

The Talking Computer Talks Back

Benemec and Mares respond to Divemate review

In our January issue, Delmar Mesa reviewed the Mares Divemate, a talking dive computer that our West Coast editor liked so much that he compared it favorably to having a buddy. He did have a few bones to pick, and forwarded a copy of the article to Mark Layton at Mares technical support. Mark sent it to Esa Raivio at Benemec Oy Ltd., the Finnish manufacturer of the Divemate. Here's Raivio's reasonable response, presented as a dialogue with our reviewer's comments.

DM: I tested the Divemate in warm water with a $\frac{1}{8}$ -inch neoprene skullcap and wondered if the announcements would be audible through a coldwater hood or to those with hearing problems. I could not hear announcements when wearing the Divemate on the wrist strap.

ER: We have been testing the Divemate with a variety of hoods — neoprene, latex, rubber, both wet and dry, and have been able to hear the voice clearly through all of them. In Finland we dive mostly with drysuits, so it was natural for us to test this. Pace your breathing and tilt your head a little sideways, so that the bubbles ascend mostly to the other side of where the computer is located, and even with a small hearing deficiency you should have no trouble at all in hearing the unit talk. The voice is not meant to be heard from your wrist.

DM: I hated the audible warning that kicked on to remind me to make a safety stop. Other warnings are heard for safety violations, such as fast ascents,

busted deco stops, etc. I also objected to the visible readout for safety stops, which counts down in seconds, unlike all other timed readings.

ER: Our idea was that also the safety stop is a warning: It's a warning that you are in a safety stop — do not move out of it. The 180 seconds were chosen to give the diver something to do while off-gassing. It is boring to watch three minutes run, but it is less boring to see 180 seconds run.

DM: The greatest shortcoming of the Divemate is its lack of audible stop-required data, though the visual display does show you what you need to know.

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I also complained about the lack of information in the owner's manual about boundary conditions for stop-required dives.

ER: The Divemate is a recreational diving computer. The product concept of the Divemate was not to make a true decompression computer. The Divemate decompression model is meant for accidental or otherwise short and depth-limited decompression diving. The limitations are 30 minutes of total ascent time or deepest (first) ceiling depth 14

meters (46 feet). These limitations should have been printed in the manual, but somehow got omitted.

If divers plan a decompression dive, they should place the Divemate on their wrist at the start of the dive. A diver's ability to use audio information in a critical situation is limited. According to our testing, it is very difficult, even for the experienced diver, to accept and memorize data given audibly during decompression.

DM: The owner's manual was truly excellent — in fact, crystal clear — in terms of operating instructions. However, it had some inconsistencies about high altitude limits, and it needed proofreading. It was very short on technical background information about the modified Bühlmann algorithms programmed into the Divemate's theoretical decompression model.

ER: When it comes to proofreading, I could not agree more. Sometimes you just become blind to something that you are too much engaged in. The correct altitude limit for the Divemate is 11,480 feet.

The original Bühlmann model variables have been slightly changed to give same results but not collide with Mr. Bühlmann's right to his own variables, legally. To give out exact information on how this was done would be revealing company secrets. The operation principle is the same, the calculation model is the same, only the variables and the tissue groups are different. We felt the ordinary user does not need this information, as it does not tell so much to the user anyhow.

[Editor's comment: This has got to be a very weird legal situation. Can a scientist assert the right to exclusive use of numbers or variables he derives to make a physiological calculation? Can another scientist end up at the same end point by tweaking slightly different equations? Is a decompression algorithm a product? Apparently the answer to all three questions is, "I'll see you in court."]

DM: The red LEDs on the loaner Divemate were so faint as to be next to worthless for either night lighting or warnings.

ER: It is true that the present LEDs are not sufficient for every diver to see the display clearly, especially when there is still some background light. This problem is known to us, and we are working to restore the good light that the original Divemate had to new versions of the Divemate.

However, the light makes the LCD readable without a torch for most divers at night, and works especially well as an ascent-rate warning during night diving ascents — the diver can hold the hand up and ascend, just by watching for the light to be lit, without having to look at gauges all the time. Please note that this kind of ascent also keeps the diver's head at the right position, looking upwards, instead of looking downwards for the gauges. We feel that even though it's less effective than originally designed, the light has a lot to offer the diver.

By the way, you do not necessarily need to tap the exact switch to operate the light. Hitting the unit against your tank or any hard object will also initiate the light.

DM: The Divemate assumes a depth of 216 feet and performs all calculations for that depth when a diver goes deeper than

216 feet. Calculations should never be performed shallower than actual depth. An instrument forced beyond its operational limits should scream that it is OUT OF RANGE or in an ERROR mode, and/or switch to a much deeper default (say, 300 feet) so that its calculations will be more conservative than any recreational diver on air is likely to go.

ER: First of all, we do not believe in error modes like Suunto's, where the unit is

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rendered inoperable after a parameter violation. We feel that any information to the diver, in water or out of it, is better than none, to consider actions during or after an unsuccessful dive. Remember that you have to come up, even though you may make a mistake during a dive!

The Divemate even allows an in-water recompression. It stores the missing part of any ascent and recalculates it. If the diver reenters the water after an unsuccessful dive, it guides the diver back to where the dive was aborted, or to another point where the dive needs to be continued.

The Divemate had, also in our opinion, a fault: it did not show the diver that the depth limit of 216 feet was exceeded. This was quickly corrected, and most of the Divemates will show the depth indicator blinking if the max depth is/was violated, also after

the dive. Obviously this change was not yet made either to the test unit, its operation manual, or both. Shame on us.

As to the calculation of a dive with false depth, please note that the small relative pressure differences at depths from 216 feet onwards have very little actual effect on the calculation. Even conservative dive tables do not change no-stop time from 160 feet to 216 feet, and from 216 feet to the max limit of air diving, 267 feet, the pressure difference is even smaller than that.

In Summary

Even though we have different opinions on a few aspects of the Divemate, I think your article is very matter-of-fact and gives a lot of useful information to the diving public.

I would like to promote a little more the fact that the Divemate can now be worn comfortably at the wrist with the new strap attachment, and that, worn at wrist, it has a lot of features to benefit the diver.

A dive computer is always a compromise, and the cultural differences in diving (funny, though, that even diving can have cultural differences between the U.S. and Europe) can sometimes make it difficult to satisfy customers in all markets.

Your testing team has done very thorough work, and I'm glad that they really took a lot of trouble in familiarizing themselves with the product. Also, we got good ideas and feedback from this article, and I wish to thank the people doing this test for helping us make the Divemate and our subsequent products even better.

Esa Raivio
Benemec Oy Ltd. of Finland