

PROCESS OF LIFELINE

The 9th

The diving gears to be used in the special environment as underwater are lifelines for divers. To maintain the safety, how do engineers in manufacturers keep researching? Is there any inside stories in development? This time, we would like to introduce you a handy underwater transceiver. Development had started with a wish of an inventor which was to speak with his daughter underwater. Many difficulties were ahead in development of the electronic underwater product. Through struggles, the underwater transceivers were completed and still keep evolving.

SPEAKING IS RELEIVING.

NEW FUNCTION ON INTERFACE WITH DIVE COMPUTERS

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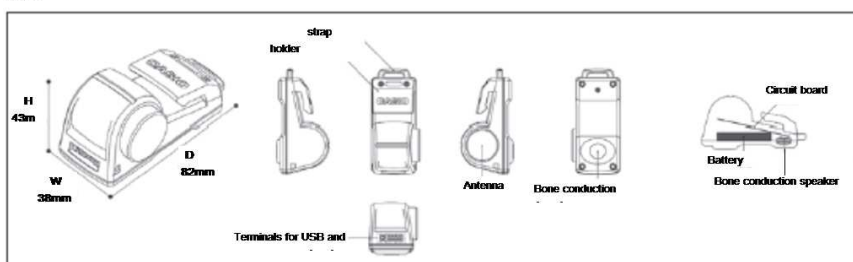
Communication with speaking is a relief

If you have problems when you are in other country where you can not speak their language, I am sure we all would feel nervous. Whenever I see crying baby, I wish I could understand why he/she is crying. Anyone who has been aboard or in raising child must have realized even a little communication could give you a relief.

Thanks to cellular phones, you can talk to anyone in anywhere in the world. Nowadays, you can even talk to an astronaut far away from the earth. On the other hand, you can not converse even a few meters away if it is underwater.

Why only the underwater world is the world of silence? This question was occurred to me when I was trying to get scuba diving certification with my 10-year-old daughter 5 years ago, and it was a trigger to start development.

Fig. 1



Underwater walkie-talkie
Logosease LGS-RG005BA
2-unit/set

Concept of Logosease

Logosease is the only one underwater communication device in the world with which needs just normal mask and regulator (* 1) . There are 4 concepts of this product.

- Able to converse with keeping a mask and a regulator
- Easy to set or remove with no cables attached
- Do not interfere existing diving gears
- Market price is less than JPY60,000 in Japan

(* 1) Checked by Yamagata Casio in Jan. 2015

3 years development

It took us 3 years to realize the concept.

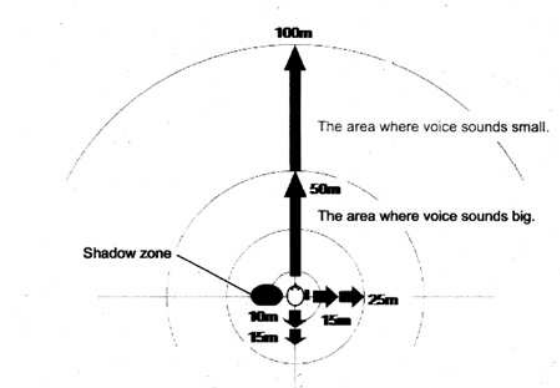
The most difficult one was underwater environment. If it is not underwater, instruments as oscilloscopes or spectrum analyzers are available and continuous developments for 30 – 40 hours are also available. But these instruments can not be brought into underwater and max working time underwater in 1 diving is as much as 1 hour. We faced the difficulties in development environment. The development and evaluation of microphone that can record the voice while putting regulator in our mouths was also through the trial and error. There was no microphone that could work underwater from the beginning. We had to start from “0”. The bone conduction sound vibration was imperceptible which varied sound quality and sound volume a lot depending on the position of where the microphone was set. And the positions where microphones would not interfere other diving equipment are limited. Where and how the microphone should be embedded?? We had proceeded development in the largely constrained situation and finally microphone was embedded as current position. The integral structure of Logosease with cableless, switchless and picket-size (Fig.1) completed at last through hard development is highly acclaimed.

Can feel speaking buddy's location

Logosease was designed and made dedicated for communication performance, especially to be able to get a feel of the location where your speaking buddy is. You can not see so well underwater compared to on land. Even in the good visibility, it would be as much as 50m, which is completely different from on land. We believe knowing each other's location in activities in a poor visibility is very important.

The communication range of Logosease is around 100m if facing each other, but it will be shorter depending on the facing directions of each other. Just like conversation on land, the best direction is facing each other. Logosease is not good at having conversation with a

person behind you. In this way, by the volume of hearing voice or its articulation rate, you can guess where your buddy is located. Fig. 2 is the result of evaluation in the visibility of 5m in the offshore of Yura in Yamagata Pref.



The most important thing in use is to set the Logosease at the right position. Not to disturb vibration of bone, set its clip as the microphone can be fit properly at the position of the bone a little lower than the temple.

After launch of Logosease

More than 2 years have passed since launched on Jan. 18, 2013. Our target customers were recreational divers.

In the first year, we could not convey the value of underwater communication well, and we had hard time in selling. Underwater is silent world; that has been the common knowledge for divers for about half century since scuba diving was born. We analyzed it was not easy to convince divers the value of underwater communication. The first ones who recognized its value were rescue teams in the fire stations and police stations. They highly evaluated "It is cableless, switchless, small size and light weight, and not easily get damaged. No need any additional gears to use Logosease but with just normal diving gears."

TV stations also made good remarks. "We need to add voices in the underwater scenes in the video, but we don't want the talents to wear full face mask because of its high risk." In such case, Logosease can record high quality voices easily with voice recording function without risks. Logosease has been used in TV programs mainly by key stations 15 times, and it is an essential gear for underwater program.

Gradually, Logosease are getting recognized and used more to recreational divers from the summer of 2014. More customers said in the questionnaire that it has become necessary gear for diving with a family or couples.

Released new functions one after another

Another attractive points of Logosease is increasing functions by software upgrading; not only improvements of weak points but also additional functions. Major ones are voice recording in Advanced model(*2), whistle function to release emergency call in far distance, and dive computer interface function to notify divers the alarms released from dive computers with recorded voices.

Whistle function releases “beep” repeatedly that you can hear clearly even in the far distance. In this way, alarm can be kept released around you without consuming air. In our evaluation, 2 divers were located 150m away each other, and one of them released “beep”. At every 10m checking hearing sound and direction, another diver could reach his buddy at the end. Only Logosease can do this because it can feel the direction of a diver who transmits.

Dive computer(*3) interface function was released on Jan. 2015. There are several alarms of dive computer but each alarm sound similar that can not be distinguished. Logosease notifies with voice as “slow, slow” in the alarm of too fast ascending.

*2) Voice recorder is installed in Advanced model RG004 and Search and Rescue model RG004-SAR.

*3) Applicable dive computers are DC Solar (Tabata), Dive Demo Solis Titanium (Bism), Calm (Aqualung Japan)

Underwater electronic devices in the future

Hiking and diving sound similar but they are completely different world. In hiking, of course you can talk and many other gears are available such as smart phones, cellular phones, digital dictionaries, music players, voice recorders, navigation systems etc. They help having more fun or for safety. On the other hand, in diving, there are only a few items as cameras, dive computers, and lights. Yamagata Casio has realized underwater conversation and voice recorders. We will keep on providing electronic devices which bring fun and safety to marine leisure