THE BRITISH SUB-AQUA CLUB
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Diving Officers Conference 1978

PROCEEDINGS
of the
DIVING OFFICERS' CONFERENCE

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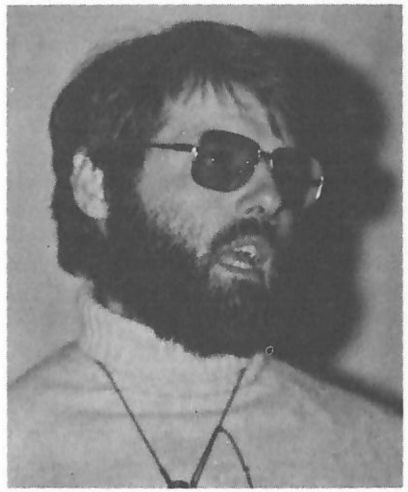
DECOMPRESSION CALCULATIONS

A. Dix



"I asked for this opportunity to speak to you because I want to enlist your help.

As you probably know, I have been responsible in the last five years for organising the 1st Class Examination, and within the last year, for organising the Advanced Instructor Examination. During the last two years, both these theoretical examinations have included questions relating to the new BSAC RNPL Decompression Table. I have been responsible for the marking of the answers to these questions.

I have to tell you that I am quite worried about the answers that are given to these questions. I believe that there is a good deal of misunderstanding prevalent in Branches. When you appreciate that the people who are answering these questions are potential Advanced Instructors, that is, they already hold the Club Instructor award, or are 2nd Class Divers presenting themselves for a really quite difficult theory examination for 1st Class, then, when such candidates get incorrect answers, I worry.

When I hear George Skuse telling us of the number of bend incidents there have been within the last year, I think you may see my line of reasoning. Perhaps there are misunderstandings about procedures.

I do not have much time, so I would like to go through one calculation with you and tell you where difficulties arise. This is a repeat dive calculation. Almost everyone who answers an exam question manages to get the right answer of decompression requirement for the first dive. No problem here, but there is a problem when it comes to repeat diving.

The first dive leaves the surface at 10.17, diving to 42 m with the ascent commencing at 10.30 The question here is: what time do we reach the surface, and what decompression is needed, if any?

The second dive leaves the surface at 16.00, on the same day, diving to 19 m and commencing the ascent at 16.15. What decompression is needed?

I will go through the stages of the calculations, and point out the kind of errors that I have found when marking exam papers.

Depth of 1st dive = 42 m, no errors
Bottom time 1st dive = time commencing ascent minus time leaving surface,
= 10.30 —10.17 = 13 minutes.

Some errors here as a few people get confused about the meaning of the term "Bottom time". Any time spent on the surface before starting the descent does not count in the bottom time.

Now enter the Decompression Table at 42 m. As the time increments read 10 and then 16 minutes, we have to use the next longer increment for our 13 minutes, that is 16 minutes.

A few errors here; some people do show confusion if the bottom time does not coincide with one of the time increments.

Reading down from the 16 minutes we find that the decompression required for this first dive is 5 minutes at 10 m and 5 minutes at 5 m.

Almost no errors here; if you enter the table correctly it is difficult not to read the requirements accurately.

What time do we reach the surface? Quite a few errors here, as people do not realise, or forget that the time elapsed during the ascent from the bottom to the level of the first decompression stop is included in the 5 or 10 minutes time for that stop. Similarly, the time spent ascending from the first to the second decompression stop is included in the timing of the second stop.

So the 5 minutes at each stop, 10 minutes total, is the time of ascent; adding it to 10.30 when we left the bottom gives a time of 10.40 for arrival at the surface. The time spent surfacing from the 5 m stop to the surface—at 15 m per minute it will be 20 seconds—can be included in the timing of that last stop and so discounted.

Now for the second dive and its decompression. Some decisions have to be made. Firstly, what is the interval between the two dives? This interval is a SURFACE interval, and must be between the time when you reach the surface at the end of the first dive until the time that you leave the surface on the second dive. In this case the surface interval is 5 hours 20 minutes.

There can be several forms of error here. Some people take it from the start of the ascent on the first dive or even from leaving the surface on the first dive, to leaving the surface on the second dive.

In fact, the Diving Manual does not help. There is an incorrect example, found by Gavin Oddy, on page 93, figure 24 of the 10th edition. It is wrong because the ascent time is included in the surface interval.

Secondly, what is the bottom time of the second dive? Starting at 16.00, ascent commenced at 16.15 and so the bottom time is 15 minutes. Depth of 2nd dive = 19 m.

Now for the repeat dive calculation, and the next question is, is either dive deeper than 40 m? Clearly the first dive was and we have to use the table of more conservative factors. Quite a few people make mistakes at this stage, but the correct choice should be simple; is EITHER dive deeper than 40 m?

Surface interval = 5 hr 20 mins, one dive over 40 m. So, find that for 4—6 hours band, the factoring is $(A \div 4) + B$.

This means dividing the bottom time of the first dive by four; and adding it to the bottom time of the second. So (13÷4) + 15, giving 18.25 minutes, taken up to the next increment is 19 minutes.

Errors here, apart from using the wrong factors, have been taking bottom time to include ascent time.

Now we get to where most people make their mistakes.

You have to enter the decompression table at the depth of the ***deeper*** of the two dives. Very easy to get right if the second dive is deeper, but as in this example, when the deeper is first, that is the one to use. You must enter at the depth of the DEEPER dive, in this case at 42 m.

You will appreciate that if you use the incorrect depth, 19 m in this case, you get a very different answer, and a very dangerous situation that is! So the common and most dangerous error is to use the second dive depth and not the deeper depth.

If correct entry is made few errors follow apart from time increment decisions. In this case, entering at 42 m for the corrected bottom time of 19 minutes, the answer is 5 minutes at 10 m and 10 minutes at 5 m.

I am sorry to labour this point. However, if large numbers of candidates are getting it wrong, and these candidates are well qualified and experienced divers, then it is a cause for some concern.

I repeat my plea to this, the greatest gathering of experienced divers. Please take note of these types of error, and consider going back to your Branch to tell your members where the errors can occur. A "Workshop" with some examples of calculations, in the way that I have done with you, could save an awful lot of problems."

REGULATOR PERFORMANCE
M.K. Todd, NDC Equipment Adviser

Introduction:

"Firstly, I am not talking on Regulator Performance, but rather on Simulated Regulator Performance. Something quite different, but I hope it will give a guide to what might be expected.

Over a number of years, I have seen various graphs and tables, in magazines and technical literature, which attempt to inform the reader about the performance of diving regulators.

It has often been difficult, or even impossible, to cross-reference much of this information in order to get comparisons between regulators which have been tested by different people and which may have been tested under different conditions and by measuring different criteria.

It seemed to me that one should try to compare a number of popular, readily available, regulators under identical conditions and that the conditions should

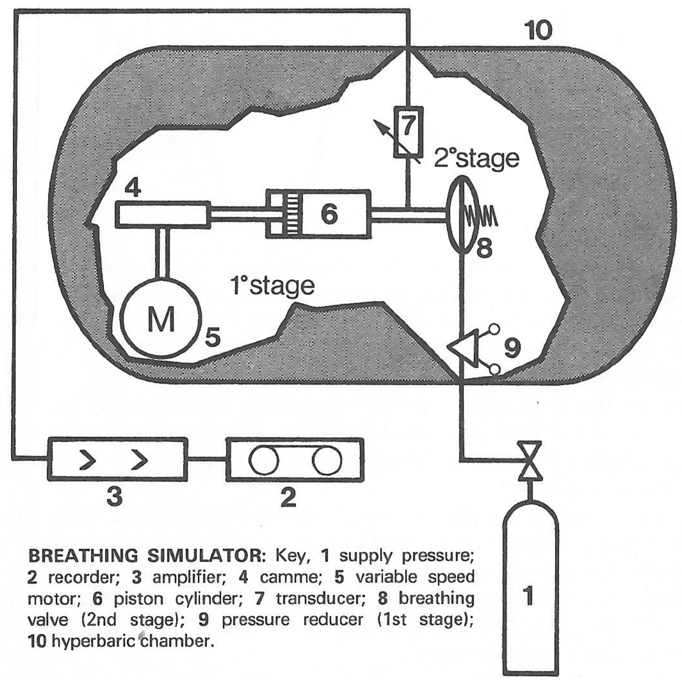
be chosen in order to highlight possible differences in performance.

It is obvious that the conditions must reflect the effects of pressure increases on the behaviour of the regulator as the depth increases. The sort of effort that is needed to get the air through it. Surface flow-tests may give an indication of a regulator's performance and may be very useful for "tuning" the regulator, but the only way to discover the system's reaction to increasing depth is to test it at increasing depth. Putting more air through a regulator at normal atmosphere pressure is not the same thing as putting through the same volume of air at a higher density due to depth.

Sub Sea Oil Services of Bergamo, Italy, have been carrying out tests using a breathing machine of their own design. The actual machine is a simple piston running inside a cylinder via an adjustable connecting arm (to control breathing volume) to an adjustable speed motor (to control the number of breaths).

The regulator is connected to the mouthpiese of the machine and a pressure-sensitive transducer measures the inhalation and exhalation resistance and feeds this information into a moving chart recorder and also into a Hewlett Packard data processor which draws a graph of effort against depth for any test.

The whole of the breathing machine fits into a two-man recompression chamber and is supplied by high-pressure air for the regulator from a large bank of cylinders outside the chamber in order to attempt to minimise any drop in pressure of the supply due to high flow rates. *(Fig. 1).*



BREATHING SIMULATOR: Key, **1** supply pressure; **2** recorder; **3** amplifier; **4** camme; **5** variable speed motor; **6** piston cylinder; **7** transducer; **8** breathing valve (2nd stage); **9** pressure reducer (1st stage); **10** hyperbaric chamber.

Fig. 1

Signor Guiseppe Bonsaglia of Sub Sea Oil Services has already done much work on the performance of regulators at depth, and although much of his work is directed towards the professional diving requirement most of the criteria are also relevant to sport diving. Signor Bonsaglia is here today and will be pleased to answer any questions on the technicalities of the testing.

SSOS, some time ago, discontinued an attempt that they had started to try exactly to simulate a diver's breathing pattern by means of a machine. They are convinced, and they convinced me, that the most important characteristic to be measured is the PEAK-FLOW of the regulator, ie, the maximum rate at which air is demanded from it.

Miles* has quoted that for a diver undergoing moderate work and with a repiration of 30 l/min the peak-flow is 100 l. (Fig. 2).

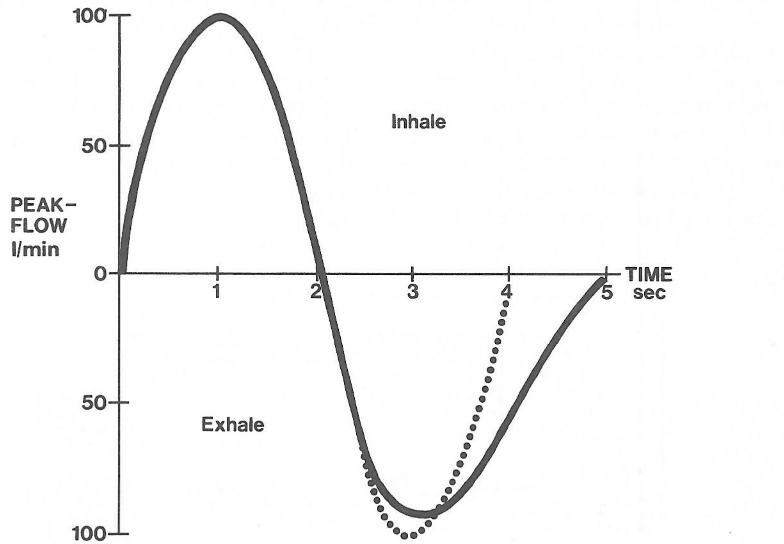


Fig. 2

The dotted line shows a perfect sine curve, which is what a machine would do. The important part is that for work underwater when you are consuming 30 l/min, you need a regulator which delivers at least 100 l/min if you are not to beat the regulator.

Deciding on the peak-flow for the regulator tests caused much discussion between myself, the SSOS engineers and Gaetano Manti of *Il Subacqueo*. Were we to try to simulate the normal breathing of a diver, a diver working very hard, a diver in distress, or what?

It seemed obvious to me that if we did not choose a peak flow that was high enough we might not show up much in the way of differences in performance of the regulators, for we all know that each of these regulators has its users who use it regularly and without problems. It was important that the regulators should be "extended" as far as the test conditions were concerned in order that any differences in response could be seen.

* *Underwater Medicine* by Surgeon Rear Admiral Stanley Miles (Staples Press).

SSOS require a regulator for their purposes that will give a massive peak-flow of 400 l/min air at 50 m depth with a maximum breathing effort (inhale or exhale) of 25 cm of water! They have not found a regulator capable of such a performance—yet. In support of what appears to be extravagant requirements, they have themselves measured a peak-flow of 350 l/min in a diver working hard in a wet-dry diving simulator.

After much discussion, it was finally agreed that a peak-flow of 200 l/min would be used (*i.e.* twice the value peak-flow for moderate hard work). It was felt that this value might be more appropriate for the field of sport diving and MIGHT be close to panic breathing in a distressed diver. Arbitrary conditions, I will admit, but I was aiming to show up any differences that there may be in the response of the regulators under test.

SSOS have carried out many tests, both wet and dry, and although there is some little difference between the two sets of conditions, they have found that a dry test is quite suitable for carrying out comparison tests—the sole object of my visit.

Therefore, all the tests were made in the dry chamber and actual readings should not be quoted too strongly since they would be likely to be different if tested wet. What is unlikely to be affected, however, is the relative behaviour of the regulators under test.

The regulators tested consisted of single-hose regulators available to divers in this country and they were:

Poseidon Cyklon, Spirotechnique 20/20, Spirotechnique 50/10, Siebe Gorman Neptune, Spartan J2, Spartan X2, Nemrod Snark 2 Silver, US Divers Deepstar, US Divers Calypso, Submarine Products Aquarius, Spinnaker B, Spinnaker Pro, Typhoon Mark 2, Typhoon Mark 3, Scubapro Mark 5, and Scubapro Pilot.

All the manufacturers and distributors were approached for a new regulator and were informed of the objects of the tests and of the test conditions and were, without exception, most cooperative and helpful.

It should be borne in mind that the tests were carried out on only ONE regulator of each type and are not, therefore, statistically relevant. However, each of the regulators was brand new and was just as "Joe Diver" might buy it at his local dive shop and I have no reason to believe that any of them was tuned specially for me, or interfered with in any way.

In order to carry out any test, the Hewlett Packard processor was programmed for the criteria of the test conditions, the breathing machine was adjusted to give the required peak flow, the cylinder bank was charged to the necessary pressure, the regulator was affixed to the mouthpiece of the breathing machine, the chamber was closed and the test commenced—first at atmospheric pressure and then at increases of 5 m of sea water down to 50 m.

At each depth, the breathing resistance for inhalation and exhalation was measured and then recorded on the graph. At the end of the test, a graph was drawn of breathing resistance in cm of water (vertical axis) against the depth of water in metres (horizontal axis).

Although a large bank of high pressure cylinders was used to supply the air to the regulators, it was not feasible to keep the high pressure reading at an absolutely constant value. Previous experiments have shown that cylinder pressures in excess of about 60—80 b have little or no effect on performance and so a high-pressure supply of 100—130 b was accepted as being satisfactory, and maintained throughout the tests.

A perfect regulator would be one where the inhalation resistance remained at a low value throughout the whole test, and where the exhalation resistance did not vary either.

There are few regulators which fulfil the first requirement but none which satisfy the second, since no regulator at present available has any form of "assist" to the exhalation. All have simple rubber flap-valves and their resistance depends on the available area of valve and the resistance to the escape of the air due to deflector horns, exhaust ports, etc.

It is quite difficult to show the information obtained in an interesting way since it consisted mainly of graphs. What I have tried to do is to collect the graphs into families having similar characteristics, and I have therefore reduced all the original information down to three graphs—one for the "moderate" performers, one for the "good" performers, and one for the "high" performers.

Moderate Performers

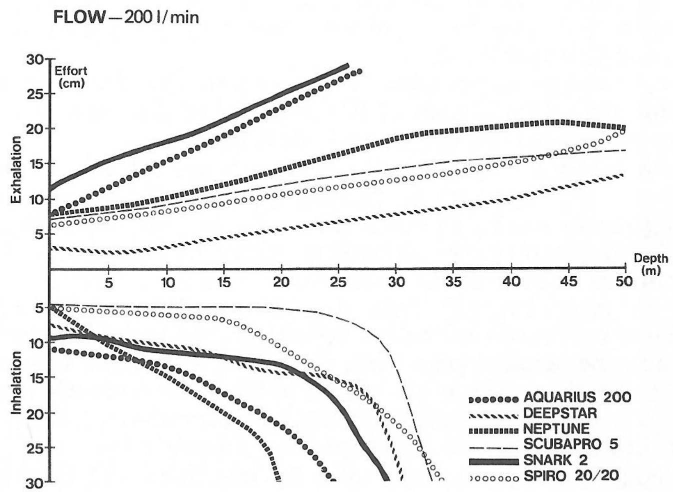


Fig. 3

Worthy of note here is the very poor exhalation performance of the Snark and the very good exhalation of the Deepstar.

Good Performers

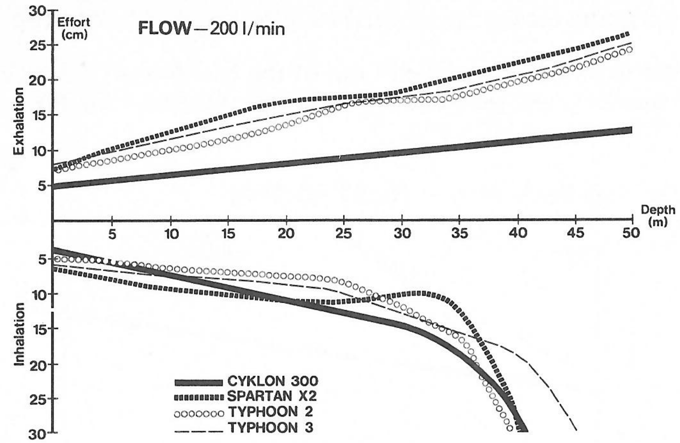


Fig. 4

The Cyklon had excellent exhalation performance and there was evidence during the tests to suggest that the performance on inhalation was much affected by "tuning", and a better result was obtained on a second, not new, regulator.

High Performers

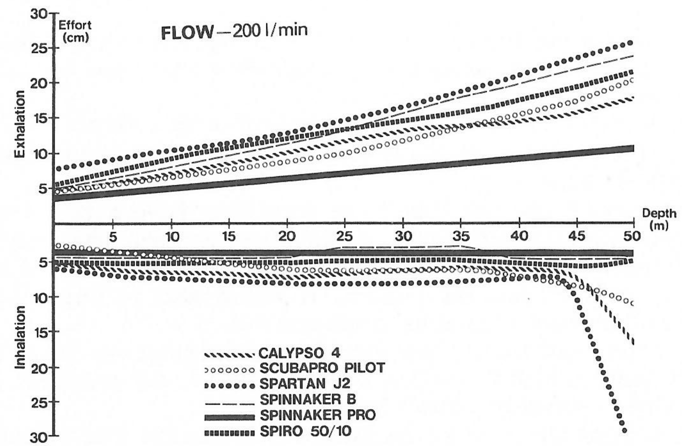


Fig. 5

It was quite possible to include both the J2 and the Calypso in the previous category and it was quite a surprise to find the J2 out-performing the X2. No doubt, Spartan will attempt to find out why.

The flat inhalation curves for the Spinnaker B and Pro, the 50/10 and the Pilot are the result of servo-assistance in each of the regulators. The very good exhalation graph for the Spinnaker Pro is the result of having two large exhaust ports.

In order to really "knock hell" out of the best four of the high performers, each of them was subjected to a further test, but this time the peak flow was adjusted to a massive 350 l/min.

Best of the High Performers at High Peak Flow

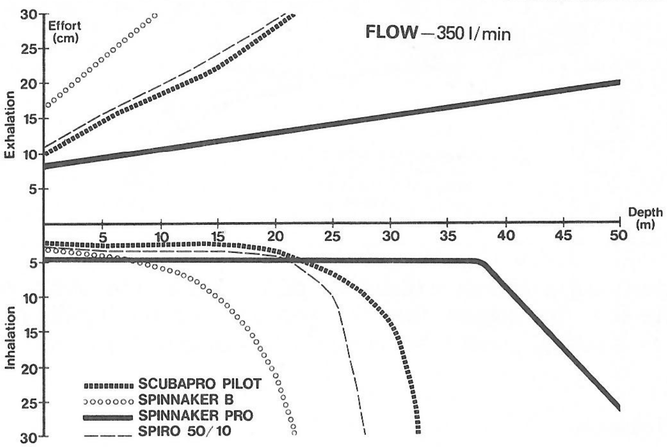


Fig. 6

The reason for the dotted line for the 50/10 was the fact that this went on to free flow because of the extremely high peak-flow and it was not until 10 m that a reading could be taken.

The Pilot shows a very low breathing resistance until about 20—25 m and the Spinnaker Pro shows good characteristics for both inhalation and exhalation over the whole range.

In summary, it appears that some regulators have a performance which gradually deteriorates with depth, while others perform extremely well until a critical depth when the performance suddenly falls off. It would be extremely interesting to investigate the reasons. It would also be interesting to re-test regulators after about 12 months' continous use.

There are so many factors that should be investigated—effect of temperature on performance at high flow-rates, effect of low cylinder pressures, and so on. I appear to have opened Pandora's Box!

Before anyone starts to try to use the information that I have presented, please let me reiterate what I have done.

1. I have tested only ONE regulator of each type.
2. They were tested in the dry and at an arbitrarily chosen peak-flow rate.
3. The organisation of the regulators into Moderate, Good and High Performers was also somewhat arbitrary.

4. No account has been taken of other essential criteria for a regulator—reliability, robustness, ease of servicing, price, comfort. All of these must influence our choice of regulator rather than performance alone.

Nevertheless, I think that it has been possible to compare the behaviour of these regulators under conditions which are relevant. If 200 l/m peak-flow is somewhere near to the rate of a diver getting into panic, then perhaps the graphs give some indication of such a diver "beating" his regulator, and there have been such instances in the past.

I think that the graphs clearly show the advantages to breathing effort resulting from the servo-assisted regulators and also how the size of the exhaust valve is important if exhalation resistance is to be kept low. I wonder if it will be long before someone produces a regulator with servo-assisted exhalation?

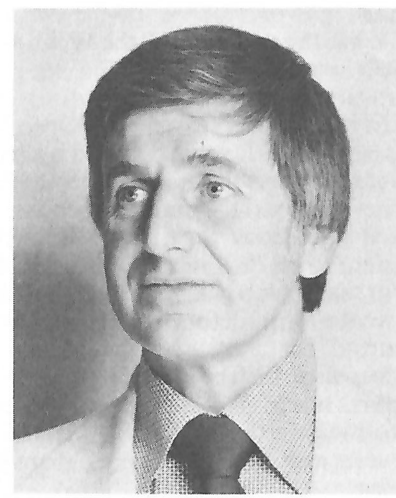
It is obvious to me that a test of the type that I have carried out could become the basis of a standard test for all regulators to give an indication of their performance.

Perhaps it is now time for the BSAC, the BSI, and all interested parties to get together to devise a standard performance test to help the diver to understand what he is paying for and what he can expect from his regulator.

I have already stated that SSOS provided me with advice, expertise and equipment and literally nothing was too much trouble for them and I must place on record my appreciation of their help."

OPEN WATER RESCUE COURSE

John Q. Page, Coach, North West Region



"Those of you who attended last year's DOC will remember the presentation by Alan Watkinson, on the Deep Rescue Workshop, and those of you who received a copy of the Proceedings of DOC '77 may well have reminded yourselves of the situation up to November last.

My colleague Peter Ormerod and I, are here today to continue the saga, and to acquaint you with the results of the Workshop findings, and the Pilot Courses which have been held since this time last year.

Firstly let me remind you of the reasons for a need for change.

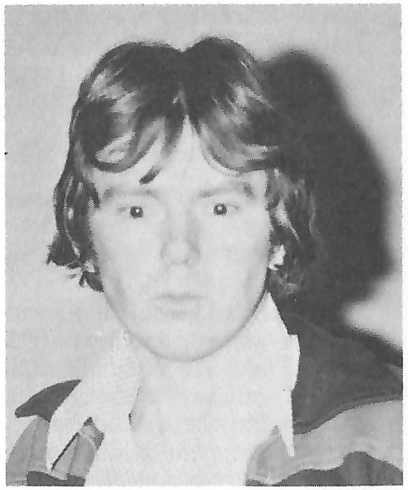
The old Deep Rescue Exercise was fun, and it was also a very popular event, certainly in my area of the North West, and I well remember the times in 74/75 when we processed up to 40 candidates in a day.

Morning Session, 26th November

Session Chairman—K. Clark, Special Projects Adviser, NDC

CAVE DIVING TECHNIQUES

M. Fawr, Welsh Association SAC



"I will be talking to you about cave diving and what I believe it really is.

I do not know what you have in your minds as a conception of cave diving; probably you think it is a rather more hazardous extension of your sphere of open water diving but, as I hope to show you, this is not really the case.

Open water divers do go into caves to dive, and there are divers that are suited to their open-water training and equipment. However, cave diving in its present stage of evolution is really a sport for cavers, and they will use basically different techniques and training.

Let me give you some background on the conditions that the cave diver operates in.

Caves are formed in limestone rock by the action of water over millions of years, dissolving away the rock. In the area I shall be talking about—the upper Swansea Valley—the streams flow south, off the Brecon Beacons and then sink underground into the limestone. They emerge much lower down the valley into the River Towey, and in between are ten or eleven miles of cave systems that we have explored so far.

There must be considerably more cave systems which have not yet been found or explored so, as you can see, caving and cave diving are very much pioneering sports. Quite a lot of the new systems being explored are flooded, which is where cave diving comes in.

Water conditions in the cave system are not too bad, with a fairly constant year-round temperature of 9°C. Weather conditions are important to us for, as you can imagine, the number one hazard for caving is flooding and it is often impossible to get into the system.

Let me describe the equipment that cavers wear. A wet-suit is essential if you are going to be in the water for a long time, and 10 or 16 hours is not unusual. A helmet, obviously, to protect yourself during the low crawls. A miner's battery pack, worn on the back of the waist gives 16-18 hours of light from the helmet lantern. And lots of other equipment has to be carried, to cope with the cave as well as the diving.

Safety lines are needed in some parts of the cave system. If the cave floods, it may be possible to get through some stretches by taking a deep breath and pulling yourself through on the safety line. If the flood is backed up 10 or 15 feet and the stream is transformed to a raging torrent, this is not possible and

the only thing to do is sit it out and wait for the flood to subside. In some parts of the system we have sited food dumps for this purpose, and cavers could sit out a flood for several weeks if necessary.

As there are quite large fissures to be negotiated, we have to take flexible electron ladders into the system, often through tight sections where the passageway may only be 9 inches high.

Some sections are very uncomfortable—either very tight or wet—but in others there is more room and you have a chance to look round and admire the scenery. But very often the cave ends in a sump and this is where the caver has to take up diving equipment to further exploration of the cave. We cave divers are not a lunatic fringe who enjoy flopping around in muddy sink holes here and there. It is a serious pioneering sport, to find another mile or two—or ten—of cave that has not been discovered.

So the diving base may be several miles into the cave and all diving equipment has to be carried into it. As you can imagine, it gets a real battering on the way, and needs to be tested very frequently between dives. You do not want to struggle with a large cylinder through tight sections and might, as a result, be diving with a cylinder as small as 15 cu.ft. Naturally you have to be very aware of the restrictions put on your diving by this equipment.

A team of cavers is often necessary to carry your diving equipment, in waterproof ammunition cases, to the dive site some miles underground and this puts psychological pressure on you, as a diver, to actually dive.

Cave diving started before the last war, with oxygen rebreathers, which were quite hazardous. Now cave divers use compressed air, usually with one main cylinder slung from the waist on one side and a smaller reserve cylinder on the other side. The reserve is solely for emergency use and, in fact, the principle of using the main cylinder is—one-third of air for the dive in, one-third for the dive out, leaving one-third for the unexpected. These two cylinders are completely independent systems, so that if the first one becomes entangled it can be jettisonned.

The cave diver usually carries three separate lighting systems, but if the dive is very tight, he might be down to only one, with a single aqualung set.

Weights and the power packs are carried on a separate belt which does not have a quick release. These would be the very last things to jettison for, if you got into difficulties, you would always be faced with a horizontal swim out to safety, and need to be neutrally buoyant. All other equipment does have quick releases to sort out entanglements or so that the set can be pushed in front of you through tight passageways.

Demand valves get a real hammering, being dragged through the mud and suffering a lot of abrasion. I believe that a good simple valve is best and preferably one that can be stripped down and reassembled underground if necessary. Performance at depth is not so important, as most of our dives are comparatively shallow. The reserve demand valve is usually covered with a nylon stocking, to prevent it becoming filled up with silt.

We always wear a knife on the forearm where we can get at it—and often carry two or three spares tucked up our sleeves. This is because the greatest hazard underwater is the safety line that has to be used.

Drysuits and VVDS's are used, as well as wet-suits and have obvious advantages for long dives of 2 or 3 hours.

The normal procedure is to dive alone. Very often the passages are so small and so full of silt that buddy diving can be dangerous, and normal rescue procedures are not possible. You need to be sufficiently confident and composed to be able to look after yourself. The life-line becomes essential, despite the entanglement that might arise.

Visibility may be fantastic in some places, even as high as 200 feet, but as soon as you stop, your fins will churn up the silt; your air bubbles will dislodge silt from the roof of the passage and the visibility drops, often down to zero. This means that the return journey is nearly always through zero visibility water, and proper use of the life-line is essential. Pull on it too hard, and it may be severed on a sharp projection, or pulled under an undercut in the passage which might lead you into a jam.

Normally, though, visibility is very poor. Rainwater brings brown silt into the underground stream system, and you are not able to see more than two or three feet.

Increasingly, our divers are getting deeper as we explore new cave systems. The passage may make a series of U-bends, with depths to 70 or 80 feet. In Wookey Hole, we have reached 150 feet depth at 2,000 feet into the system, and have to cope with decompression and nitrogen narcosis through some sections.

In some parts of the world, there are systems where the passages are hundreds of feet wide and perhaps a hundred feet high with water at 20°C—a diver's paradise. But in Britain, they are cold, dirty and usually tight. So why dive in them?

Well, apart from exploring the unknown there are often marvellous dry caves to find. Vast caverns with stalactites and stalagmites which you are the first man to see, and small passages lined with delicate crystalline growths. And, of course the challenge of self-discipline in an arduous and potentially hazardous sport.

Training is essential. Our cave diving group places great importance on caving ability. New members have to be experienced cavers and work with us for at least a year before they ever dive underground. The risks are too great otherwise; a caver in South Wales bought some diving equipment one day, dived underground the next, and his body was not found for five years.

We have a minority sport with only 60 or so cave divers in the country. But we are not mad, and we are serious and dedicated, and often have great rewards."

adjudged to have completed the most useful underwater project in the preceeding 12 months. The project may have been started at any time.

The adjudicators will be the NDC Project Adviser, the Director of Coaching, the National Diving Officer and a representative of the Selby Branch of the BSAC. Peter Small came from Selby and the Branch have donated the Trophy.

In order to qualify, the project must be completed and a report submitted to the Projects Adviser and we would like the project to be registered with the BSAC from its inception."

Bernard Eaton talked about Peter Small:

"You may wonder why this "Peter Small" Memorial Trophy is being donated in the memory of a man of whom most of you probably know very little, and who has been dead for 16 years.

I am fortunate enough to be able to tell you about this, as I was a close friend and colleague of Peter Small. The story goes back to 1953 when Oscar Gugen first had the idea of forming a British Sub-Aqua Club.

Oscar met Peter at this time and Peter was immediately enthused. Oscar had tapped an amazing fount of energy and enthusiasm. Peter helped to put the blue-print for the BSAC together with Oscar and they both travelled the country, talking to people and forming the first Branches.

Peter also wrote articles for the press, magazines, and so on. He was the editor of the first BSAC magazine, "Neptune" which became "Triton" and now "Diver".

I knew him as a colleague on newpapers and we became close friends in 1958. These were stirring days in diving, with Cousteau and Ed Link starting the first underwater living experiments and George Bond investigating saturation diving.

At that time, the BSAC decided to organise the The Third World Congress of Underwater Activities, a tremendously ambitious project. Peter's role was to put the programme together.

A young Swiss, Hannes Keller had produced a new gas mix which he believed could be used to take a diver to 1000 feet. He and Peter discussed it at great length and they decided to make the dive together.

The story of the dive is too long to tell now, but it was a disaster in that Peter Small and a support diver both died. This double tragedy put the work on these deep dives back by a year or two.

We felt that Peter Small should be honoured, and with Oscar Gugen, I tried to form a memorial Chair of Oceanography at Southampton University at that time. It was too ambitious; the Club was small, with only 5000 members and it never got off the ground.

So I am delighted that Selby Branch, a new Branch of the BSAC came up with the idea of a "Peter Small" Memorial Trophy. If Peter were alive now he would be delighted; delighted to see this particular gathering of divers and the growth of the Club. His articles in "Neptune" showed that he had great vision in diving and he was interested in projects of all kinds. This is why the Trophy is particularly apt.