Safe Diving and the Diver

The Self-Reliant Diver

Your view of scuba diving has probably changed somewhat from the time of your initial training program to the time when you're ready to undertake rescue diver training. You've broadened your range of experience through repeated diving activities in increasingly wider types of diving environments. You've learned new skills, "tricks of the trade", amassed more knowledge, and dived with several, if not many, buddies. You've gained experience and judgment—the two indispensable keys to safer, more enjoyable diving. Most of your beginner's jitters and reservations have been conquered and you feel that you're becoming the kind of diver you always wanted to be; reliable, capable and self-reliant. Self-reliant?

An important attribute for a diver to posses is self-reliance. If you haven't given this much thought before, this would be a good time to do so. Admittedly, the ability to look after all your problems underwater without assistance from a buddy may not be the first thing that would occur to you when you consider what you need to dive properly. After all, the point was made time and time again in your training programs that you always dive with a buddy. This is a good rule that helps increase your enjoyment of diving, brings people together in a shared social setting, and gives you the confidence to explore new areas. So, where does self-reliance come in?

Imagine for a moment that you and your buddy are nearing the end of what has been a truly memorable dive: the walls were vertical and

blanketed in the kinds of marine life seen only in the magazines, the warm water was clear enough to see from here to next week, and the prospect of relating the dive to envious friends back home beckons. Then you realize that your buddy is gone. Which of you is responsible for this: you, because you were daydreaming, or your buddy, because he stopped to take just one more photograph? Your own air supply is dwindling and you suspect that your buddy may have even less. It dawns on you that you're not even sure where you are; you weren't paying that much attention on the way back, and your buddy was doing the navigating anyway. What to do?

Looking around more carefully, you see bubbles in the distance and swim to your buddy who's trying hard to tighten a loose weight belt while balancing the camera and the demands of buoyancy control at the same time. With a little help from you the crisis is quickly resolved and you're both soon back on the boat again and reliving the highpoints of the dive. Some new lessons have been learned, too. Never again will you leave the navigation entirely in someone else's hands, and you wish to seek out a buddy who is independently capable of looking after typical underwater problems without causing you moments of anxious concern.

TDI/SDI believes that all divers should be trained to be self-sufficient. This means that each diver accepts the responsibility for his or her own planning, equipment, and performance underwater. We are all ultimately responsible for our own safety and conduct on a dive. Any time our problems require assistance from our buddy on a dive, we disrupt the flow of the dive at the least and possibly endanger them at the worst. In fact what we strive to be is the ideal buddy; able to plan

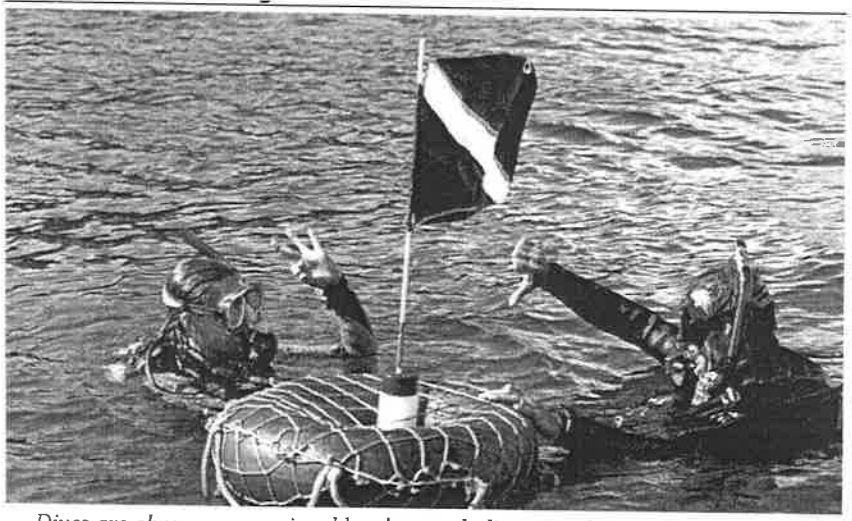
Self-Reliance
- **Understand your equipment**
- **Take personal responsibility**
- **Develop self-awareness skills**
- **Become more aware of your surroundings**
- **Plan for contingencies**
- **Learn to handle your own emergencies**

and lead the dive, capable of looking after most underwater problems, attentive and responsible. We can become better than we are by practicing and refining the basic skills of diving and by developing new skills and knowledge. Many of the new assessment and problem solving skills that will make you an independently capable diver will be learned in this Rescue Diver course. Along with this will come the knowledge that you'll also become a more valuable dive buddy.

Relaxed confidence is a characteristic of the self-reliant diver.

Awareness

Self-awareness to a diver means keeping in touch with the personal factors affecting our survival underwater. These include how cold or tired we are, how we and our equipment, as a system, are working together, and knowing what our remaining air and actual depth are at any given moment without having to look at the gauges. While this may all seem obvious, it's common enough for divers to withdraw from their surroundings and forget to pay attention to what's happening to them. This is not a diver in the comfort zone. This is also a diver more likely to blunder into an accident simply from carelessness.



Dives are always more enjoyable when each diver is independently competent.

"Global awareness" is defined as attentiveness to our surroundings, and is equally important in staying out of trouble underwater. In practice it gives us the ability to "feel" in a 3-dimensional sense. An alert diver knows his orientation underwater, maintains his sense of direction at all times and in his mind's eye "sees" himself in the middle of a changing seascape as he fins through the water. Global-awareness helps you register approaching entanglements and evade them, judge distances from the bottom and avoid kicking up the silt, stay in synchronous motion with a buddy without getting in the way and almost instinctively pick the best natural navigation clues. It's no coincidence that both self-awareness and global-awareness are the hallmarks of the self-reliant diver.

Preparing for the dive

Most of us view diving as a liberating experience that frees us from our every-day "topside" worries. Still, preparation in advance of the dive will help ensure that we make the most our time underwater, and do so enjoyably. These activities fall into several categories.

Physical Preparation

Scuba diving is a relaxing activity, one that allows the neutrally buoyant diver to swim with little effort and to stop and rest underwater whenever

the diver feels the need. Nevertheless, the presence of currents and surge underwater can significantly increase the diver's workload. Gearing up on the boat or on shore and entering the water wearing 60 to 100 lbs. of equipment can be physically demanding. Exiting the water after a long swim to shore or the dive boat can exhaust an already tired diver. In short, despite our view that diving is effortless, we can expend a great deal of energy on almost any dive. Add to this the caloric requirements to stay warm in anything but the most tropical waters and it's evident that even "easy" dives are work.

With this in mind, divers should strive to maintain a level of fitness appropriate to their typical kinds of diving. For all of us, we should attempt at the least to undertake sufficient regular exercise to keep us in condition for diving. This should include regular swimming sessions, especially with mask, snorkel, and fins. Any other exercises that emphasize cardiovascular fitness such as, running, tennis, and most competitive sports will also provide benefit for divers.

Keep in mind that many of the rescue skills and techniques you will be performing in TDI/SDI's Rescue Diver program will require sustained physical effort. Real life rescues may involve a long towing assist of a tired buddy. Even minimal swims on the surface while towing a helpless person can be exhausting. Are you ready?

Mental Preparation

A sure way to avoid pre-dive jitters is good mental preparation for the dive. If it's a site that's new to you, this starts with having done adequate research in advance of the dive. Talk to divers who have done the dive before, study the charts for the area, learn where all the entry and exit points are, and understand the effects of weather on the dive site. If the dive is challenging, such as boat diving on a relatively deep wreck, this might be a good time to review your present experience and training to make an honest determination as to whether you're really ready for this type of dive.

If you think you're up to the challenge and are diving in solid, experienced company, then you might benefit from mentally walking through the proposed dive with your dive buddy. Examine each step

of the dive process to familiarize yourself with the way it should all unfold. Then mentally create some of the possible obstructions to the smooth progress of your dive. This kind of preparation will help prepare you for the many unforeseen events that so often arise in even the most straightforward dives.

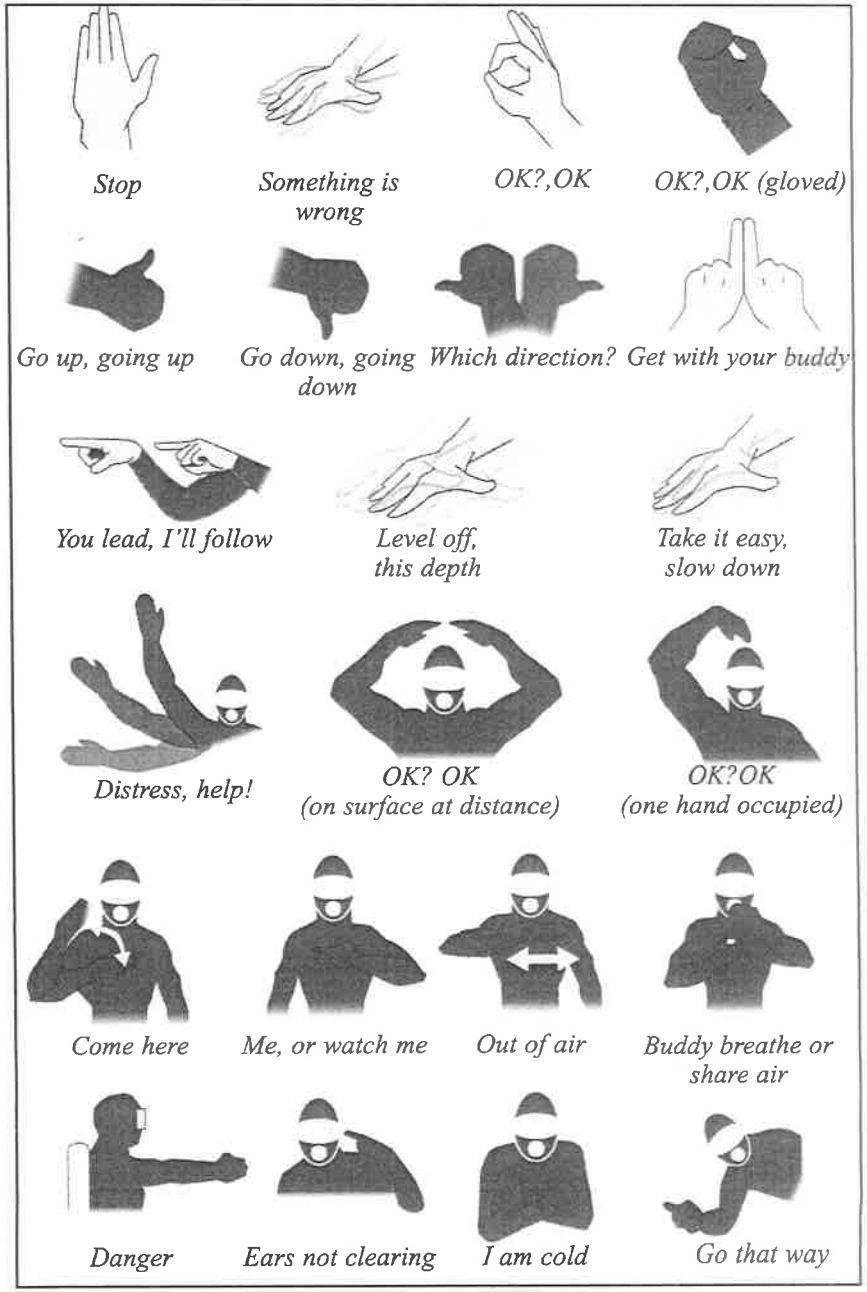
Equipment Preparation

Scuba diving is an equipment-intensive activity. Without properly functioning dive gear, we run the risk of equipment malfunction while underwater, particularly during deep or high-exertion activities. However, equipment preparation extends even to our exposure suit. Improperly cared for suits may get stiff and uncomfortable with age. The same may happen to improperly cared for bodies. If it's been a while since you last had the suit on, good advanced preparation would call for a pre-dive fitting to ensure that the suit is still serviceable.

Regular annual inspection and maintenance of all scuba equipment, including regulator, buoyancy compensator, and air cylinders will help prevent avoidable gear breakdowns that may cut a dive short, or cause an underwater emergency. Make sure that all your underwater gauges are in good working order. Check electrical contacts on bottom timers and computers. These need to be kept clean and without corrosion to function reliably during the dive. TDI/SDI believe that dive computers are an essential component to good diving. A computer that fails during a dive calls for an immediate end to the dive. You should not be near decompression limits on any average dive; however, always remember to make a safety stop at 15 ft (5 m) for at least three minutes on ascent. The use of a marked ascent line and alternate timer will allow a proper stop in the event of computer failure.

Specialized equipment required for the upcoming dive should be inspected well in advance. This might include line reels, lift bags, bottom grid lines for plotting debris or artifact distribution, marking buoys and flags, inflatable personal markers and the batteries in underwater cameras, strobes and dive lights. The last thing you should have to worry about is whether your dive gear is going to be able to perform as well as you will on the dive.

Diving Hand Signals



Dive Planning

Few pre-dive activities are more important than setting up a good agreed-on dive plan. All divers in the group or both divers in a buddy pair should participate. The dive intentions and nature should be clearly stated to avoid confusion later on. The dive plan should include the maximum depth and time of the dive and be calculated to keep all divers out of mandatory decompression. Or, if decompression stops are planned, that sufficient cylinders are in place. Most experienced divers will already have a good working number for their air consumption rate, and this should be compared to the proposed maximum depth and time of the dive. Be sure to allow adequate reserve air for the safety stop at 15 ft (5 m) for three minutes, as well as sufficient air for emergency use.

The dive plan should also include a proposed route to follow underwater. This provides for a much better sense of orientation during the dive, as the divers should be able to visualize their relative position on the route at any time. Deviations from the route are always acceptable as long as both divers understand and agree to the changes. The route should be designed to bring the divers back to their entry point, or another selected alternative.

All divers and surface support personnel should review the range of hand signals that might be used on the dive. This is best done before the divers are fully geared up for the dive and are impatient to get into the water. This review should include the support personnel as well, as hand signals may be used for communication to them from divers on the surface.

Buddy Check

One of the most important ways to ensure a successful dive and to avert accidents is to get in the habit of conducting a thorough buddy check before every dive. Most divers start with checking the scuba unit and air supply. Ensure that straps on the harness or buoyancy compensator are not twisted and are properly buckled. Typically the second stage of the regulator will come over the diver's right shoulder, though this is not always the case with some models. This is a good time to make note of this fact, as it will change your mutual orientation if buddy breathing

should become necessary. Note also the arrangement of your buddy's octopus or other backup air supply. Be sure you know precisely where to find it in an out-of-air situation. Ideally the octopus will be distinctly colored and attached in such a way that it can be quickly released.

Complete your check of the scuba unit by noting your buddy's starting air pressure and that any gauge and dive computer are in good condition and functional. A quick test to determine whether the air supply has been fully turned on is to hold the pressure gauge in one hand while pressing the purge button on the second stage. The needle on the gauge should not move. Continue the buddy check by examining the mask and snorkel, ensuring that the hood does not lift the mask and that all straps are in place. Pay particular attention to the weight belt or other integrated weighting system. The buckle on the belt must be unobstructed by any other straps or belts and readily accessible.

Buddy Check
- **Is air on? Alternate air source?**
- **Are all hoses properly placed?**
- **Is mask sealed? Are straps secure?**
- **Weight system release accessible?**
- **Dive knife or tool in place?**
- **Signal review?**
- **Dive plan review?**
- **Contingencies review?**

Pull-toggles or any other mechanism used to release integrated weights must be both properly functioning and completely understood by both divers. There should be no doubt about how to drop the weight in an emergency situation. Take this opportunity as well to check that the belt, if used, is snug around your buddy. One frequent cause of inability to release a belt when necessary is that the belt loosens in the water and swings around so that the buckle is behind the diver. It may be almost impossible to reach the release mechanism without removing the diver's buoyancy compensator and scuba unit first in these cases. Remember that it is almost always a mistake to remove a diver's buoyancy source before dropping his ballast.

Note where your buddy's straps are on the dive knife or other tool. Most frequently this will be on the lower leg. The general recommendation is that the tool be strapped inside the calf so that a dropped weight belt doesn't get snagged while falling. Many divers, especially those frequently involved in rescue operations, will wear a second knife, often placed within easy reach on the buoyancy compensator. In some circumstances, such as walk-in entries on rocky beaches, dive fins will not be put on until the divers are in the water. In any case offer assistance to your buddy in donning fins. Make sure straps are straight and properly placed.

It should go without saying that all these steps of checking your buddy before entering the water apply to you as well. Take the time needed to familiarize your buddy with the configuration of your own gear. You may be the one to require assistance on the dive, and your buddy may be the one who will have to handle the emergency, including your equipment.

Special Emergency Skills

Beyond the specialized rescue skills you will learn in the Rescue Diver course, there are particular diving skills that will both increase your safety and improve your effectiveness during emergency situations. While these are skills that any competent diver should possess, the nature of distress on or under the water calls for refined abilities to deal with emergencies.

Out-of-Air Emergencies

Most divers will gratefully spend their diving careers without ever having to face the prospect of an out-of-air emergency underwater. Proper dive planning, prudent air rationing, and staying within bottom time limits will diminish that possibility even more. Nevertheless, circumstances will sometimes conspire against us and result in air shortage situations. This can happen by not leaving enough air for a full safety stop, deviating from the planned route that results in extended swims back to the exit point, "lost buddy" searches, unanticipated currents on the way back, stopping to relieve cramps, and delays due to entanglements. Fighting for breath as the pressure gauge shows very low air pressure can be panic inducing. Reviewing your options before this happens is good emergency preparation. There may be more choices available than you think.

Buddy Dependent Options

The most widely employed option for the diver in a low air situation is to "borrow" air from his buddy. Always remember that if you are out of air, or nearly so, that your buddy is likely in the same or similar situation. At worst this makes the buddy dependent option one that exposes both of you to the risk of an out-of-air problem. At best it's a solution that calls for an immediate ascent together to the surface.

The preferred method of sharing air is through the use of an octopus regulator or other additional second stage (sometimes referred to as a "safe second"). There are several variations of second stage regulators directly incorporated into the low-pressure inflator hose. In both cases, the mouthpiece/second stage must be cleared or purged before inhaling a full breath. Whatever the arrangement, the out-of-air diver should know exactly where to find and how to use the device. This is a critical part of the buddy check and should never be left until the time of need.

Procedure for using an octopus regulator

1. The out-of-air diver signals "out of air" and "share air".
2. The air donor passes over the octopus regulator or allows receiving diver to take it from him.
3. Both divers grasp each other's buoyancy compensator or harness straps with their right hands.
4. Maintaining constant eye contact, the divers ascend together, using their left hands to vent air from their buoyancy devices as required.
5. Keep breathing as regular and normal as possible during this ascent.
6. On the surface both divers make themselves buoyant.

Buddy breathing, or sharing a single second stage, has been used successfully many times to assist an out-of-air diver. This method has been largely replaced by required training in the use of an octopus regulator. All TDI/SDI training requires an octopus, though buddy breathing remains an effective alternative, but only if practiced on a regular basis. Any out-of-air emergency is a stressful event and to employ buddy breathing as the alternative of choice will necessitate that the divers exercise excellent self control, thus the need for frequent practice.

Procedure for buddy breathing

An octopus regulator is the preferred buddy-dependent option.

1. The out-of-diver signals "out of air" and "share air".
2. The air donor takes a breath before passing the second stage to the receiver.
3. The receiving diver guides the regulator to his mouth and takes two breaths.
4. The donor replaces the regulator and takes two breaths in turn before passing it back to the receiver.
5. Throughout this exchange the divers hold on to each other, the receiver using his right hand to grasp the donor's BC, while the donor uses his left hand to grasp the receiver's BC. The donor uses his right hand to pass the regulator while the receiver uses his left hand to guide the regulator to his mouth.
6. Be sure that both divers exhale slightly whenever the regulator is not in their mouth.
7. Both divers ascend carefully together, venting air from their buoyancy compensators as required.

Buddy Independent Options

Both buddy breathing and using a buddy's octopus share the drawback of requiring that your buddy be nearby, be practiced in the proper techniques and that the urgency of the situation does not cause mistakes. The best options are those that allow the out-of-air diver to act independently to help himself. These fall into two categories: redundant air supplies and direct ascents.

Redundant air supplies


A true alternate air source is usually the best option in an out-of-air emergency.

Probably the most useful and easiest method of solving an out-of-air problem is to have a true alternate air source. A completely redundant system would include tank and regulator. This has the further advantage of a replacement regulator if in fact the out-of-air emergency is actually caused by a faulty regulator, rather than an empty scuba cylinder. Typically called "pony bottles," these small tank setups range in size from as little as 6 cubic feet to 40 cubic feet capacity. The most commonly used sizes are the 13 and 19 cubic foot bottles. Depending on the depth, pony bottles will allow a diver several to many minutes of bottom time, usually more than enough to ascend safely to the surface.

Increasingly popular among serious sport divers are self-contained bottle and integrated regulator devices, such as Spare Air® and its smaller relative HEEDS. The latter is essentially an escape air supply for pilots or others who may be temporarily entrapped underwater. Spare Air also provides a short-term air supply, though with its larger

size (up to almost 2 ft³), it gives the diver a little more ascent time. Both units have a built-in regulator with mouthpiece and are refillable from scuba cylinders.

Whether having a pony bottle or small, integrated bottle/regulator system available in emergencies, the diver is still in need of refresher practice from time to time. You need to be completely certain of where to find the second stage of the pony bottle regulator or the holster holding the Spare Air without thinking about it. Bear in mind that if you were wearing certain types of full-face masks when you run out of air, then you will also be maskless when you ditch your regulator for an alternate air source. It might be advisable to carry a spare mask in a side pocket for this possibility.

Direct ascent

Often times it may be quicker and easier to ascend directly to the surface without pausing to change air supplies, signal your buddy to share air or otherwise delay. Certainly in depths of less than 30 ft. (9 m), the surface is only seconds away. Considering the time it might take to employ another option, a direct ascent might make more sense with less risk to either diver. However, t here are several important points to keep in mind to make this a successful procedure.

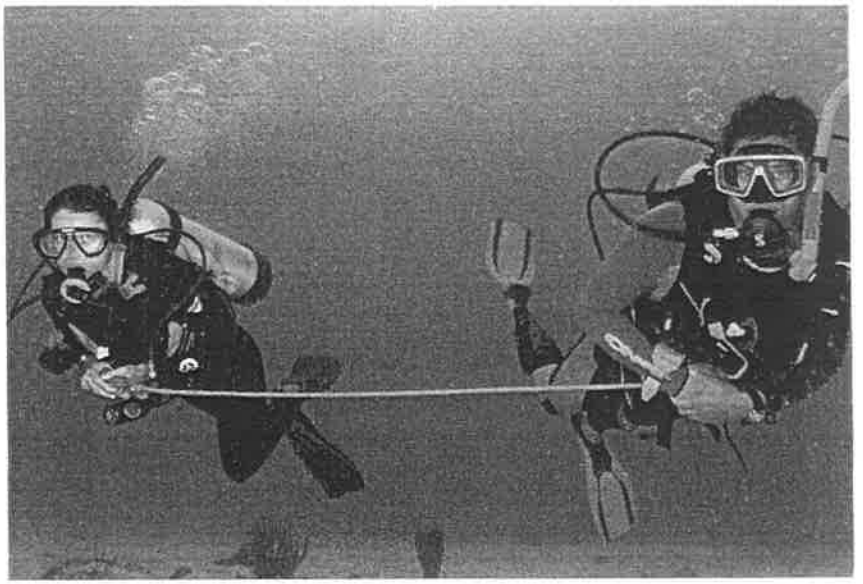
First, even though you may not be able to get a breath from the regulator at 40', it's unlikely that the cylinder is completely empty, even if the regulator had been free flowing. Most likely there is simply insufficient pressure left to overcome the ambient pressure due to the depth. This means that as you rise in the water and the ambient pressure falls, there should be some residue of air in the tank available to you. The shallower you ascend, the more air is available. Clearly, to take advantage of this air, you must have your regulator in place. The procedure is to attempt to inhale on ascent, to exhale normally, and to attempt to inhale. As long as you continue to attempt to inhale and exhale normally, your airway will stay open and any expanding air will automatically vent from your lungs on its own. This will happen even as you attempt to inhale.

As you get to shallower water, you'll find that you'll get as much air as you need (when you really need it). Remember, *never* hold your

breath on ascent. Methods that limit your exhalation such as humming, blowing a fine stream of bubbles, etc., will likely cause some lung expansion. The surest way to avoid a lung over-expansion problem is to keep the airway open by attempting to breathe normally throughout the ascent.

Limited Visibility

Diving in conditions of visibility less than 5 ft. (1.5 m) will often lead the buddy pair into problems of separation and navigation. Separation of buddies during a dive is not an unusual event, but may become more than a nuisance if conditions are unfavorable to rapidly finding the other. Prevention is the best cure in this case. Agree beforehand that you and your buddy will stay within arm's length throughout the dive and will frequently check with each other. Determine who will lead the dive so that the other is not jostling to be in front. In severely limited conditions a buddy line, i.e., a 6 ft. (2 m) length of line held between the divers, will be necessary to maintain constant contact.



In low visibility conditions, divers might consider using a buddy line between them.

Despite your best efforts, however, buddies will inevitably drift apart on occasion. This is not in itself an emergency, but the stress level in both divers is sure to rise if they cannot readily find each other. As long as both divers understand and apply the same "lost buddy search", then the separation will last only a minute or two. This may be an anxious time in some circumstances, but rarely will divers fail to be reunited shortly if they follow the same plan.

Lost buddy search

1. As soon as you realize that your buddy is gone, stop and take a good look around you, looking up and down, as well as from side to side.
2. It helps to rise a few feet when you survey the area around you. If your buddy has stayed at the same depth, you may see the reflection of light off the tops of his bubbles.
3. Spend no more than about a minute looking for your buddy. It may help to backtrack a bit to determine if he stopped for some reason, rather than wandered off on his own.
4. Ascend to the surface, always observing the correct ascent rates and procedures.

Every diver should be accomplished in the art of accurate underwater navigation.

5. If not already there looking for you, your buddy should arrive shortly.
6. If your buddy has not returned to the surface after 5 minutes, there may indeed be a problem and you should consider calling for assistance.

Most experienced divers go to some lengths to prevent this kind of situation from happening at all. Surfacing and returning to depth is not only a waste of time and air, but also makes divers more prone to precipitate decompression sickness. It also causes "wear and tear" on the ears and sinuses due to repeated, and unnecessary, pressure changes.

Navigation

Limited visibility diving is essentially a test of a diver's self control and ability. There will always be a certain amount of stress associated with diving in poor visibility conditions. Divers prefer to have readily available visual reference points to help them plot their course across an otherwise featureless bottom. In the case of visibility of less than about 5 ft. (1.5 m), divers are forced to conduct all their wayfinding through the use of their instruments, particularly the compass.

Underwater Navigation
- **Visualize your dive plan.**
- **Visualize your environment.**
- **Superimpose both images.**
- **Calculate your progress so far.**
- **Plot your position on the dive plan.**
- **Use all available natural and instrument aids to complete route.**

Good navigational skills are essential to any kind of diving activity, but are often neglected by divers. Diving in clear visibility waters, having readily apparent underwater landmarks or being routinely guided by other divers, it is easy to become lazy in wayfinding skills. Planning a search for a missing diver and actually conducting such a search will usually require that we possess fairly refined navigational skills. Most search patterns that we might undertake will necessitate that we can cover the bottom in an organized and systematic fashion. This demands skills that will guarantee our being able to conduct the search and not get lost ourselves. As with any other diving skill, we lose proficiency

when we fail to practice. Get into the habit of using a compass on every dive. Set up your dive plans so that they require some facility with navigational ability to complete them. Challenge yourself by making the compass critical to completing underwater routes successfully. Certain standard search patterns, as discussed later, will depend on these skills.

Even more importantly, the rescue diver should become adept at the skills of global awareness. Place yourself in your environment and know where you are at all times. There is a multitude of clues available on almost every dive. Learn to visualize your plan and route, and you'll begin to feel orientated throughout the dive.

Scuba I.Q. Review

1. What does the term "self-reliant" diver mean?

2. A diver's sense of awareness underwater is made up of what two components?

3. List three essential parts of a good dive plan.

4. What two broad categories of options describe responses to out-of-air emergencies?

5. When might a diver favor a buddy-independent response to a buddy-dependent response in an out-of-air emergency?

6. Describe two self-rescue options for an out-of-air diver at a depth of 20' (6 m).