

A HOT WATER BOTTLE PENDULUM

BY TOM ROSE



Photo by Patrick Rose

I am proud to say that this project won me a coveted CEDU AWARD.

The award was coveted until Dave got his. Now the award is hung in the back of the closet behind the winter coats and the 10,000 dollar check from CEDU has been spent. You other winners did get your checks, didn't you?

Warning Warning Warning
REBREATHERS CAN AND DO KILL
I AM NOT RESPONSIBLE FOR YOU
YOU MAKE YOUR OWN DECISIONS
AND REAP THE CONSEQUENCES

You can die from too much oxygen by using pure oxygen below 20 feet underwater. You can die from too little oxygen. You can drown. Screw up and you are likely to die. When you enter the water, you are on your own, even if a buddy is nearby. You alone must make the decision that you are capable of using a rebreather, you are up to the dive, and that your equipment is up to the dive. Even extensive open circuit experience will not prepare you for the details inherent with staying alive underwater on a rebreather. If you have any concerns about your abilities, take a course or do not dive. If you are foolish enough to dive rebreathers, be aware that it is a case of Evolution in Action. It is an effective sorting out process that has created many unhappy widows, mothers, and children. I recommend against it. This project is described for your amusement only. It is not the intent of the author that you build one of these and go out and kill yourself. As I have shown it, if you take the mouthpiece out of your mouth, water will flow in filling the scrubber, and your next breath is a caustic cocktail. If you don't know what you are doing, don't try this one at home. If you know what you are doing, I am sure you have a rig that makes this one look childish.

Why did I do this? Am I crazy? I caught the rebreather bug again last January after many years of remission. In the 60's I built a similar unit to push siphons in caves. I chanced onto [Dr. Bo's great rebreather page](#) and the deadly virus once again surfaced in my brain. That looks like a lot of fun. After a couple of e-mails Dr. Bob challenged me to recreate that old rebreather. (I think he really didn't believe I had built one.) I really wanted to make a FEOR.....but I cannot stand it when the gauntlet is thrown down.

I had to make a couple of compromises in the re-creation. I could not find a large red rubber hot water bottle like I used before and I could not find the type of tank I used. Instead I bought the smallest oxygen bottle I could off E-bay and a blue hot water bottle from the same source. The system works perfectly but there is one little problem. The hot water bottle counterlung is so low that it takes some effort to exhale, but then again inhalation is really automatic. Where did I get the design? I don't remember but in the fifties and sixties I read a lot of stuff by Hans Hans and others. I am sure that is where it came from.




On the left you see an old Siebe Gorman system, in the middle a Fenzy, and on the right my pendulum. Note the similarity in the systems. During World War II there were a lot of these types of rebreathers around. The Italian navy used them with great effectiveness, much to the distress of the Brittish. They were used on manned topedos.



The Mariners Museum in Hampton Virginia used to have several of these torpedos on display. I loved to play on them as a kid. They still might have them. Those wartime pendulum rebreathers also killed a lot of divers. Recently many similar systems show up for sale on E-bay. As you can see, no new technology here with my system, only new parts, but I built it without a big military budget, and my color scheme is much better than either of those systems. I am sure you will agree that mine looks much better. I also have largely solved the problem of dead air space and CO2 buildup.

Since I built the unit and wrote this page to give my rebreather friends a chuckle, there are a lot of missing details necessary to build one. It is not a manual on how to build a rebreather, but instead some chest thumping on how I solved some problems. Hope you got a laugh out of the \$100 dollar rebreather. Oh yeah, for a real laugh, you should have seen the look on the divemasters face off Big Pine Key when I pulled it out of the dive bag and dropped overboard without a bubble. It must have been the hot water bottle that got him.

Here is the basic layout. I exhale though the hose, the CO2 laden air goes down through the scrubber, out through the bottom of the scrubber into the hot water bottle counter lung (CL). When I inhale, the air is pulled from the CL back through the scrubber. The oxygen tank outlet is a plastic hose and goes to the top of the breathing hose. When the CL gets empty, I just exhale and vent in some more oxygen. That way, the added oxygen pushes any CO2 laden air into the scrubber. This lowers the amount of dead space in the system. It is a no moving parts system that is almost failsafe if I use new scrubber material and check that the Oxygen tank is full.



I made the scrubber out of 3 inch ABS pipe from Lowes. I drilled a hole in a 3 inch pipe cap, and epoxied in a barbed hose fitting from Lowes.

The hose came from a "expired" BC. At the breathing end of the hose I put a barbed elbow. The rubber mouthpiece would go on the barbed end. Then I glued the pipe cap on one end of the scrubber tube.

At the other end of the scrubber tube I drilled a hole, put in a pipe to feed the CL and built up the assembly with epoxy.

I picked up a couple of snap in drain screens at Home Depot, made them fit the pipe. One went to the top of the scrubber with a filter pad. I attached a spring holder to the other.

I got a spring from a sprinkler head, glued a matching holder to the bottom cap, and checked out the fit.

I filled the scrubber, hooked up a big oxygen tank and did the standard TV Couch Diver test while I watched one of my famous Home Underwater Videos.

Since I survived the couch test breathing warm moist air, I reloaded the scrubber, attached the little oxygen tank, added straps, and headed for the backyard pond.

Here are a couple of shots of the Virginia Tech Human Powered Submarine During Practice Runs in Florida in May of 2001. I was using the pendulum rebreather when I took those shots. The kids were amazed, they had never seen a rebreather. The course advisor was worried 'cause he thought of rebreathers as some kind of black magic.



The kids are assembling the sub under water. Looks like open heart surgery.

Justin is loaded into the sub and ready to go.



*I'm on the right.
Note the relative sizes of the divers and gear for an one hour dive. I'm using
my 15 pound pendulum system. Who knows what she has on her back.
Life just isn't fair.*