the diver on board.

Repetitions and experience
Repeat the exercises under Staff supervision.
By repeating the exercises about rescue techniques following your Instructor and Staff suggestions, you will become more familiar and prompt in case you need to intervene in a real situation. If an exercise is not clear, don’t hesitate and ask the Staff to try it again.

Ascent and safety stop
Ascend along the boat line or signal ball at correct rate and (if necessary) make a safety stop at 5 meters for 3 minutes before surfacing.
This course includes exercises on the surface and underwater. Therefore, remember that you have to respect a correct ascent rate and, if necessary, make a safety stop as you would do in any other dive.

**Exit**
Exit the water applying the techniques suggested by the Instructor

**Equipment care and disassembly**
Disassembly and taking care of the equipment
In this course we discussed about prevention and maintenance as well. This phase is precious to keep your equipment efficient. If you can, it is best to rinse it in clean, fresh water even before disassembling it. If this is not possible, carefully put it in your bag or in the basket to rinse at a later time, following the Staff indications.

**Debriefing**
Listen to the Instructor’s comments
Here is another opportunity to advance in your learning process!
Interrupt any activity and carefully listen to comments about your performance, suggestions and recommendations offered by your Instructor and Staff.
Take the chance to further improve and don’t hesitate to ask questions!

**Dive validation**
Log the dive on your log-book and have it signed by your Instructor
Log your dive! This procedure is to confirm your training in open water. Carefully note down all parameters, environmental conditions, temperature and add your personal comments. Remember to have your dive validated by your Instructor.

An exhausted scuba diver can need help in the phase of exit.
Open Water 2

Briefing
Listen to description of activities to perform and ask questions for possible explanation.

Equipment preparation, wearing and check
Correctly prepare all the diving equipment, put it on with your buddy’s help and check it reciprocally. Remember the checking procedure.

Entry
Enter into the water using the adequate technique according to site’s characteristics.

Weight check
Check for correct ballast.

Rescuing a conscious diver – underwater
Equalization problems
Provide assistance to the dive buddy simulating equalization problems during descent. The buddy system provides that divers always keep close to each other and this is also valid during descent, when one can have equalization problems more often. This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. The victim, along a descent line, will simulate an equalization problem, correctly signaling the buddy (something wrong with the ear). As a rescuer, you will have to signal OK to the buddy with problems, signal him to stop and ascend a little. Then indicate to him to try again the equalization using different techniques (move the jaw and swallow). If your buddy, after a couple of attempts, still cannot equalize, indicate to him to slowly ascend and surface together.

Assisting a diver in need
Underwater, provide proper assistance to diver in need. A diver underwater could experience overexertion for an excessive effort (current) or for superficial breathing due to suit constriction or a BCD that is excessively tight. This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. When your dive buddy, playing the victim’s role, simulates overexertion underwater, you will have to get close and look at him, signal OK the STOP. Allow him to lean
on a rock, on the bottom or against you. Then, taking his arm or hand, signal him to breathe slowly and deeply until his respiration rate is normal again.

**Assisting a passively panicking diver**
Underwater, provide adequate assistance to a passively panicking diver. Underwater panic is a condition that exposes several dangers for both the panicking victim and the rescuer. It may happen that the victim spits out the regulator underwater, inhaling water or he may make an uncontrolled ascent even holding his breath and pulling the rescuer with him. For this reason it is necessary to intervene before the diver in stress goes into active panic. Passive panic is still a manageable situation before it degenerates, and this exercise is just about this condition. A passively panicking diver is like in a trance and doesn’t react to stimulations, but he could suddenly change into active panic. This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. The victim will simulate passive panic and, as a rescuer, you will have to try to stimulate him and make him feel your presence by holding his arms or hand, frequently signaling “ok” and signaling for a quiet and controlled ascent together.

**Sharing air**
Underwater, share air with your dive buddy. Being prepared for an air shortage emergency, even though this should never happen, is a good sign of control over a critical situation and, although this is learned in the ESA Open Water Diver course, it is always appropriate to repeat the exercise once in a while. One of the simplest methods to solve this kind of situation is sharing air with your dive buddy. This exercise provides that both diver’s, underwater, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. The victim will correctly signal his buddy for air shortage and, as a rescuer, you will position in front of him so that he can grab your alternate air source, put it correctly with the exhaustion deflector downwards and exchange it with his own. He will exhale from his mouth when he has no regulator, then, after the exchange, he will press the purge button or blow to empty the regulator. After you have exchanged roles, the Instructor will ask you to ascend with your buddy. Exchange “OK” and “ascent” signals and, firmly holding each other, ascend keeping contact with the line, which you could position between the two of you. With one hand, hold the BCD button to discharge
air in excess and slowly ascend. If necessary, make a safety stop at 5 meters for 3 minutes continuing sharing air. As soon as you are on the surface, keep holding each other and inflate the BCD. The diver who simulated air shortage inflates the BCD with his mouth, the other will use the inflator button.

**Low Pressure hose removal**

Underwater, remove and reconnect the BCD low pressure hose.

If a BCD, or a dry suit, suddenly starts to constantly flow because of problems with the buttons, valve or low pressure inflator, they would start to inflate, putting the diver in the impossibility of controlling buoyancy and at risk of a possible uncontrolled fast ascent. This exercise provides that the divers remove the low pressure inflator hose on the Instructor's request. While simulating the constant flow with a light pressure on the inflation valve, try to disconnect the BCD or dry suit inflator hose. Proceed with this exercise only on your Instructor’s indication and after he is well positioned close to you. After removing the hose, with your Instructor’s help, you can reconnect it to your BCD.

**Repetitions and experience**

Repeat the exercises under Staff supervision.

**Ascent and safety stop**

Ascend along the boat line or signal ball at the correct rate and make a safety stop at 5 meters for 3 minutes before surfacing.

**Equipment care and disassembly**

Disassemble and take care of the equipment.

**Debriefing**

Listen to the Instructor’s comments.

**Dive validation**

Log the dive on your log-book and have it signed by your Instructor.
Open Water 3

Briefing
Listen to the description of activities to perform and ask questions for further explanation.

Equipment preparation, wearing and check
Correctly prepare all the diving equipment, put it on, with your buddy’s help, and check it reciprocally.

Entry
Enter into the water using the proper technique according to site’s characteristics.

Weight check
Check for correct ballast.

Rescue an unconscious diver
Search techniques
Adopt the adequate techniques for a missing diver search, evaluating environmental conditions, time, depth, air reserve, limits provided by computer or tables and if assistance is available, both on the surface and underwater.
When a diver is missing, emergency operations start and it may be necessary to intervene in a search procedure while waiting for medical aid.
This exercise is for at least a couple of divers, with proper assistance out of the water.
With your Instructor you will have to evaluate the criteria for an efficient search, considering recreational dive limits. In favorable marine conditions, with optimal visibility, the most efficient techniques are often possible without even wearing the cylinder. In any case, the search should be suspended because of cold, adverse environmental conditions, dangers, air, no decompression time and safety stop limits.

Controlled ascent with an unconscious diver
Underwater, correctly ascend recovering an unconscious diver
It can happen to rescue a diver who felt ill and appears to be unconscious underwater or to find a missing diver, unconscious on the bottom.
This exercise provides that both divers, underwater, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. The victim will have to stay still, lying on the bottom and, as rescuer, you will have to get close until you can fully observe the entire scene. This will allow you to catch any detail, like noticing if the victim is breathing, if he is free or entangled and if he has the regulator in his mouth or not. This is a simulation, therefore the diver in the victim’s role will have to have the regulator always in his mouth and will have to breathe constantly. As a rescuer, after deflating your BCD, you can grab the victim from behind and with your right hand keep the regulator in his mouth without covering the purge button and exhaustion deflector. Your left hand can control the victim’s BCD inflation button with light taps and, at this point, you can slowly leave the bottom.

Keeping the victim’s face, towards the up position, guarantee open airways and remember to keep the ascent rate at no more than the 10 mt/sec. rule. The exercise ends on the surface, after you have inflated both BCDs.

**Rescue Circuit**

On the surface, in deep water, intervene on an unconscious, non breathing diver, providing adequate assistance until the boat or shore, removing both the victim’s and the rescuer’s equipment.

If you happen to rescue an unconscious diver on the surface, once you have reached him, the first thing to do is examine his level of consciousness. If the victim does not answer it’s necessary to put in action rescue operations and proceed with BLS, evaluating the distance to arrive at a dry place, the boat or shore.

In this exercise both divers, on the surface, on Instructor’s request and taking turns, enact the rescuer’s role, the victim’s and the collaborator. The victim will be at 25 meters from the boat or shore and will be in neutral buoyancy simulating to be unconscious. The collaborator (if available) will be close to the victim, ready to recover the equipment removed by the rescuer. As rescuer, you will have to evaluate the intervention in base of environmental conditions. Then you will swim, keeping your head out of the water, towards the victim and will try to call him and gently shake him. If the vic-
Tim does not answer, immediately start rescue procedures. Rotate the victim belly up (taking care that airways are out of the water), securing positive buoyancy (remove the ballast, adequately inflate the BCD), open airways and start the look, listen and feel technique. We will also simulate the absence of breathing and asphyxia. At this point you will have to ventilate the victim for about one minute and rapidly evaluate your distance from the point of support (boat or shore) to decide how to proceed.

If you need less than 5 minutes to reach the point of support you continue resuscitating the victim in the water. If you are further away you will practice ventilation for another minute, and then tow the victim as fast as possible toward the point of support.

We will simulate a less than 5 minute distance from the point of support so you will have to fin towards the boat or shore practicing artificial respiration and equipment removal at the same time. In the interval between ventilation and the other, you can release the BCD buckles and remove the equipment from both of you. The exercise ends when both victim and rescuer are wearing only suit and fins, close to the boat ladder or shore, where you can touch or anyway at the Instructor’s “stop” command. This exercise will group components of water skills, synchronization and concentration, therefore it could be repeated more times to allow you to become more familiar with these techniques.

Of course the Instructor will provide a clear and slow demonstration that you will have to follow carefully, step by step, to ascertain the various details.

**Exit with an unconscious diver**

Exit from the water with an unconscious diver. If you happen to rescue someone who is unconscious, you could also decide to bring him out of the water for First Aid procedures. With proper assistance, it would be very simple to rapidly bring an unconscious person, dead weight, out of the water.

This exercise provides that both divers, on Instructor’s request and taking turns, enact the victim and the rescuer’s role. However, Staff or other divers, at Instructor’s discretion, may step in for help, like anybody would do from a boat or shore. Depending on the conditions, the Instructor will show you different possible examples.
**First Aid procedures.**
Out of the water, on a boat or shore, perform First Aid procedures on a conscious person.
A patient could be conscious after resuscitation or he simply was never unconscious, yet he could still be a victim of an underwater accident.
This exercise provides that both divers, out of the water, on Instructor’s request and taking turns, enact the victim and the rescuer’s role, providing principal First Aid procedures. The simulation of First Aid procedures could resume with the Primary Examination and the resuscitation interrupted by the exit. This includes the positioning of the conscious patient (who has to lie down and be constantly helped), treatment for shock and oxygen respiration until the arrival of medical aids.

**Repetitions and experience**
Repeat the exercises under Staff supervision.

**Ascent and safety stop**
Ascend along the boat line or signal ball at the correct rate and (if necessary) make a safety stop at 5 meters for 3 minutes before surfacing.

**Equipment care and disassembly**
Disassemble and take care of the equipment.

**Debriefing**
Listen to the Instructor’s comments.

**Dive validation**
Log the dive on your log-book and have it signed by your Instructor.
Open Water 4

**Briefing**
Listen to the description of activities to perform and ask questions for further explanation.

**Equipment preparation, wearing and check**
Correctly prepare all the diving equipment, put it on with your buddy’s help and check it reciprocally.

**Entry**
Enter into the water using the adequate technique according to site’s characteristics.

**Weight check**
Check for correct ballast.

**Emergency simulation**

**Simulate an emergency scenario**
This last test is a summary of the techniques you have become familiar with during this course. The emergency scenario is a realistic simulation of the operations that start at the moment a diver is declared missing. In this exercise the divers have to collaborate in team, they have a limited time to put into practice their procedures and are assisted by the Staff. The exercise will be performed in a relaxed environment, in favorable environmental conditions and in no way participants safety will be compromised. As a rescuer team, the first thing you will have to do with your dive buddy is gathering all information related to the event. This can be provided by the victim’s buddy. The Instructor and staff will also collaborate as the missing diver’s buddies, giving you overall information necessary to the finding. Where it happened (in which direction from the boat or shore, location and depth), how to recognize the missing diver (suit, BCD and fin colors) and how much time elapsed from the disappearing.

At this point there will be the roles assignment, which may also involve the staff (who remain on the boat to prepare First Aid equipment and alert medical aid? Who will participate in the search? When missing diver is located who will perform the rescue procedures in the water? etc.). Now, the practical operation can begin. In this phase you will be able to choose, under Instructor and Staff supervision, the best intervention based on the scenario’s conditions. The initial operations are related to the actual search that will have to be adequate depending on marine conditions, visibility and depth.
The Instructor will set a time limit, for practical convenience and to develop the habit of always being conservative, especially towards rescuers, since they are recreational divers and not intervention team professionals. The moment the missing diver has been found, rescue operations will start, featuring the controlled ascent with an unconscious diver, resuscitation in the water (Rescue circuit), towing to the boat or shore, exit and First Aid procedures.

**Repetitions and experience**
Repeat the exercises under Staff supervision.

**Ascent and safety stop**
Ascend along the boat line or signal ball at the correct rate and (if necessary) make a safety stop at 5 meters for 3 minutes before surfacing.

**Equipment care and disassembly**
Disassemble and take care of the equipment.

**Debriefing**
Listen to the Instructor’s comments.

**Dive validation**
Log the dive on your log-book and have it signed by your Instructor.
Congratulations!

With completion of this dive you will obtain the ESA Prevention and Rescue Diver certification. Your recreational diving career could continue with many other Specialty courses or you may think about enrolling in the ESA Diveleader course, which will allow you to face the professional world. The Diveleader role, besides the advantages you can imagine as a diver, will offer you wonderful possibilities for traveling in many countries of the world and work hand in hand with nature, guiding divers underwater or assisting the Instructor during courses.

But this would be just the first step....The ESA Diveleader certification is the first of a series of professional achievements that will guarantee you many, many, more satisfactions.
Appendix

Dive planning scheme

General planning
Dive buddy
Dive date and time
Dive purpose
Chosen location
Alternative location
Navigation to the dive site
Appointment: time and place
Particular equipment
Forecast check
Cylinder check and recharge
Equipment check and preparation
Equipment and spare parts kit
Complete ballast
Complete dive bag
Transportation
Site information
Emergency contacts
Information for who remains on land
Food and drinks
Reservation/Tickets
Money
Dive site planning
Psychophysical conditions
Weather conditions
Environmental conditions stability
Locate and test communications systems
Decide entry techniques and location
Decide exit techniques and location
Buddy system
Underwater communication techniques
Navigation
Depth and time limits
Emergency procedures
Diving equipment check
In case of emergency contact: ________________________
__________________________________________________________
Not to forget

**Miscellaneous**
- Personal identity document
- Certification
- Log book
- Reservations/Tickets
- Emergency contacts information
- Bathing suit
- Sun filter or cream
- Sunglasses
- Hat
- Wind jacket
- Towel
- Bathrobe
- Slippers
- Bathing cap and goggles
- Change of clothes
- Food/Drinks
- Medicines

**Accessories**
- Underwater slate
- Species recognizing charts
- Pencil
- Dive marker
- Surface signaling device
- Reel
- Main torch
- Alternate torch
- Flash light
- Position light
- Snap hooks
- Anti-fog liquid
- Equipment line

**Spare equipment**
- O-ring
- Tanks
- Weights
- Straps
- Untensils
- Suit repairing kit

**Equipment**
- Bag
- Fins, mask and snorkel
- Suit
- Undervest
- Hood
- Gloves
- Boots
- Ballast
- BCD
- Full cylinder
- Regulator
- Alternate air source
- Pressure gauge
- BCD hose
- Dry suit inflator hose
- Knife

**Particular equipment**
- Camera
- Lens
- Flash
- Film
- Videocamera
- Case
- Cassettes
- Lights
- Batteries
- Battery charger
- Cables

**Instruments**
- Computer
- Integrated instruments
- Depth gauge
- Timer
- Compass
- Thermometer
- Tables
### EQUIPMENT

<table>
<thead>
<tr>
<th>ITALIANO</th>
<th>INGLESE</th>
<th>FRANCESE</th>
<th>SPAGNOLO</th>
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<tbody>
<tr>
<td>A.R.A. scuba</td>
<td>autorespirateur</td>
<td>équipement de plongée</td>
<td>escaphandra autónoma</td>
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<tr>
<td>attrezzatura subacquea</td>
<td>diving gear</td>
<td>équipement de plongée</td>
<td>equipo de buceo</td>
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<tr>
<td>boccaglio</td>
<td>snorkel</td>
<td>tuba</td>
<td>tubo/snorkel</td>
</tr>
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<td>tank</td>
<td>bouteille</td>
<td>botella/tanque de buceo</td>
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<td>bouteille pleine</td>
<td>botella llena</td>
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<tr>
<td>bombola vuota</td>
<td>empty tank</td>
<td>bouteille vide</td>
<td>botella vacia</td>
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<td>cintura dei piombi</td>
<td>weight-belt</td>
<td>ceinture</td>
<td>sistema de lastre</td>
</tr>
<tr>
<td>computer</td>
<td>computer</td>
<td>ordinateur</td>
<td>computador/ordenador de buceo</td>
</tr>
<tr>
<td>erogatore</td>
<td>regulator</td>
<td>déténdeur</td>
<td>regulador</td>
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<td>bcd</td>
<td>gilet</td>
<td>chaleco</td>
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<td>gants</td>
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<td>pressure gauge</td>
<td>manomètre sous marine</td>
<td>manometro sumergible</td>
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<td>wetsuit</td>
<td>combinaison</td>
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<td>timer</td>
<td>temporisateur</td>
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<td>palmes</td>
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<td>primo stadio</td>
<td>first stage</td>
<td>premier étage</td>
<td>primera etapa</td>
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<td>depth gauge</td>
<td>profondimètre</td>
<td>profundimetro</td>
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<tr>
<td>secondo stadio</td>
<td>second stage</td>
<td>deuxième étage</td>
<td>segunda etapa</td>
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### DIVES

<table>
<thead>
<tr>
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<th>INGLESE</th>
<th>FRANCESE</th>
<th>SPAGNOLO</th>
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</thead>
<tbody>
<tr>
<td>immersione da terra</td>
<td>shore dive</td>
<td>plongée de la plage</td>
<td>buceo desde palya</td>
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<tr>
<td>immersione dalla barca</td>
<td>boat dive</td>
<td>plongée de bateau</td>
<td>buceo desde barco</td>
</tr>
<tr>
<td>immersione profonda</td>
<td>deep dive</td>
<td>plongée profonde</td>
<td>buceo profunda</td>
</tr>
<tr>
<td>immersione in curva</td>
<td>no-decompression dive</td>
<td>plongée sans palier</td>
<td>buceo sin descompresión</td>
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<tr>
<td>brevetto</td>
<td>diving card</td>
<td>brevet de plongée</td>
<td>certification</td>
</tr>
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<td>caricare le bombole</td>
<td>to fill the tank</td>
<td>gourfier les bouteilles</td>
<td>cargar las botellas</td>
</tr>
<tr>
<td>aria cattiva</td>
<td>the air is not good</td>
<td>air mauvais</td>
<td>aire contaminado</td>
</tr>
<tr>
<td>corrente forte</td>
<td>strong current</td>
<td>courant fort</td>
<td>corriente fuerte</td>
</tr>
<tr>
<td>corrente debole</td>
<td>feeble current</td>
<td>courant faible</td>
<td>corriente debil</td>
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<tr>
<td>alta marea</td>
<td>high tide</td>
<td>marée haute</td>
<td>alta marea</td>
</tr>
<tr>
<td>bassa marea</td>
<td>low tide</td>
<td>marée basse</td>
<td>baja marea</td>
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<td>onde</td>
<td>waves</td>
<td>vagues</td>
<td>olas</td>
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<td>surface</td>
<td>surface</td>
<td>superficie</td>
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<td>profondità massima</td>
<td>maximum depth</td>
<td>profondeur maxime</td>
<td>profundidad máxima</td>
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<tr>
<td>profondità media</td>
<td>mean depth</td>
<td>profondeur moyenne</td>
<td>profundidad media</td>
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<td>sosta di sicurezza</td>
<td>safety stop</td>
<td>palier de sécurité</td>
<td>parada de seguridad</td>
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<td>risalita</td>
<td>ascent</td>
<td>remontée</td>
<td>ascenso</td>
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<tr>
<td>visibilità</td>
<td>visibility</td>
<td>visibilité</td>
<td>visibilidad</td>
</tr>
<tr>
<td>intervallo di superficie</td>
<td>surface interval</td>
<td>intervalle de surface</td>
<td>intervalo de superficie</td>
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<tr>
<td>sono in affanno</td>
<td>I'm distressed</td>
<td>je suis en essoufflement</td>
<td>sufrí agotamiento/jadeola</td>
</tr>
<tr>
<td>mia bombola è vuota</td>
<td>my tank is empty</td>
<td>ma bouteille est vide</td>
<td>mi tanque es vacío</td>
</tr>
<tr>
<td>ho il mar di mare</td>
<td>I'm sea sick</td>
<td>je suis malade de mer</td>
<td>Tengo/sufro mareo</td>
</tr>
<tr>
<td>ho un crampo</td>
<td>I have a cramp</td>
<td>j'ai une crampe</td>
<td>tengo calambre</td>
</tr>
</tbody>
</table>
Environment protection Advice

By putting these simple suggestions into practice, you will give your important contribution to the protection of the environment.

1) Underwater keep neutral buoyancy, avoid contact with the bottom and marine organisms: without gloves you will be more careful where you put your hands.

2) Close to the bottom block movements of any kind, if you have to lean, check that your knees and fins don’t cause any damage.

3) Avoid passing under vaults or going in caves, you may hit and damage organisms, furthermore air bubbles, trapped on the ceiling, cause serious damage to the environment.

4) Do not hold onto turtles, big fish, or cetaceans, instead swim with them but do not follow animals if you realize you’re disturbing them.

5) Avoid touching organisms you don’t know or that could be delicate; don’t caress fish or other organisms, you could remove their protective mucus and cause lesions.

6) Don’t recover from the bottom dead or alive organisms, archeological or historical finds and objects covered by algies and animals.

7) Do not purchase souvenirs made with marine products, this way you will discourage their picking.

8) Do not throw anything in the water (refuse, cigarette butts, bottles, paper, food, etc.): throw garbage in the proper containers.

9) Continue your education and deepen your marine environments knowledge, you will find out that every location deserves a dive and that in every bottom there is an incredible variety of organisms to discover.

All inhabitants and visitors of the underwater world thank you in advance for your commitment.