

THE BACKUP PLAN:

How to Use a Redundant Air Supply



PHOTO 1

Pony bottles typically are mounted to the side of the scuba cylinder. Valve-down positioning makes the air control knob readily accessible. This 6-cubic-foot unit is held in place by a purpose-designed pony bottle bag.

Divers are not supposed to run out of air. But those who do typically have two choices. They can either head for the surface using a controlled emergency swimming ascent, and hope to arrive before their brain insists that they take another breath, or they can approach another diver with the intent to share air. Either way, running out of air is a potentially panic-inducing emergency that could have serious consequences.

If the out-of-air diver has practiced emergency skills faithfully, he approaches another diver, signals that he

needs to share air and waits for the donor to respond. The donor then offers the diver either his primary second-stage regulator or his safe-second octopus. In a perfect world the two then slowly surface, sharing air as they go.

A more likely scenario is that the near-panic, out-of-air diver frantically swims to a nearby diver, grabs the primary second-stage regulator from the diver's mouth and sticks it in his own mouth for a much-needed breath of air. Hopefully the startled donor regains enough composure to begin breathing from his own octopus.



PHOTO 2

The second-stage regulator of the pony bottle's air delivery system attaches to the front of the diver's BC.



PHOTO 3

Hand-held redundant air supply systems typically attach to the front of the BC where they can be retrieved quickly in an out-of-air emergency.

Both of these options, if not precisely executed, can result in serious injury or worse. And, if the donor's tank runs empty or his first-stage regulator malfunctions, the octopus is of no use to either diver.

A Better Alternative

A more fail-safe solution for dealing with air emergencies is backup air. A redundant air supply is exactly what the name implies; a backup air cylinder and a self-contained air delivery system that is separate and independent from the diver's scuba unit. The cylinder is smaller than a standard scuba cylinder and the regulator may be different from that typically used as a diver's primary air delivery system.

Although there are several technical diving applications, for recreational divers a redundant air supply is intended as a backup source in an air deprivation emergency. Such a situation could be caused by running out of air or by a first-stage regulator malfunction that prevents the diver from obtaining air from his scuba unit.

In an emergency the redundant supply typically is used by the diver who is carrying it. If all divers were equipped with redundant air systems, there would be no need for sharing air. As a precautionary measure many redundant-air-equipped divers still include a safe-second octopus on their scuba ensemble in case they are approached by a diver wanting to share air.

Carrying a redundant air supply makes a diver more self-sufficient. If he were to find himself deprived of air he need only switch to the redundant system. If he were approached by a diver who needed to share air he could hand off either his primary second-stage regulator or his octopus, if so equipped, with the confidence that he is carrying a dependable backup air supply.

Pony Bottles

Redundant air systems are available in a variety of sizes and styles, ranging from a 40-cubic-foot (cf) pony bottle, which closely resembles a mini-scuba cylinder, down to a 1.7-cf hand-held redundant-air canister.

The common sizes of pony bottles range from 6 to 40 cf. Most are equipped with a standard tank valve to which the diver attaches a first-stage/second-stage regulator setup and, if desired, a miniature pressure gauge.

Pony bottles that hold greater than 6 cf of air typically are mounted on the side of the diver's scuba cylinder using any number of techniques, from commercially manufactured fastening devices and nylon pouches (photo 1) to improvised surgical tubing configurations.

The bottle can be mounted on the tank either upright or inverted. When positioned downward the diver has easy access to the pony bottle's valve and air control knob (photo 1). This facilitates activating the air supply if and when it is needed. However, most dive instruc-

tors recommend turning on the pony bottle air before entering the water.

When the pony bottle is mounted on the scuba cylinder typically its second-stage regulator is routed beneath the diver's arm and attached to the front of the buoyancy compensator (BC) (photo 2). This provides easy access and allows the diver to notice if it were to free-flow.

Some divers loop the second-stage hose along the pony bottle and attach it and the second-stage regulator to the bottle using surgical tubing. This configuration minimizes the number of hoses secured in the diver's torso. To use the backup air supply the diver reaches back and retrieves the second-stage regulator from the side of the pony bottle.

Hand-held Redundant Air Systems

What qualifies a redundant air system as hand-held is the size of the canister and the air delivery device. A hand-held

unit typically is not equipped with a standard-length second-stage regulator hose. Most have an air delivery system that provides air through an integrated mouthpiece (photo 3) or a second-stage regulator tethered on a short hose.

A 6-cf-size pony bottle with a standard regulator attached can be mounted to the scuba cylinder (photo 1) and used the same as a larger pony bottle. Or, the 6-cf bottle can be fitted with an integrated air delivery system designed for this type of system, attached to the BC and used as a hand-held redundant air supply.

Hand-held systems range in size from the 1.7-cf Spare Air® canister to a 6-cf pony bottle that is set up as a hand-held. Some hand-held systems are filled from a scuba tank, while others are filled the same as a standard scuba cylinder. All have a working pressure of 3,000 psi or higher.

Hand-held systems hold less air than the larger pony bottles and, therefore,

provide the diver fewer breaths in an emergency. The 3-cf Spare Air® unit, for example, is advertised as providing 57 breaths at the surface. This will vary depending on the diver's breathing rate and volume and, of course, the deeper you go the fewer breaths any system — pony or hand-held — will provide.

Hand-held units typically are attached to the front of the diver's BC, where they are easily accessible in an emergency.

If the Need Arises

A redundant air supply system is like catastrophic medical insurance; you hope you'll never need it. However, it is a good feeling to know you have it, just in case.

Regardless of the type of redundant system used, before each dive confirm that it is full of air and operating correctly. Most units have some sort of device for determining if they are full. If not, adding a miniature pressure gauge to a pony bottle rig is reassuring.



PHOTO 4

In an out-of-air emergency the diver releases the Velcro tab and removes the Spare Air canister from its holster.



PHOTO 5

After ditching the nonworking primary second-stage regulator the diver holds the redundant air canister to his lips and breathes from the unit's integrated mouthpiece as he makes a controlled ascent.

The air delivery mechanism of any redundant system — the hand-held canister/mouthpiece or a pony bottle's second-stage regulator — should be readily accessible during the dive; both typically are attached to the diver's BC where they can be reached in a hurry (photos 2 and 3). Some equipment manufacturers incorporate attachment points into the BC design, making it easy to secure a hand-held unit.

Being equipped with a redundant air system significantly reduces the stress associated with an air emergency. To use a pony bottle, simply retrieve the redundant system's second-stage regulator, place it in your mouth, clear it (by depressing the purge button or blowing out) and inhale. Of course, if you dive with the pony bottle valve closed, it must first be turned on (photo 1). Depending on the size of the bottle and your depth, you most likely will have sufficient air for a normal ascent, including a standard safety stop.

To use a hand-held redundant air system in an out-of-air emergency, simply remove the canister from its holder (photo 4), hold the canister in your hand and breathe from the mouthpiece (photo 5). The process is just as easy as using a pony bottle, but time is more of an issue.

Since the number of breaths available from a hand-held unit is more limited, the diver must immediately begin a controlled ascent. The deeper he is and the more elevated his breathing rate and volume, the fewer breaths he'll get before the canister is empty. A unit

How Important is Being Self-sufficient?

There is no doubt that having a backup air system increases a diver's self-sufficiency and his chances of successfully dealing with an air deprivation emergency. However, there are other considerations.

In addition to the cost of a redundant air system, a pony bottle adds weight to the scuba unit and increases drag in the water. Hand-held units aren't as heavy or bulky but they still add weight. And all types of redundant systems require special procedures when traveling by air. Typically the unit must be emptied and the valve removed.

rated at 60 breaths at the surface will give him no more than 20 at a depth of 60 feet (18 m).

A hand-held canister can be used by the diver carrying it or passed to a diver needing to share air. However, before the dive it is important to familiarize your buddy with the use of the redundant system. Handing a hand-held redundant air canister to an out-of-air diver who is unfamiliar with its use could be as disastrous as denying him air.

Both pony bottle and hand-held redundant air systems require the same post-dive maintenance as a standard scuba cylinder and regulator setup. They should be rinsed in fresh water after each dive outing and stored appropriately.