

## THE FREEDIVERS RECOVERY VEST

Unfortunately, we are all too familiar with the consequences of freediver blackout (FBV) where the victim is usually found on the bottom with his weight belt firmly strapped to his lifeless body. Since we know the drowned diver did not intend to die during that dive, logically, we can say that during his last conscious seconds he did not appreciate his imminent danger. FB is sudden and often occurs without warning. These victims tell us an important fact about our sport. On some dives, during the last 20 or 30 seconds, our thinking is impaired. If our thinking was clear, we would hear of more divers self-rescuing by simply ditching their weight belts, the basic life-saving maneuver we all were taught.

2011 marks the 6<sup>th</sup> year of continuous development of the Freedivers Recovery Vest (FRV). Initially, a group of concerned divers began an Internet forum to develop a simple timed freediver life vest device that mechanically-inclined divers could assemble with simple hardware. Early in the process, one member suggested that in addition to a timed element, the device should also trigger at excessive depth. She gave the example of a disabled open-water diver descending so deeply that when the mechanism timed out, the victim was already too deep for recovery. The need for a depth component ruled out a simple do-it-yourself device. At the minimum, a pressure sensor would have to be coupled with a computer with logic to fire whenever the user dove too deep or for too long.

About two years into the project we became aware of the surface blackout phenomenon. Victims' friends and family provided us with computer-generated graphs of their fatal dives. Ironically, each had made an impressive dive including a return to the surface. Within 4 seconds, presumably during exhalation, they sank accelerating as the increasing pressure forced the remaining air from their lungs.

In direct response to this problem, we developed the surface minder feature. The user may set surface minder to ON, which requires him to acknowledge his conscious state at the end of 30 seconds of surface time by either pressing a button on his Computer/Console, or by swiping his Computer/Console across magnets in his vest. Failure to respond to the 15-second SWIPE message, which begins at the end of 30

seconds, will cause the FRV to inflate and quickly roll the user onto his back, face up in rescue position.

Occasionally, the diver will descend before the 30-second surface interval has passed—to catch some gear, to dodge a boat, or perhaps due to blackout. To distinguish between FB and an intentional dive, the FRV enters the Premature Dive State. Once he exceeds 10 feet in depth, the Computer/Console begins to flash the swipe message. The user has 15 seconds to swipe or press any of the 3 buttons to suspend immediate inflation. If he does not respond, the FRV will inflate.

A single unnoticed wire connects the streamlined back-mounted inflation unit to the forearm-mounted Computer/Console. The Computer/Console offers most features found in dedicated freediver computers—time-of-day, duration of the dive, temperature, and depth. In addition, the user can check his trigger time, trigger depth, cylinder pressure and battery charge.. Other warning features alert the user to low battery charge, low cylinder air and lost communication with the inflation unit. Distinguishing features include graphing of each of 4,000+ dives, directly from the Computer/Console screen. Simply pressing a button, scrolls through the previous dives. Besides presenting maximum depth, duration and temperature, it also informs the user of the important surface interval prior to the currently displayed dive. In another menu, the diver can call up depth and duration averages from a range of dives.

At home, you may download up to 8,000 dives (4,000 2-minute dives) for analysis on your PC. One mode presents pop-up graphs for each of the day's dives as you mouse over the list. Because a normal day of diving includes warm up dives, the program allows you to capture statistics on a specific range of dives. Analysis of your dives will provide valuable information about your dive profile, which will help you to set your trigger time and depth more accurately. In addition, you can correlate your dive performance to your surface interval preceding each dive. The program also reports your rates of ascent and descent.

The FRV can inflate for a variety of reasons. It inflates when you exceed your self-set trigger time or depth, or if surface minder is on, when you fail to respond to swipe messages that appear at the end of the 30-second surface interval or during a premature dive. The FRV can also be intentionally inflated with Command Inflation which allows

the diver to inflate the FRV anytime he is diving by pressing 3 buttons on his Computer/Console. If the diver is lost at sea, or simply tired, he may inflate the vest on the surface from the menu, or he can inflate it with the oral hose.

We designed the FRV to present the user in a head-up position optimized for buddy rescue. A review by paramedic and world record holder, Joe Tobin, confirms the ease with which the FRV allows for rescue breathing, and for towing potential victims in need of emergency assistance. Joe says,

We all know how deadly the phenomenon of shallow water blackout has been in the freediving community. Your decision to become an FRV user was a wise safety decision. Your best chance of survival after a shallow water blackout is to be at the surface where rescuers can find you without delay. Make the commitment to learn how to incorporate the features of your FRV in a way that fits your diving situation and wear your vest every time. Adjust your trigger settings and surface minder options conservatively with your safety in mind and always dive with a capable buddy.

It is important to remember that the FRV is a mechanical adjunct to the freediver. In no way is it a substitute for adequate training, safe diving practices, or a replacement for a capable dedicated buddy diver.

The FRV is made from the finest components available and supports a redundant inflation mechanism. Two inflation valves and their electronic drivers fire when only one is needed. At its maximum service depth of 150 feet (45 meters,) it provides 18-pounds (8 kilo) of lift. As the user ascends, the lift reaches 43 pounds (19 kilo) when excess air is vented from the over-pressure valve. Each FRV is 100% tested during the manufacturing and assembly process.

While the maximum service depth of the FRV is 150 feet of water, it is tested to exceed pressures of over 250 feet. The Computer/Console is thoroughly tested as are the redundant valve mechanisms. The accuracy of the depth sensor is tested with calibrated instruments to confirm its accuracy. There are a host of additional tests that the FRV must pass before it is shipped.

The FRV is integrated into a vest, which is quite streamlined. Users have reported no interference with their descent or ascent rates.

Julie Richardson who's groundbreaking work on freediver blackout can be found at <http://divewise.org/> says, "Many of you know that three years ago I nearly lost my sons

Robert and David as one tried to rescue the other on a 90 ft freedive. Both boys suffered a near-fatal blackout involving CPR and a MedEvac under life support. Thankfully, they made a full recovery from this event. I met Terry soon after the accident and learned of his FRV project and followed the development process with great interest.... I have worried a lot in the three years since the accident while my boys were out diving. But I have now purchased something invaluable: safety for my sons as they pursue their passion for spearfishing, and peace of mind for myself.”

Famed blue water hunter Roberto Reyes says, “I have been following Terry on his quest to make something that would save lives of spearfishermen, and this is it. The price only reflects the quality of the parts , it will last a lifetime, and like Julie says, it is priceless when you think what did you buy it for.”

While the FRV cannot prevent FB, heart attack or stroke—nor is it designed to—it can deliver the user to the surface in rescue position. It combines a mechanical inflation mechanism, housed in a streamlined vest with a sophisticated dive computer. What began as a search for a basic timed mechanism evolved into a highly sophisticated device with complex logic and the hardware to support its function under a wide range of circumstances and diving conditions. The FRV offers disruptive technology—a potential game changer for the sport of freediving. Please take a look at our Internet site: [www.oceanicss.com](http://www.oceanicss.com) where your may download our complete manual, where you can find current user feedback and view demonstrations, and where you can request a complementary DVD.