Up from the Ashes & Into the Breach

Orca/EIT Phoenix and Suunto Eon Dive Computers

The first modern electronic dive computer to be sold widely was, of course, the Orca EDGE. Despite its size (large and heavy), flaky off-on switch, and very limited battery life, the EDGE had an extremely loyal cadre of owners. Many professional divers still swear by their EDGEs, mainly because of their outstanding visual display. About 4 years ago, In Depth *reviewed the Orca Delphi, an air-integrated extension of the EDGE that used the same decompression algorithms. The Delphi was an innovative, inspired design. Unfortunately, our demo models and the production units suffered from persistent mechanical and electronic problems. Accordingly, we warned readers not to buy the Delphi.*

A few years ago, Orca was acquired by EIT, Inc., an electronics firm based in Virginia, which has been working hard to establish a reputation as a high-quality manufacturer. The Delphi has been modified and upgraded to the Phoenix. We felt that it was time for our equipment editor to give Orca/EIT another chance by test-diving the latest version of this pioneering product.

Until this year, the Finnish firm Suunto Oy had not produced an air-integrated dive computer, notwithstanding the success of its two non-air-integrated units, the Solution and its lower-priced relative the Companion. Unlike most other dive computer makers, Suunto also manufactures mechanical submersible pressure gauges (SPGs), which may explain why it hasn't rushed into the air-integrated arena. The long delay also allowed Suunto an unhurried look at the strengths and weaknesses of existing air-integrated dive computers. Our equipment editor met with some of Suunto's engineering staff last fall in Helsinki for a preview of the first Suunto air-integrated dive computer, dubbed the Eon, and then test-dived it a couple of months ago alongside the Phoenix. Here's his report.

Who Are You Calling a Pro?

Both of these air-integrated dive computers have all the necessary pieces of information any recreational diver — and quite a few professional divers — would likely need, including ceiling alerts, fast-ascent warnings, remaining no-stop times, dive logs, total ascent times including required stops, elapsed dive time, ambient temperature, tank pressure, and remaining air time. The Eon has a built-in dive simulator and a user-operable, IBM-compatible PC interface (optional). The Phoenix doesn't have a built-in simulator, but Orca does offer an optional PC interface, too.

Both of them will handle serious decompression profiles. Paul Heinmiller at Orca/EIT and Ari Nikkola at Suunto each stated that their instruments had the ability to display essentially unlimited ceilings and deco times in excess of hours.

Mountains & Other Frills

The Phoenix and the Eon can both handle high-altitude diving, though the Eon is more restricted in maximum altitude and a bit harder to set up. The Phoenix does automatic high-altitude equilibration to 10,000 feet, whereas the Eon requires a user to tweak it manually — a series of wet-finger taps and releases (8,000 feet max).

There are other frills in the Eon, but I didn't use most of them after the first blush wore off. You might be more interested in them, especially if you're a research diver who keeps detailed records of profiles. The Eon's instant playback is much more detailed, including minute-by-minute dive profiles, and there's a built-in real-time clock linked to the log. The Phoenix can also play back detailed profiles, but only through its PC interface.

Instrument Abuse

Both the Phoenix and the Eon ran flawlessly throughout a week of tropical diving. They were both subjected to exactly the treatment their owner's manuals discouraged. I left them out in the blazing sun and in hot cars for hours, thumped on them vigorously, dropped them from chest height onto cement pavement, and rotated them a zillion times on their hose ends in an attempt to kill their swivels. Since the Phoenix's predecessor had experienced some failures due to static discharges, I rubbed a synthetic cloth back and forth on a cat that happened by to see if a few kilovolts applied to the two computers' hoses and consoles could destroy their electronics. My hair stuck out in all directions and the cat ran off, but both dive computers survived.

Good Times Underwater

The Eon and my Solution backup typically ran right on top of each other with respect to remaining no-stop times, times when ceilings first appeared, and ceiling depth. Sea Quest, Suunto's American distributors, told me that over a series of long, deep exposures, the Eon will back off a little more than the Solution, but that wasn't my experience in the field.

However, the Eon was a couple of minutes less generous than the Phoenix, which tracked my buddy's EDGE so closely that they appeared to be linked together. The differences between the Eon and the Phoenix were usually on the order of 2 to 5 minutes of no-stop time.

I'm from Missouri

The Phoenix is about twice as large as the Eon, with a display area about 2 inches wide and 3½ inches long. The numbers are large enough to show a buddy who is 6 feet away. By comparison, the Eon's display area is about 1¼ by 1½ inches. If you like very compact instruments, you will probably prefer the Eon, especially without a compass. When you attach a compass to the end of the Eon, it's still shorter by an inch than the Phoenix. When you add a compass to the Phoenix, the console doesn't increase in length because the compass sits on the base of the hose mount, but it does get thicker.

If a very big, clear display is more important to you than overall size, the Phoenix may be a better choice. The Eon's display is slightly darker and lower in contrast than those of the Solution or the Phoenix. Although all critical information on the Eon is large enough to be legible, it does have some tiny LED elements that were hard for me to read, even though they are slightly larger than their equivalents on the Solution. If your close-up vision has deteriorated or is on the way downhill, try to read the Eon's display from a couple of feet away, underwater if possible, before committing to buy one.

Neither the Eon display nor the Phoenix display is visible at night without external lighting. The Eon has a phosphorescent screen, but as far as I can tell, it's a worthless sales gimmick. A minute or two after it's illuminated by a flashlight, it fades into obscurity and has to be reactivated to read the numbers.

I rubbed a cloth on a nearby cat to see if a few kilovolts could destroy the computers' electronics. My hair stuck out and the cat ran off, but both dive computers survived.

Eek! You're Going Up!

The ascent rate indicator and SLOW warnings on Suunto diving instruments have never been particularly good. Most of the divers I know who have had Suunto dive computers essentially ignore the SLOW warning display because it's too sensitive to small rises and too insensitive to rate corrections. Unfortunately, you can't ignore the warning on Eon because it's audible. You don't really want to hear a beep every time you lift up a few feet to swim over a rock or a small coral head. The Eon even beeped sometimes when I lifted my console to read it during a very slow ascent.

Furthermore, the warning doesn't cease and desist when you do slow down promptly. During an ascent, when the 3-stage rate indicator gets past its first two levels but hasn't yet reached its safe limit, even if you come to a full stop the third stage will often light up, followed immediately by the SLOW warning and beeping, although you're no longer moving up at all. If you wait until it goes out and start up again gradually, you'll probably see the rate indicator climb right past its maximum again, kicking on the SLOW warning and the beeper. You end up doing an ascent in jerks and pauses. The feedback you get from the indicator comes much too late to control your ascent smoothly.

The Phoenix doesn't use audible alarms but has a pair of bold, bright LEDs to indicate a violation of a decompression ceiling or a fast ascent. They worked perfectly and were buffered correctly. They were visible in broad daylight as well as at night. Undoubtedly, they're power consumers, but their impact on battery life should be nil if you do everything right to keep them from coming on.

Stop! . . . Don't Stop. . . . Stop!

The Phoenix has a variable ascent rate that permits ascents of 60 feet per minute below 120 feet, whereas the Eon insists on a constant maximum rate of 33 feet per minute at all depths. The variable ascent rate is a major advantage for air management; at the end of a deep segment when you're burning air like a sweathog, it's nice to boogie up into shallower water to conserve air before having to slow down. Perhaps higher ascent rates increase bends liability, but if the Orca decompression model works for times at depth, it also ought to work for variable ascent rates. Fast ascents in shallow water are, after all, the really risky phase, according to the experts, and the Phoenix backs you down to 40 feet per minute once you hit 120 feet, then slows you to a crawl, 20 feet per minute, for the last 60 feet.

Air Warnings

The Phoenix and the Eon both activate alarms when air supply reaches some predetermined set point. That isn't equivalent to zero air, of course, but is intended to provide a buffer. The warnings on the Phoenix are strictly visual (air time display drops to zero), while the Eon adds several sonic alerts. A double beep and blinking warnings are given at 725 psi, and another reminder is furnished at 500 psi.

Both Orca and Suunto did a good job of predicting when I would reach the set point, and throughout the dive, the "minutes remaining" displays changed smoothly with depth and stayed pretty close to what I actually had left.

The Phoenix's set point allows a reserve of 500 psi, and in fact, just before I got down to 500 psi, the display usually said that my "air limit" was 1 minute. At 500 psi, my air limit went to zero. It seemed to function perfectly.

The Eon air calculations were more complex. Its set point is variable, apparently depending on maximum consumption rate. On a heavy-breathing dive, the set point increases from 500 psi to about 725 psi. The Eon seemed to remember my maximum breathing rate at depth and carry that into shallow water by revising its set point to the maximum, even when back in shallow water.

Having an air time of zero minutes at 15 feet with over 700 psi flies in the face of common

Pass the Fork, Please

I must eat a bit of crow. For years, I've been advising readers that air-integrated dive computers weren't all that great an idea. Tank pressure is clearly the most important information to have underwater. You can probably fall back safely to an extended 20-foot safety stop if your dive computer dies, but if you don't know how much air you have left, your dive is — or should be — over immediately. My bias against air-integrated units came from the higher failure rates of early electronic dive instruments.

However, it's time to reexamine the contention that mechanical SPGs are inherently more reliable than electronic air-integrated dive computers. Diving electronics seem much better built than they were a few years ago, and there is now quite a bit of disturbing data on mechanical SPG failure. For example, DAN's *1992 Report on Diving Accidents and Fatalities* details a death in which the SPG on the diver's tank read 200 psi even though the tank was empty.

In Australia and New Zealand, diving accidents and close calls are reported to the Diving Incident Monitoring Study (DIMS) coordinated by Dr. C. J. Acott at the Hyperbaric Medicine Unit of the Royal Adelaide Hospital. Last December in the *South Pacific Underwater Medicine Society Journal*, Dr. Acott summarized 82 out-of-air and 49 low-on-air incidents that had been reviewed by DIMS through the end of 1992. Although the majority of out-of-air situations were caused by not checking gauges often enough, *inaccurate SPGs caused 20% of the out-of-air accidents.*

This inaccuracy is probably due to wear and tear on used gauges. No manufacturer could survive the legal action that would undoubtedly ensue if new SPGs were consistently defective, but once they're in the field, it's a different story. Mechanical gauges are full of tiny parts that are crimped and pressed together, and they can just plain wear or break when flailed around on the end of a hose. An SPG can develop a consistent reading offset or show more subtle erratic behavior. Since the Bourdon tube inside a mechanical SPG changes shape every time the gauge is pressurized, it fatigues and can eventually fail or even blow out, resulting in ejection of the safety plug in the back of the gauge or (as a worst case) launching the glass face. In fact, the Diving Safety Officer at the University of California, Berkeley, who taught me to dive said he had experienced an SPG explosion that scattered broken glass into his armpit, right through his ¼-inch wetsuit.

In light of the trend toward better underwater electronics in general, the data on SPG inaccuracy, and recent personal experience in the field, I have a much more positive impression of air-integrated units. A modern air-integrated dive computer with a fresh battery is probably as reliable as any randomly selected mechanical SPG, and a great deal more accurate.

sense. It did, of course, show psi, so I had enough information to ignore what I considered to be a false alarm.

Power to the People

The batteries are user changeable in the Phoenix and the Eon. The little 3.6-volt Saft LS14250 lithium battery in the Eon is rated at 2,000 hours, which ought to be enough for several years of diving by even our most hard-core subscribers. Although the battery in my loaner wasn’t shot, I did change it and the battery compartment O-ring just to see how difficult it was. Although the manual lists 17 separate steps, the whole operation, including reading the instructions, took only 10 minutes. The Eon loses the residual nitrogen information from the last dive, so a battery change can’t be done in the middle of a dive series, but with a 2,000-hour lifespan, it shouldn’t be hard to pick a dry time between trips.

The battery in the Phoenix is much easier to change (unscrew a big plastic cap, change the alkaline or lithium 9-volt battery in less than 15 seconds to avoid losing any information), which is a good thing, because it doesn’t last nearly as long. An alkaline battery lasted 5 days in the Phoenix before it gave its first low-battery alert (LO), which then stayed on through another day of diving before going to the “last chance to change me” (LO LO) display. On the seventh day, the “you lose” message finally came on (LO LO LO), after what I would consider more than ample warning.

In the good old days, EDGE users bought 9-volt lithium batteries marketed by Kodak, but they fell off the shelves for a while. Now they’re back, without the Kodak label, at Radio Shack for about $8 a pop. I didn’t have one along to test, but based on previous EDGE experience and on the Phoenix manual, you ought to be able to get in more than a full week of diving.

Service

Service for the Eon in the USA is provided by Sea Quest, Inc., in Carlsbad, California. Dealers can perform battery changes if you don’t feel confident about working with small, expensive, O-ring-sealed compartments. Repairs, even those off warranty, are likely to be inexpensive (or free), given Sea Quest’s well-deserved outstanding reputation for customer relations.

EIT provides free factory servicing for the Phoenix. I haven’t heard much lately about the quality of their service, though I have listened to some snarls about their $125 fee for a routine EDGE servicing.

Read On . . . and On . . .

Both the Orca and the Suunto air-integrated dive computers are complicated products. They aren’t hard to use, but they do require you to understand the display before you jump in, if for no other reason than because both of them employ graphic symbols such as blinking bars. The manual for the Phoenix is a well-written, straightforward document in plain English. The Suunto manual is clear enough, too, but almost twice as long (77 pages vs. 43). Both manuals are choked with dire warnings, though the Suunto manual has more waffle words.

The Bottom Line

I’ve been diving with a Solution since it first came out and am partial to the times and the display that it provides. It’s worked perfectly, and I haven’t gotten bent. Sea Quest is a wonderful company to do business with, too. The Eon is so similar to the Solution that I adapted to it right away. After a couple of days in the water, I just glanced at the Solution in my pocket occasionally to make sure it was still running. I liked virtually everything about the Eon except for the ascent rate and SLOW indicators and the audible ascent warning, which I appreciated in theory but really hated in practice. I wasn’t too thrilled about the Eon’s variable zero set point, either, though it wasn’t a big deal. It would be useful for divers who remain in deep water until they’re low on air.

It’s also a pleasure to write a favorable review of an Orca product that seems to have left its troubles in the past. I have logged hundreds of safe dives using computers based on the Orca algorithm. It’s nice not to have to squint at a screen to figure out what I’m seeing underwater, or stop to figure out what some blinking icon means. I had a really good time diving the Phoenix. It was everything its predecessor should have been. It worked perfectly despite intentional abuse, its display was clear and unambiguous, it gave all the information I needed on every dive, and it supplied ample warning of a low-battery condition.

Experienced SkinnyDipper or Marathon users will find the Phoenix display very familiar, with only a few added features to learn. EDGE users — well, what can I say? They’ve been asking the same question of Orca for years: “Please, can we have the EDGE display on a smaller, more modern instrument?”

Suggested retail prices: Orca/EIT Phoenix, $699.00; Suunto Eon, $775.00 ($825.00 with compass).

In Depth gives both computers two thumbs up.