PHOTO DENNIS WILLIAMS

Dr. Jill Yager collecting a remiped specimen in Queva de los Carboneros, Cuba using the **YSI 6000 Sonde.** The sonde is a compact environmental monitoring device designed to assess water quality by measuring and recording six fundamental parameters; depth, dissolved oxygen, conductivity, Ph, temperature and oxidation reduction potential (ORP). This data can then be loaded into a PC—
submitted by Robert Spokane.

tool for underwater research. Applications for CVID technology are limitless; mapping a subject is relatively easy provided images can be made.

Author and professional photographer, Rod Farb has worked on assignment for National Geographic and other projects and is well known for his USS Monitor expeditions. He can be contacted at: Rt 1 Box 48AB, Cedar Grove, NC 27231, f: 919.732.6197.

DIVA

The Lady of Commercial Computing

by Jean-Pierre Imbert

Since their introduction in 1983, the dive computer (DC) has become a standard tool for calculating "realtime" decompression in sport and scientific diving replacing the old watch and depth gauge system. However, in spite of their usefulness, DCs have had limited application in commercial diving. This limitation is not the result of a narrow minded attitude towards computing; commercial divers utilize many sophisticated electronic devices including monitoring systems and dive recorders. Rather it is due to the specific operational requirements of the job.

Commercial diving procedures have specific constraints that make their computing requirements quite different then their sport diving counterparts. In fact, self-contained (scuba) diving is not considered to be a professional method of intervention. The inherent freedom of a self-contained diver is viewed as unsafe due to limited gas supplies, the lack of communications and link with the surface in case of emergency. Commercial divers use umbilicals and diving baskets. The umbilical provides and unlimited gas supply, communications, heating, depth monitoring, video camera and a solid link in case of trouble. In commercial diving, everything is directed from the surface.

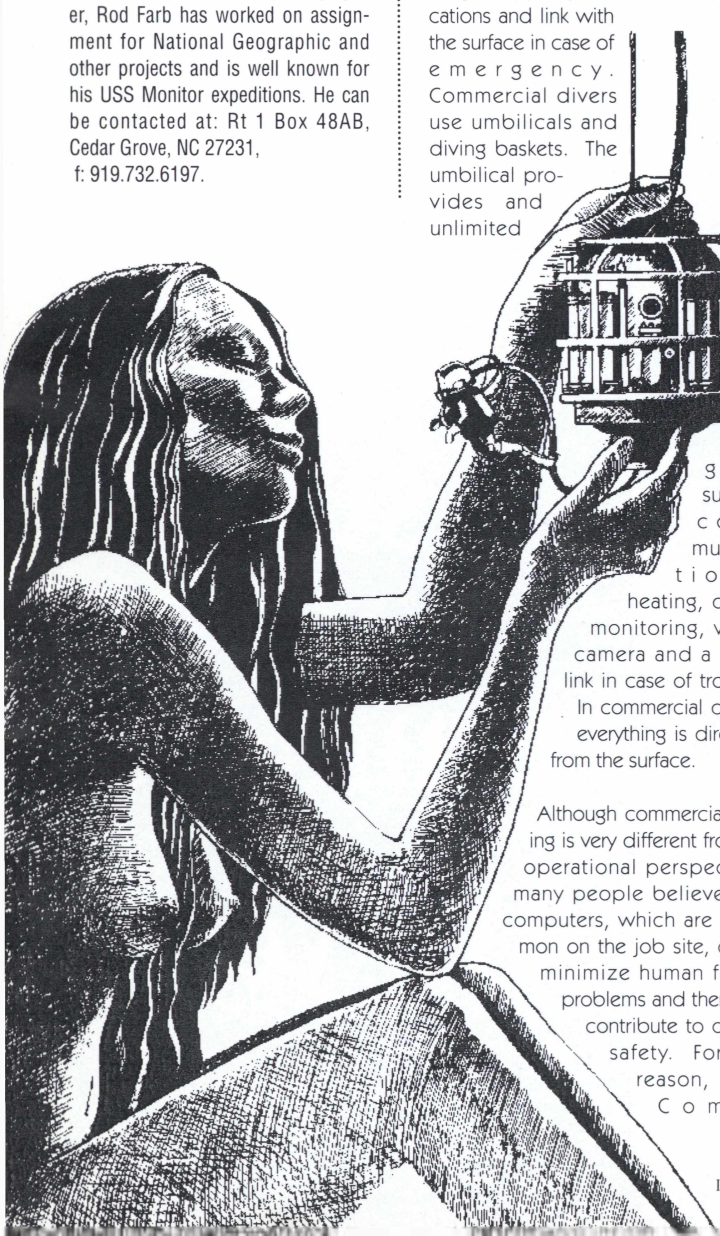

Illustration by Jean-Pierre Imbert

Although commercial diving is very different from an operational perspective, many people believe that computers, which are common on the job site, could minimize human factor problems and therefore contribute to overall safety. For that reason, Stolt Comex Seaways set up a research programme to define the specifications of a commercial dive computer and develop DIVA. Personal computers with a minimum of a 286 processor and small hard drive were chosen as a platform on their basis of their wide spread availability.

DIVA is a surface-based dive computer designed for use by the diving supervisor. Depending on the parameters established for the dive, it monitors both decompression procedures as well as the overall operation and serves as an onsite "expert system." In countries such as France, decompression tables are published in legislation and are a statutory requirement. In other countries, because of employer liability, the diving company must use well-referenced decompression procedures, such as the US Navy Tables, to demonstrate that they do not expose their employees to any undue risk. In either case, there is little flexibility in selecting the decompression schedules which must belong to official or approved tables. Interpolations and extrapolations are not allowed because each dive must be referenced to a printed document. As a result, realtime decompression calculations are unheard of in commercial diving, rather computing a schedule is a matter of document retrieval. In this regard, DIVA works like a database providing easy access to accepted protocols rather than a realtime calculator.

Commercial diving utilizes documented procedures to cover the span of operations including; air or mixed gas diving, surface supplied or bell diving tables, normal or emergency situations. Dealing with a client may require references to the legislation or guidance from professional associations such as the ADC. DIVA includes a database for reference texts used in commercial diving that are often referred to as the "North Sea Standards," allowing the user to retrieve relevant information by title or by index. The database packs what would be a stack of manuals 1.5 metres high (approximately 5 feet) into three 3.25" disks, saving both rain forest and the supervisors overweight baggage charges. Because these procedural instructions can be quite complex, particularly when it comes to work optimization such as which diving method to use, which bottom time and mix, or how many divers per sift, DIVA has a small built in "expert system" that allows the supervisor to make his choice and define his best job plan.

Finally, DIVA can conduct all the calculations that are expected from an onboard computer. This includes the determination of equivalent depths and other relevant calculations such as mixing and consumption planning for nitrox diving, altitude diving, mud diving or multi-levels diving. It even runs a small data base that stores the onboard gas reserve status and edits gas consumption reports.

Today, a Beta version of DIVA is operating on a test basis at a number of Stolt Comex Seaways job sites and DIVA T-shirts are given out for bug reports.

"Can you hear me?"
"Yes," the robot answered promptly.
"Do you recognize me?"
"Yes, Mr. Bradley."
Good, thought Bradley. We're getting somewhere....
"Do you have any problems?"
"No. All systems are normal."
"We have sent a recall—Subprogram 999. Have you received it?"
"No. I have not received it."
"One has been sent out. I repeat: Obey Code 999. Acknowledge."
"I acknowledge."
"Then execute."
"Command not understood."
"Damn."
Arthur C. Clark,
Ghost from The Grand Banks

In the last six months of evaluation we have received very warm comments on the system and have given out a large number of T-shirts as well. Once the system is fully validated and proven reliable, we plan to distribute it throughout our operation sites but are not considering any further commercialization at this time.

Jean-Pierre Imbert is the Quality and Safety Manager at Stolt Comex Seaways and has been involved in a variety of special projects including the development of DIVA and the Comex Hydra Program. He can be contacted at Stolt Comex Seaways, 36 Boul. des Oceans, 13275 Marseille, Cedex 9 France, f: 91.40.12.80