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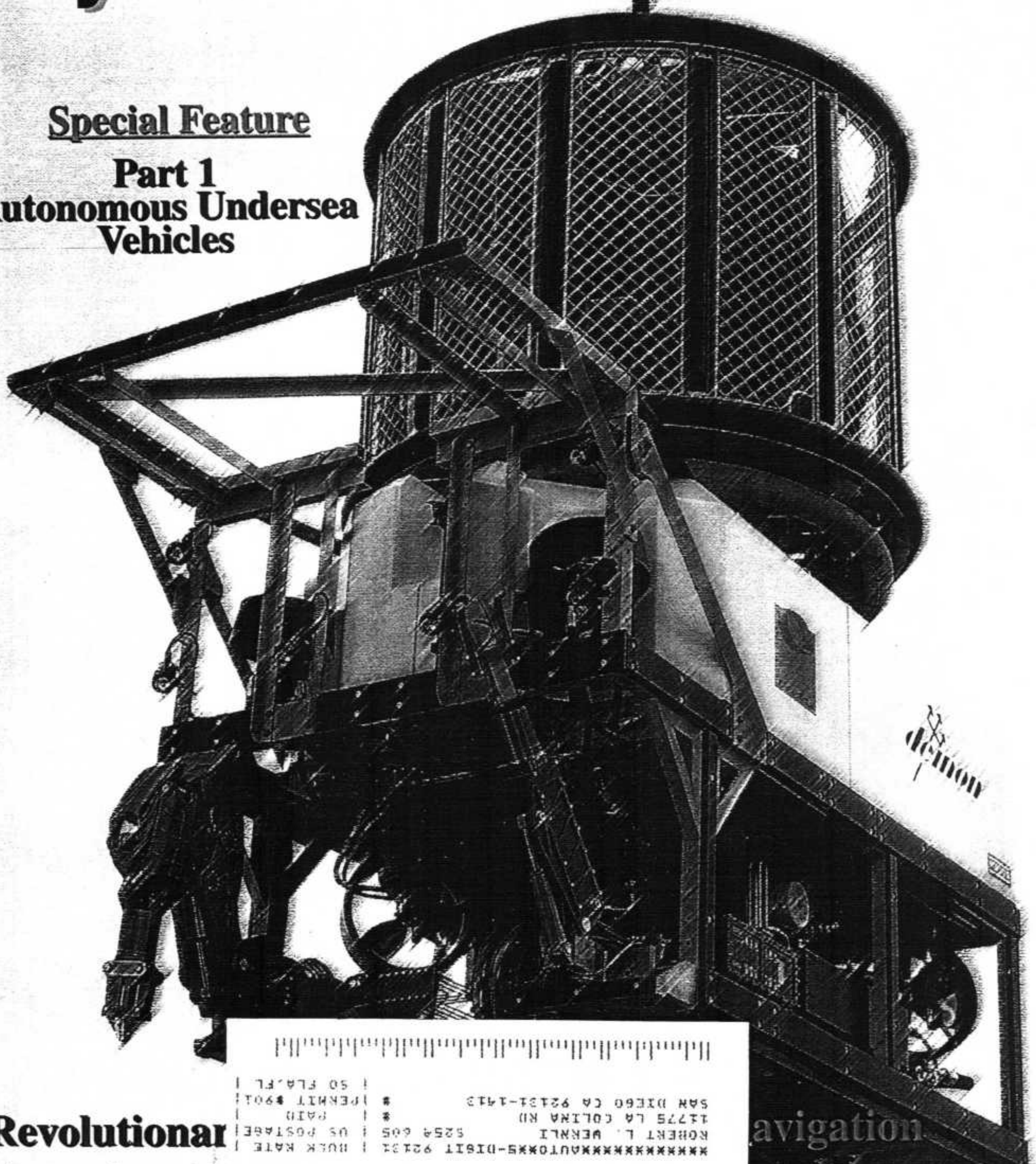
Hydrovision's New Vision



Special Feature

**Part 1
Autonomous Undersea Vehicles**

Revolutionar ... avigation

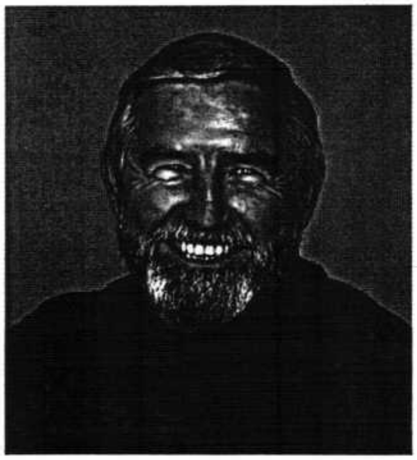
Sonardyne's Big Head USBL Transceiver

Under Control's 400,000Nm Torque Tool

Tanya Streeter - Freediving Champion

Now Is The Time To Launch Some AUVs

By Robert L. Wernli, SPAWAR Systems Center, San Diego, California



Bob Wernli

AUV (autonomous undersea vehicle) development began in the early 60's with vehicles such as Rebikoff's SEA SPOOK, and the Applied Physics Laboratory, University of Washington's SPURV (Self-Propelled Underwater Research Vehicle). The technology has come a long way and today at least 66 different AUVs are under development or operational. Twelve countries either have significant AUV developments ongoing or they are purchasing an initial capability. For example, China and Korea have purchased their AUVs from Russia's Institute of Marine Technology Problems. In Europe, programs such as MAST and NERC are underwriting the costs of AUVs like SIRENE and AUTOSUB. And in the U.S., the most ambitious developments have been undertaken by the military, where overall investments will reach hundreds of millions of dollars once the submarine launched NMRS (Near Term Mine Reconnaissance System) and LMRS (Long Term Mine Reconnaissance System) reach operational status.

Vehicles have been developed that range from the life-sized Robo-Lobster and Robo-Tuna up to the mammoth DARPA (Defense Advanced Research Projects Agency) UUVs (unmanned undersea vehicles). Japan is planning an AUV to reach the depths of the Mariana Trench and the Jet Propulsion Laboratory is developing AUVs to bore through the ice and investigate the seas of other planets and moons. Companies working offshore are beginning to address the use of AUVs, such as Hugin, being used by Norway's Statoil. And, sources have indicated that within the next few years the use of AUVs by offshore oil should begin to increase.

With the existence of such potential, why aren't AUVs running rampant in the ocean? The technology to field them is at hand. There are high-energy batteries, closed cycle diesel engines and fuel cells operational in today's AUVs. Computational and data storage problems have gone the way of the vacuum tube. There are techniques to obtain adequate navigation fixes to complete a task. Depth is not a limitation, and depending on the launch platform and method, neither is size of the AUV. And, universities have programs that are driving the cost of AUVs down.

Unfortunately, cost is still the driver. The almighty bottom line rules. However, when placed into the context of the future of our planet, is the cost really that high? An understanding of the small and large scale processes taking place in the ocean are not only necessary to understand and predict the climate and future of our food supplies, they will be critical to the survival of the human race. Although the world has gained a

tremendous understanding of global processes through the use of outer space satellites flying high above the seas, what would our understanding be if an equal number of inner space satellites were exploring the oceans in situ? Sputnik I was launched into orbit in 1957. When will the first "real" inner space satellite be launched? For the cost of launching one space satellite, hundreds of AUVs could be launched into the oceans on limited duration missions today.

Even with such technology at our disposal—computers, data storage, navigation, energy—there is still one barrier that will prevent the large-scale use of AUVs in ocean exploration and other missions—human nature. The inability to "cut the apron strings" and let the AUV leave home, possibly never to return. This attitude can be changed when governments, preferably in a cooperative fashion akin to the international space station program, divert an adequate level of funding to produce a fleet of cost effective AUVs. Not perfect AUVs, but AUVs that can do their given missions "well enough," and be considered expendable if necessary. Then AUVs will reach maturity. Until then, there will only be a limited number of vehicles operated by a limited number or organizations.

The future will see vast undersea networks of AUVs. An ocean network of "innerspace satellites" will exist that will provide the data necessary to explore the oceans properly, predict the weather, support industry, provide a defense capability when required, and just possibly save the ecology of the world. Whether this capability is achieved within the next 10 years, or the next 100, will be determined by funding. Increased funding provided in an atmosphere of synthesis, where academia, industry and government can leverage each other's attributes to reach an achievable goal. We have talked about the same technological problems for the last 30 years. Now is the time to quit talking and do something. Space satellites are launched and never return. Now is the time to launch some AUVs. ■