

Richard Pyle and John Earle test the Cis-Lunar MK4 rebreather during a New Guinea dive. Photo by Bob Halstead, special to the Star-Bulletin

Breathe Deep

Isle divers test new gear that recycles air, allowing them to probe deeper and stay longer

By Greg Ambrose
Star-Bulletin

Peering into the chilling black in a New Guinea cave mouth that started 300 feet below the ocean's surface and extended an extra 100 feet, Hawaii researchers knew their space-age diving equipment was letting them view something no one had seen before.

The new gear allows divers to take a self-contained breathing system deeper, and stay down longer, than even scuba divers breathing exotic gas mixtures.

B R E A T H E
DEEP

While testing the new rebreather in Hawaiian waters, University of Hawaii ichthyology Ph.D candidate Richard Pyle and commercial pilot John Earle had visions of the worlds it would reveal.

The Cis-Lunar MK4 rebreather is simplicity. It takes exhaled



breath and runs it through a chemical scrubber so that it can be breathed again. Computers add precise amounts of oxygen and helium at the optimum levels to let divers stay down longer and decompress more quickly when it's time to ascend.

Pyle's and Earle's grand visions were exceeded last summer when Bishop Museum ichthyologist (fish expert) Jack Randall invited them along on a diving expedition off New Guinea, one of the ocean's richest areas of flora and fauna.

Randall wanted to acquire specimens of new fish he had seen on a previous dive. Pyle and Earle were keen to take the rebreather for its first serious exploration, and ended up discovering new species of fish.

The two might have had more discoveries, but the group's scuba divers vetoed their impassioned pleas to return to a super-deep reef to collect specimens of fish from a biological treasure trove they had spotted the previous day.

"This opens up a whole new world for us," said Earle. "I went down a reef wall in New Guinea past 300 feet and was suddenly surrounded by a world of new species. I was just looking around, amazed."

Divers don't have the luxury of closely examining surroundings at that depth while breathing tri-mix gases in scuba gear, because they have to begin the long decompression ascent. "You get tunnel vision, and sometimes can't breathe and swim at the same time," said Pyle. "You also only have 10 minutes down there, with no time to appreciate anything."

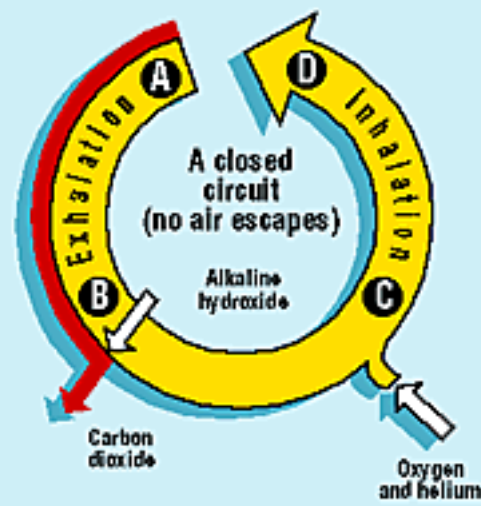
Because the rebreather is a closed system that emits no bubbles and because there is no regulator noise, fish treat divers as though they are part of the scenery. "Every time I try to sneak up on a fish with scuba gear I try to hold my breath," said Randall. "Once they hear those bubbles, they're gone."

Using a rebreather allows Pyle to get up close and personal with fish. "I saw more fish spawning activity during my first dive than in my previous 14 years of scuba diving.

"One pair of parrotfish even spawned right over my head."

HOW IT WORKS:

A diver breathes out air (A) which is treated with alkaline hydroxide to remove the carbon dioxide (B). Three computers and backup systems add helium and oxygen to the treated air in the exact amounts appropriate for the diving depth (C). The diver then rebreathes this rejuvenated air (D).



John Earle, left, and Richard Pyle show off the MK4 Rebreather. "This opens up a whole new world for

us," Earle says. Photo by Ken Sakamoto, Star-Bulletin



While the rebreather reduces the risk of embolism and bends, common problems with scuba gear, the new technology possesses its own fatal consequences. Too much oxygen can lead to convulsions and death; too little oxygen and a diver will black out and drown. And poorly designed rebreathers can let water flood the carbon-dioxide scrubber and let the diver breathe poisonous gas.

"The benefits outweigh the risks," said Earle, as Pyle pointed out that the rebreather has a tremendous margin for error because problems occur slowly and leave plenty of time for the diver to react and correct the situation.

The rig also has backup computers and other systems, and when all else fails, a diver just has to flip a switch and he has a scuba tank for air.

The rebreather was invented by structural engineer Bill Stone to help him traverse flooded chambers in his decade-long quest to explore a cave system in Mexico deemed the world's longest and deepest.

He studied rebreathers the U.S. military has been developing since the early '70s, and built his own from scratch.

Although designed for shallow diving in freshwater caves, Stone is letting his friend and diving partner Pyle test the rebreather in the ocean depths. Stone is refining the rebreather with feedback from Pyle and Earle before releasing it to the public this summer.

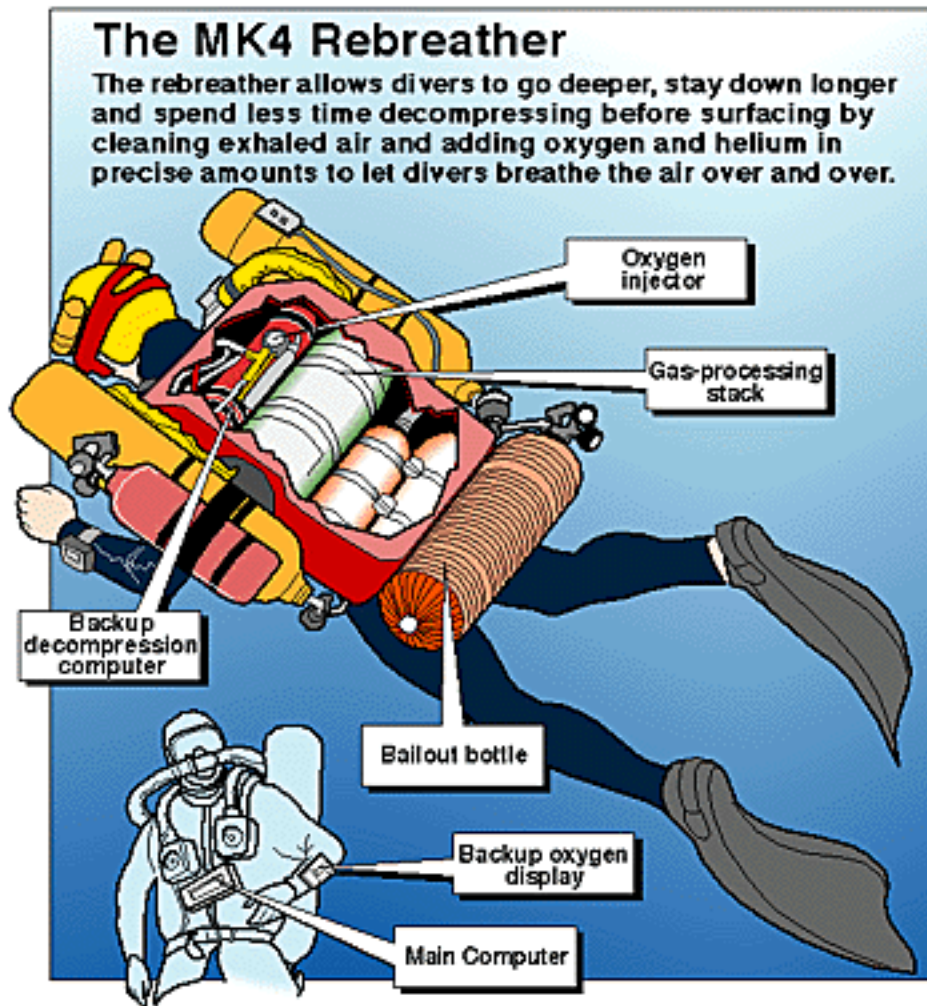
The rebreather has let the test pilots descend through a door to another world. "This is incredibly far from the surface," said Earle. "There are gray walls going off into inky black. It's like being in outer space and going to the surface of an asteroid."

The shadowy world has confronted them with giant sharks and fantastic creatures and formations.

"I've done a lot of things in my life, but this is the most exciting thing I have done," Earle said.

And they are eager for more.

On the New Guinea trip they had to conform to the schedule of the paying scuba customers. Pyle is trying to encourage other divers with similar interests to join him in an expedition dedicated to deep-water diving.



Graphic by Kip Aoki, Star-Bulletin

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