
Classic Diver

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Eldred article
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Porpoise

The Regulator that Revolutionised Diving

Ted Eldred

An Interview Recorded in August 1997



Ted Eldred never stopped designing things. Here he's sitting at his drawing board in 1997

Edward Francis (Ted) Eldred (1920 – 2005) was born a century ago this month, on 16 December 1920. Ted was, as most HDS Aus-Pac members will know, the inventor of the Porpoise two stage, single hose regulator. It was the first commercially available single hose compressed air regulator and replaced the Cousteau-Gagnan Aqualung. The HDS Aus-Pac award for an outstanding contribution to the history of diving bears Ted's name. Ted invented his single hose regulator in Melbourne, shortly after World War II. When it became known worldwide, La Spirotechnique, the company holding the Cousteau-Gagnan Aqualung patents, purchased Ted's company (the Breathing Appliance Company) and replaced the twin hose Aqualung with the more efficient Porpoise.

In August 1997, *Classic Diver* editor, Jeff Maynard, sat down with Ted at his property in the country town of Yarck, Victoria, and

recorded an interview. This is an edited extract of that interview.

JM: Start by telling me about when you saw the Aqualung patents, and your idea of how to get around the twin hose patent.

TE: Well, I never saw the Aqualung. I just read about it. I saw illustrations in a magazine or a paper. I immediately started to investigate. I was working for patent attorneys at the time. I used to do a lot of work for them, busting patents. Australian manufacturers would go over to world fairs and bring back a product, and then toss it to the patent attorneys and say, "Tell us if we can manufacture this in Australia."

And if it had a patent on it, the patent attorneys would analyse it and find out exactly what the patent held. Usually a patent doesn't hold very much. You get pages of garbage. There's

probably only one paragraph that is the crux off the whole thing. So, then they would call me in and say, “This is the part the patent holds. Can we get around it?”

And I’d be given the job of circumventing the patent. So, I’d been doing that sort of work, on and off, as a sideline, for a couple of years. So, when I saw the Aqualung patent, I had a good look at it and realised it was based purely and simply on the circuit. Then the logical thing of course, was to redesign the circuit. So that’s what started me off.

JM: What made you take the leap from there, to actually making one to see if it would work?

TE: Well, I’d been concerned with diving from 1938. The period we’re talking about now is straight after the war—I think I saw the Aqualung mentioned in the papers about the end of 1947. Of course, I’d been using the oxygen rebreathers for years. As soon as I saw the advantages of compressed air—well I already knew what an advantage compressed air would have—but when I saw it in a developed unit, the whole area opened up to me. I thought well, I’ll have a go at this.

So, I hopped straight in and started to develop the Porpoise. Of course, it doesn’t come immediately on paper. First of all you’ve got to design a set of specifications. If you’re going to put a product on the market, you need two sets of specifications. One is the mechanical aspect of it. You’re got to set down precisely what it’s got to do. And the second set of specifications are the marketing specifications. What it’s going to cost, is it presentable, transportation—all the marketing aspects. Then you designed the product to meet the specifications you’ve put down.

The main specifications here were performance of the apparatus. So, this is where I contacted the British Admiralty and got them to set out for me all the Admiralty specifications. But of course, they hadn’t been developed for compressed air. But they had specifications for respirators and helmet diving and all those sorts of specifications. So, I really had to take the specifications set out for respirators, which were similar inasmuch as they

had to provide sufficient flow of air as it was required by the respirations of the wearer in all sorts of circumstances.

The first set of specifications I applied to the equipment were those given to me by the British Admiralty. The first Porpoise was built around those specifications—inhalation requirements, exhalation requirements. The rest was comfort and wearer utility of the apparatus to fit a person who’s going to swim.

JM: Can you remember the first time you dived your Porpoise, and where you went to test it?

TE: It went through a few stages. It just didn’t appear. The very first test of the regulators were on a test bench, to ensure they gave the performance I required. Then I developed the complete unit. That would be late 1949, or 1950.

I had a die-casting foundry at that stage. It was just a sideline. It was virtually a continuation of the oxygen rebreather unit, which I had been adding to, or developing, over a period of years. And that was purely and simply a sideline too. I had no intention of ever manufacturing an oxygen rebreather apparatus. It was only for my own requirements.

So, the first Porpoise of course, was similar, except that I could see—I never could see the future of oxygen rebreather apparatus because it was too bloody dangerous—but the compressed air was a different kettle of fish. It opened up a wider avenue. It was not long before I sold the foundry and shifted over full time to the development of the Porpoise, ready for manufacture. But that would have taken 18 months, which brings me up to about 1951, 1952—something like that.

JM: Originally, you saw your main market as the navy. Is that right?

TE: Yes. The sporting field was an unknown field, whereas the navy was a definite aspect. Also, it meant that if I could satisfy the navy, I could satisfy anyone. I wasn’t just putting something on the market and hoping someone would buy it, and

Teaching divers to use the Porpoise rebreather at the Melbourne Baths.



not worrying about the performance. It was a challenge to meet the navy requirements, because no one could do that at the time. Their requirement was pretty severe.

I had for some time been seeking more and more information on respiratory physiology, which was a very restricted field, all over the world. So I got to the stage where I was asking questions that nobody could answer here in Australia until Maurice Batterham came back from overseas and I was introduced to him. We became firm friends and he was able to fill in the gaps of knowledge that I required to a certain extent, but the main advantage that he had was that he could open up avenues to me to investigate further. We were able to get the files from the British Admiralty, of all the research that had gone on over the years. He had open

access to the Defence Standards Laboratory, which I was able to use. He was still in the [Royal Australian] Navy, but in the reserve, and he was director of underwater activities. But because he was in the reserve, he was able to have an outside interest. As a matter of fact they welcomed it, because they were interested in the diving equipment. In those days the government were very much concerned with helping companies produce things for the armed forces, because they had the horrible period during the war when we had to rely on other people overseas to manufacture equipment, then send it out to Australia.

So, if you were a manufacturer, and you started to manufacture something that was of interest to them, the Department of Supply, at the time, was very interested in you, and they'd come along and assist you—but never financially. For instance, when I wanted information on testing apparatus, the universities were made available to me, through the

Department of Supply. I was able to get the information from the universities. But the main field concerning the Porpoise equipment was the physiological requirements for the apparatus, and these were tied up with all the normal laws of physics, but here in Australia, nobody had any experience with respiratory physiology under pressure.

JM: When you set up the diving school at the Melbourne Baths, it seems to have got a lot of interest with people coming along to learn to dive. Was it successful from the time it started.

TE: Oh, it boomed. We had a waiting list. It was a pretty comprehensive set of teaching that we applied to it. The [Royal Australian] Navy thought it was a hell of a good idea. I officially applied to the navy for assistance and they came back through

Batterham and said, "Right, we'll help you. You can officially have a loan of Batterham to conduct the school."

And the school used to teach the oxygen rebreather apparatus—the Porpoise rebreather—and the Davies Escape Apparatus. The navy issued as many oxygen rebreathers of the Davies equipment that we needed. They insisted that a syllabus be set up by the navy, and that at the end of the syllabus there would be an examination and all the names would be registered with the navy, so the navy could call up these people in a time of war, because we'd been caught with our pants down in the previous war.

JM: What sort of people came along to learn to dive?

TE: We had a terrific range of people. We had a woman—a fifty-year-old woman—came to me and said, "You know, I can't swim very well, but I'd just love to dive".

And of course, what we did, we taught them to swim first of all. And with the advent of fins and snorkels, it was the easiest thing in the world to teach someone to swim. As soon as we could teach them to put their head in the water and breathe—because the head is the heaviest part of the body—they realised they would float. So, what we used to do was put a face mask on then and a set of fins—no snorkel at this stage—and we'd put something on the bottom in about six feet of water, and we'd say, "Now you dive down and get it."

They'd get down a couple of feet and pop up to the surface again. After they'd done this half a dozen times you'd say, "What's your problem?"

They'd say, "I can't get down there."

And we'd tell them that when they dive they are automatically coming back to the surface. As soon as they get that in their minds, they realise it is safe. Then they would take to it like ducks to water.

And we also had a doctor, Dr Bill Taylor, who'd been with me all through the years, helping me with the oxygen rebreather, and he and I used to go spearfishing together, and he was also the official doctor for the school. So he would give

them an examination before they started on the course.

JM: Where did it go from the school? How was it that it went worldwide?

TE: I think people who grow up on the environment similar to what I did—with the ocean and the bays right alongside you—the sea was always an enormous attraction for me, and I would imagine that people wanted to get down there and have a look. It's a magical world. And there was a lot of activity, all over the world, trying to get your head down under the water. And people were watching and the Aqualung opened it all up to everybody. But [La Spirotechnique] the Aqualung people were hanging onto their patent rights. They were controlling the whole development of the field.

But out here in Australia we were so isolated, that we didn't have a clue what was going on overseas. We were just a little backyard company with a lot of expertise. But everything was done on the cheap. I was just pursuing my field here, which was to satisfy the requirements of the navy and open it up for the sporting enthusiasts. I had to make all my own tooling, and design all my own tooling. We didn't have enough money to invest in a lot of expensive equipment. It was a small struggling company at that stage. I went around trying to get the money into the company—trying to get other companies interested. I tried to get banks to help us. And all I heard was like a litany in the finish. The director of the bank, or whoever, I was talking with, would sit back in his chair and say, "Don't waste your time, son, in a stupid thing like this. Bricks and mortar. That's where you should put your money and your activities."

This was the attitude. Even when I was selling over 90% of my turnover to the armed forces, I couldn't get 100 pounds credit from the bank. If I went one pound over my limit, the bank manager would be on my doorstep.

So after I sold the company [to La Spirotechnique] and I went to America, they actually wept. They had no idea that we were a

small struggling little concern, because we were leading the world down here. I didn't know it at the time—I couldn't conceive it at the time—that places like Siebe Gorman and enormous big companies with physicists and scientists and engineers, that we could beat them. But beat them we did.

JM: When you look back on it, do you get a bit sad about the lost opportunity, and think about what you would have done differently?

TE: Yes I do. I had too many things against me in the finish. Lack of finance—I was fighting all the time to keep the company buoyant.

JM: You told me about the time you were in New York, or somewhere, and you saw a series of old Aqualungs or regulators up on the wall, and there was a Porpoise there, and you asked about it, and they said it was the one they had copied.

TE: Well there was only one unit on the wall. That was the Porpoise. And the fellow said, "Yeah, that's where it all started from. We saw Arthur C. Clarke's book [*The Coast of Coral*] and we ordered us a Porpoise, and that's what started us in the field."

Prior to that they were making gas masks and things.

JM: So basically people overseas saw it and copied it?

TE: Yes, it took off like a bushfire. Arthur C. Clarke's book features the Porpoise all the way through it. There's a lot of hoey in it. Clarke had got an assignment to write a book about the Great Barrier Reef. Before he came to Australia he had ducked his head under the water two or three times, but when he arrived in Melbourne he saw the school in operation and he was amazed at what he saw.

Clarke said to me that he had no idea that diving equipment had advanced to that stage. All he

knew about was the Aqualung. We were training people every week, and we were selling a lot of equipment.

So anyway, he went up to the Barrier Reef and we loaned him some equipment to take up there. But the big problem was compressors. We never had the little portable compressors. We only had the large compressors, and that restricted the use of the self-contained equipment. But of course the hookah was a different thing—you could spend hours underwater with the hookah. So they had a hookah unit and some self-contained, and it features right through the book. Of course, this opened the eyes of people all over the world. They suddenly saw the way to circumvent the Cousteau-Gagnan patent. So they didn't have to worry about patent rights because it wasn't patented.

JM: It wasn't patented because you didn't have the resources?

TE: I just didn't have the money to do it. To patent a thing worldwide takes a lot of money. I never had that.

JM: Did you try to raise the money?

TE: You see, I'm a good technician, but I'm a lousy businessman. I was naïve regarding overseas financing. Out here I never had a chance because originality was a dirty word in Australia. It still is to a certain extent. Because if you came up with an original product, and you approached a company that would be able to manufacture it, saying, "Are you interested in this product?" they would come back to you a few days later and say, "It's not being sold overseas. We can't touch it."

That was the attitude.

Anyway, one chap was interested, not in the diving, but in firefighting application. He was a manufacturer in safety equipment. So he approached us and said "Can you produce this firefighting equipment?"

I said, "Yes, but I don't have the money to outlay for it."

He said, "I'll put some money in, on loan to the company, providing my accountant can keep an eye on your company operation."

I was desperate for money, so I accepted that.

When I came back from three weeks up in the Northern Territory [training indigenous divers to dive for pearl shell], I found the company was being sold up. As soon as I'd left this guy had withdrawn his money, and declared the company bankrupt, and had an offer of a few shillings on the pound for the company.

When I came back I found they hadn't paid any of the debts. The debts had piled up. I was about 10,000 pounds down the drain, which I didn't have. So the first thing I did was to throw him and his accountant out of the place. I went around to all the suppliers, like Dunlop Rubber, for instance, because we used their welding hose, because it was strong and buoyant.

That meant it floated on the hookah equipment. It floated above the diver, which was very important. The way we used to operate was to throw out about 120 feet of hose, and it would float above the diver, and he was free to swim in a big area.

So I went along to Dunlop and told them the situation. To give them credit, the director never even hesitated. He said, "What we'll do is put that money you owe us aside."

That was the bulk of the money, about 6,000 pounds. And he said, "You can pay that off as you can over a period of time. And we'll open up

another account for you and we'll give you 60 days [credit]."

So I fought our way out of it. But these were the difficulties I had. I had a wife who had no interest in it whatsoever. She was always at me to give it away. In the finish I did.

I got that way that when La Spirotechnique arrived on my doorstep—a big arrogant Canadian was in charge of it out here—he strode in and said, "We want to take over your company. You either sell out to us, or we'll run you out".

As simple as that.

So I sold out to them. But I would have loved to have sufficient backing. The stupid part about it was I could have easily have got it overseas.

Jean Richard—they manufacture watches and divers' watches—I met up with the director just after I sold out. He said, "If you'd approached us you could have had anything that you wanted, because we could see a big future in this field."

That's all I got when I went to America. Had I taken it straight to America, I could have gotten any amount of money. If I had my time again, I would have gone straight to America.

JM: You're a long way from the sea. When did you stop diving and come up to the bush?

TE: I was born in the bush. My family came from Healesville [Victoria]. They were loggers. I love the bush, but I was chained to the city because of the industry I was in. When I retired, I hot-footed it straight to the country.



Author Arthur C Clarke with a Porpoise hookah setup at the Great Barrier Reef.

This issue we are delighted to present a series of CAD drawings of the Porpoise CA 1 by Graeme Cameron. Graeme's brilliant drawings showcase the simple functional beauty of the Porpoise regulator, as it was designed by Ted Eldred seventy years ago. The single hose two-stage regulator (as you will read in the Ted Eldred interview) went on to be copied around the world. The first three pages reveal the workings of the first stage, while the last shows the second stage.







