

# The HangLine

Issue #06-01

Originally Posted January 1<sup>st</sup>, 2000



## For The Record

By Bill Nadeau

When Chuck Yeager broke the sound barrier he was heralded as a hero in aviation technology. He helped bring the stars closer and shorten our commute around the world, subsequently establishing him as an icon in history.

On May 6, 1954, Roger Bannister broke the four-minute barrier, running a mile in 3:59.4. His feat had been considered unattainable; he changed the way we think about personal limits. These men, like many other men and women in our history who have marked achievements, have indexed our own evolution. Their records continue to be broken now that we know we can reach beyond the impossible. Gradually we are beginning to excel beyond what was once thought impossible in diving but it has come only after we readdressed our history and the technical evolution that started diving in the beginning.

In 1988 Sheck Exley, one of the greatest technical

divers of all time entered a cave in Tamaulipas, Mexico. Almost eleven hours later he emerged breaking the previous deep cave mixed-gas diving record by 124ffw reaching an astounding depth of 780ffw. The previous record was his own. Sheck went on to again break his deep mixed-gas cave record by diving to 881ffw in the same system in 1989. With a serious passion to explore Exley used his talents to push major surveying efforts resulting in even more milestones including the longest swimming penetration into a cave (10,444 feet) and the longest scooter/DPV assisted penetration into a cave (10,939 feet). That is nearly two miles.

Canadian underwater explorer Dr. George Benjamin gave his thoughts on what drives individuals like Exley to explore beyond their reach, "Its more the feeling of adventure, the great feeling of putting your foot where no other has gone before." Dr. Benjamin, a record setter himself, was a trailblazer, diving and surveying internationally renown blue holes. His work led to the development of some major cave exploration techniques and equipment including the isolation system now standard on most twin tank manifolds found around the





world. His accomplishments with the help of other technical pioneers like Tom Mount, Jim Lockwood and Frank Martz awarded him the Father of Blue Hole Diving title.

Exley's deep diving records are but one example of man's potential. Long before Exley donned a scuba tank, diving pioneers were rigging open circuit, semi-closed and closed circuit systems to dive deeper and stay longer. Mixed gas and Rebreather technology having been around since the turn of the century, provided an effective means to dive to depths still considered extreme by today's standards.

In 1945 Arne Zetterstrom knew very well the physiological implications of diving deep on air. With helium expensive and scarce he resorted to a hydrogen/oxygen mix. Due to the explosive nature of the oxyhydrogen gas that was produced, Zetterstrom had to design a travel mix that allowed him to make a safe gas switch



upon ascent (Oxyhydrogen gases will explode when in contact with oxygen mixtures over 4%). The result was one of the earliest forms of nitrox ever to be used in a mixed gas dive. His gas mix paved way to one of the first deep diving records ever recorded (500fsw). This only two years after Cousteau and Gagnon invented the scuba regulator we are familiar with today.

Zetterstroms mixed gas record was broken 17 years later in 1962 when Hannes Keller worked with physicist Albert Buhlmann to produce an accelerated decompression profile with heliox. Their decompression theories proved sound after Keller successfully dived to 1000fsw. Although Buhlmann is today considered the father of modern day dive tables much of the credit could very well be shared between him and Hannes Keller.



Sheck Exley tests the Cis-Lunar MK1 prototype Rebreather, December 11, 1987. Weighing 205 pounds the unit had to be wheeled into the spring on a dolly, yet underwater it was neutrally buoyant. The unit had outrageous range and was also fully redundant, meaning it contained two complete Rebreathers within the one backpack. This was the first Rebreather to utilize multiple, redundant computer systems for electronic control of the life support backpack.

*Photo by Wes Skiles*





These are but a few of the historical milestones in underwater exploration. Many of these records still stand. Regardless, they represent the effectiveness of a technology that really has not changed much in over one-hundred years. Sure there are a few more bells and whistles, but the concepts are the same as the wheel is still round.

Perhaps what is evolving is our attitude about exploration. When dive training first became standard in the industry we prescribed absolute limits much like the four-minute mile. And the reasoning was sound; we needed to restrict a diver's activity so that he did not dive beyond the limits of his equipment, experience and training. However our equipment selection has caught back up and can safely meet our technical diving needs. We now also have the sound training available to prepare us to dive beyond traditional limits. All that is then required is the opportunity for interested individuals to gradually gain the necessary experience and attitude that will safely guide them further.

Compartment	Half-time N <sub>2</sub>	Saturation time
1	4	0:24
2	8	0:48
3	12.5	1:15
4	18.5	1:51
5	27	2:42
6	38.3	3:50
7	54.3	5:26
8	77	7:42
9	109	10:54
10	146	14:36
11	187	18:42
12	239	23:54
13	305	30:30
14	390	39:00
15	498	49:48
16	635	63:30

Buhlmann ZH 16 a Nitrogen compartment half times in minutes and approximate saturation time in hours and minutes

