

**Key West, FL**—Like the "Enriched Air Nitrox Workshop" it hosted three years ago, aquaCorps' **Rebreather Forum**, held 22-24MAY94, drew industry and tekkie aficionados from around the diving circuit including: Canada, China, Germany, Sweden, the UK, and the U.S., to clear up the many myths associated with rebreather technology and discuss where it will go from here. The difference was there wasn't much controversy; attendees were interested in getting into the loop.

Over 90 industry participants representing the spectrum of end user communities were in attendance including: nine rebreather manufacturers, a host of companies and training agencies including: BSAC, IANTD, IADRS, PADI and Dr. Max Hahn of the German Federation of Sport Divers (VDST), government agencies from NOAA and NMRI to EDU, the U.S. Army Special Forces and the UK's HSE, com-

mercial representatives, scientific organizations, several police groups, and special guests: U.S. Navy physiology guru, Dr. Ed Thalmann, Alan Krasberg—one of the godfathers of closed circuit systems—and forum co-chair and circuit guru in his own right, Tracy Robinette of Divematics, "I have been involved in rebreathers for nearly 25 years and a meeting like this has simply never happened before." Heady stuff to be sure. Beamed technical dive store owner, Dennis Pierce, Epic Dives, HI "The level of collective [diving] consciousness in the room was almost overwhelming."

First conceived of in the 17th century, rebreather technology has a 50 year history of successful use by the militaries of the world and is a fundamental component of commercial gas diving reclaim systems. Now with declining military budgets, inexpensive computer chips and a burgeoning non-military diving

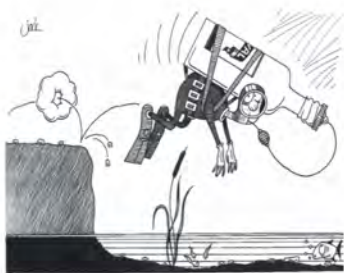
Rack of Dräger LAR V rebreathers at the Special Forces U/W Combat Swimmer School, Key West, FL.

community ready to take the plunge, many people believe that rebreathers represent the wave of the future. Observed Krasberg, "Rebreathers seem to come back every 30 years and now it looks like they will remain with us for some time."

The forum kicked off with a "No Bubbles—No Troubles" tour of the U.S. Army's Combat Swimmer School where participants were ushered into a room full of rebreathers—racked, stacked, and ready to rock 'n' roll. An appropriate starting point; the school has been training closed circuit divers continuously for over 27 years, and provided a healthy reality check for rebreather wanna haves. From there, the forum got down to business; dissecting the knotty issues surrounding rebreather technology; technical require-

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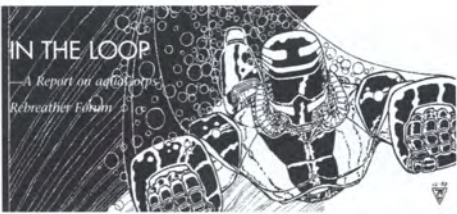
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Rick Lesser, with  
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ments, closed vs. semi-closed systems, market economics, training and liability concerns.

Similar to nitrox in the pre-tekkie era, established rebreather manufacturers, whose revenues are derived solely from military coffers, approached the forum cautiously, though those in attendance were seen frantically scribbling notes throughout the 'dollars and sense' session on new market applications and economics. Who wants rebreathers? A lot of divers, public safety officers, scientists, photographers, videographers, harvesters, specialized commercial users and of course, the tekkies. And most of these users appear to have the money to pay, "My clients think nothing of spending U.S. \$5,000-10,000 for camera equipment," said photographer and wildlife guide, Amos Nachoum. "I don't think rebreathers are any different." NOT.

The market? Confessed, John Sherwood, one of the principals of Fullerton-Sherwood, which builds the CUMA system for the Canadian Forces, "I was the cynic in our company. But it seems clear to me now there's a real emerging market that we had better address." The message from users? *Do it now.* As always-to-the-point wildlife photographer, Marty Snyderman chided "The world is waiving them [rebreathers] in front of me, but they won't let me have one." (This while threatening the stony-faced panel of manufacturers—*pen drawn*—with a raised check book in hand. Uggh.) Later, the Dräger and Carleton Technologies delegations were separately observed

wooing Snyderman over conch fritters and Key lime pie. No free lunches? Where there's a dollar there's a way.

Next, Dr. Thalmann gave a refreshing and enlightening luncheon discourse on diving physiology, sponsored by legal defense heavies, Hruska & Lessor. The bottom line? There's still a whole hell of a lot of diving physiology we just don't understand. Case in point; CNS oxygen toxicity. According to Thalmann, "Convulsions appear to be a random event at PO<sub>2</sub>s above 1.3-1.4 atm"—*this in an era of computerized oxygen toxicity tracking!*#? Hmmm. Which algorithm did you say you were using? Think hard.

Training? Forum participants learned they'd be lucky to survive the week with combat swimmer staff instructors, Sgts. Dennis Wardlow and Rob Gardener, as they presented the grueling details of their six week training course. A weekend rebreather certification? How about something in between? Of course, the real problem with training was right there under our nose; or not as the case was. "It's hard to talk seriously about rebreather training, when none of us can even buy one," Ocean Odyssey's Wings Stocks, CA, made his point. Though it apparently hasn't dissuaded some companies from thinking through the loop; offered PADI's Karl Shreeves, "When rebreather technology is ready for the mainstream, PADI will be there to offer training." That should keep those wheels spinning (couldn't resist).

Getting down to brass tacks, the hazards and potential liability problems associated with rebreather diving were discussed at length, and included a closed circuit fatality report from Dr. Bill Stone's Huatla Expedition (see Incident Reports, pg. 71), and a perspective from a different kind of diver, Bill Booth, the inventor of the single point release parachute and avid "skydiver." Overall, the results of the liability session were better than expected. According to diving



NMRI FirstClass Diver, JR Hott sporting his personal collectible, a mint Dräger LT Lund (late 50's).

plaintiff attorney, Bobby Delise of Vosbein, Delise, Amedee, Bertrand, LA "As long as manufacturers and distributors give the end user a *full disclosure* relative to a rebreathers specifications, limitations, risks and most importantly, the requisite training and maintenance demands, product liability should not present formidable barriers." Divemaster Insurance Consultants of London apparently agrees; the company sent a solicitation flyer to be distributed at the forum. The scariest line of the session? "They're [referring to a particular rebreather] so simple what could go wrong?" The comment was followed by a *full* 30 seconds of silence. You wanna list?

After three grueling days of discussion, attendees had the opportunity to finally dive a rebreather, courtesy of Carleton Technologies and Key West Diver, assisted by JR Hott of NMRI. "It's like going back to the womb of the mother," said Amos Nachoum, "Very natural, very pleasurable." Others

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were equally enthralled. "Rebreathers are the way of the future. There's no doubt in my mind," asserted London's Health and Safety Executive, Graeme Lawrie. Most everyone seemed to agree.

The conclusions? The consensus at the forum seemed to be that semi-closed rebreathers will likely represent the first wave of product due to their simplicity and relatively low cost. Even so, it will be a while before the technology is generally available on a broad scale. Several rebreather start-ups reportedly plan to offer systems within the year: Cis-Lunar Labs, Prism Life Support Systems and Oceanic. Expect to see them offered at the 95tek Conference and receive some hands-on pool training. Note that training will be an important component of purchasing a rebreather; a typical training course will likely run about 40-60 hours.

Finally, forum participants expressed the desire to form an association for advanced diving technologies, code named, "Deja Vu." After all, there's more to come. Confessed, Bishop Museum's Richard Pyle, "I always figured that open circuit was just a stop gap until I got my rebreather. Then I spent a weekend with Phil Nuytten [inventor of the NEVTSUIT]. Now I'm wondering whether rebreathers aren't just another stop gap along the way." Something to think about—M?

For more information about the forum or association to be formed, contact aquaCorps, POB 4243, Key West, FL 33041 USA, ph: 305.294.3540, fax: 305.293.0729 or Tracy Robinette, Divematics @ 145 W Whiting Ave. "A", Fullerton, CA 92632, f: 714.773.0471. We will announce when the transcript of the forum is available.



### Getting Into A Loop

Technical training entrepreneur, Hal Watts, founder of the Professional Scuba Association (PSA), has teamed up with Prism Life Support Systems, UK, to offer one of the first "rebreather experiences" to the general sport diving community in the U.S.. Sporting three PRISM semi-closed rebreather systems (see aquaCorps Journal, N7, "Through The Semi-closed Door," by Rob Palmer, pg. 20), 32 divers made the pilgrimage to Forty Fathom Grotto, Ocala, FL—PSA's training facility—to receive basic instruction on rebreathers and dive a unit. Over the course of the week, divers logged approximately 25 hours on the three systems at depths ranging from 30 f/9m to 140 f/43 m.

PSA held a second "experience" during 94 July and will be distributing the Prism in the States once the units are available for sale sometime later this year. The expected retail price will be about U.S.\$5000. For more information contact PSA @ 407.896.6294, f: 407.896.4542.



### Mainlining

U.S. sport diving major, Oceanic, San Leandro, CA announced their plans to offer sport divers a series of semi-closed and closed circuit systems with a target price in the U.S.\$ 5-10,000 range. A prototype of one of the Oceanic systems, developed in conjunction with Stuart Clough, Carmellan Research, UK, was unveiled at this year's tek.Conference, DEMA, and the recent IANTD UK symposium (94MAY) in Bristol, UK. Reportedly the systems will include some measure of redundancy and will offer onboard decompression computing—a feature that will become standard on next generation rebreathers. Though preliminary announcements indicated that the systems might be available in the UK as early as 94 March, insiders suggest that it may be late 94 or more likely 1995 and beyond before consumers can expect to see units on the market.

According to Oceanic president, Bob Hollis, the company plans to develop an in-house instructor and instructor-trainer education program at its headquarters in San Leandro, and possibly in the UK, in order to build its education network. The end user course is expected to require about 40-60 hours beyond advanced open water training. Oceanic can be contacted @ p: 510.562.0500, f: 510.569.5404.



### From Lübeck With Love

Dräger unveiled the latest rev of its SMS-2000 prototype at the 1994 BOOT show in Düsseldorf, Germany. The SMS-2000 is a fully electronic mixed gas rebreather comparable to the U.S. Navy's Mk-16 manufactured by Carleton Technologies, and can be used as a diver-carried back pack in umbilical based surface supplied system or as a self-contained diving system. One of the innovative features of the system is an onboard computer that allows the user to preprogram the systems oxygen set point and vary PO<sub>2</sub> levels over the course of the dive, for example, increasing PO<sub>2</sub> during decompression. Currently, there are no production rebreathers that offer realtime decompression computing. (Note that Stone's Cis-Lunar Mk-4 working prototypes have this capability. See aquaCorps Journal N7, "New Kids On The Block," pg. 20—ed.).

Dräger has expressed strong interest in the emerging sport and professional rebreather market but is taking a slow cautious approach—not surprising for the planet's oldest and largest rebreather manufacturer. Dräger can be contacted @ +49.4502.8357, f: +49.4502.8383.



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