Printed by Coasby & Co. Ltd., St. James' Road, Southsea, Hants

ROYAL NAVAL DIVING magazine

Submersible, 1984?

Vol. 12 No. 3

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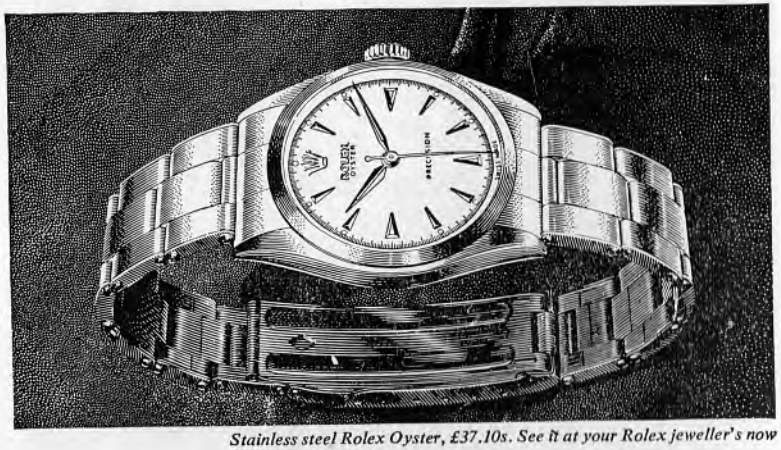

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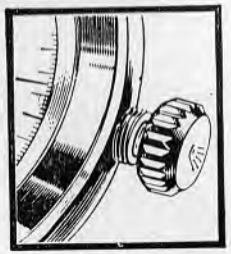

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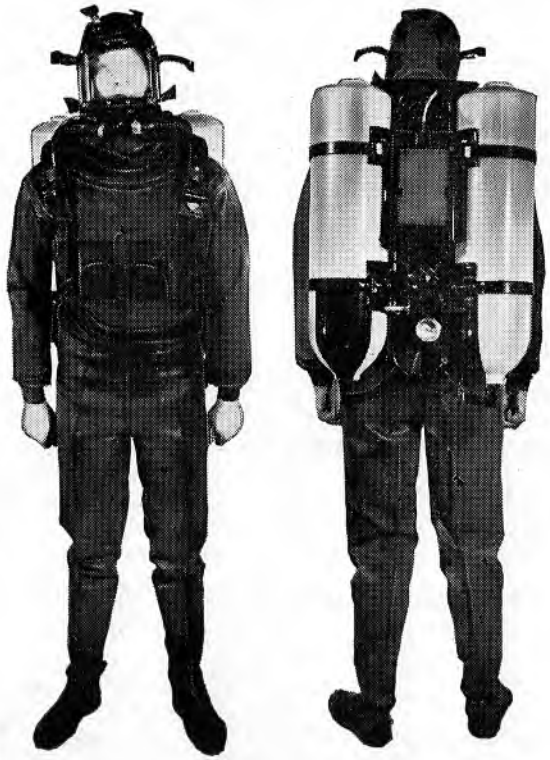


The diver is wearing an Underwater Swimmer's Dress made from rubber-proofed crimped knitted nylon, and is using SABA (Swimmer's Air Breathing Apparatus).

The suit is manufactured by Dunlop General Rubber Goods Division of Manchester, and the breathing equipment by Dunlop Aviation Division of Coventry.

Dunlop have for many years produced various types of underwater equipment for the Admiralty, playing a leading part in the design and development of apparatus for different specialized branches of underwater operations.

DUNLOP

CFH/AV/24

Contents

R.N. Diving Magazine

Vol. 12 Winter 1965 No. 3

EDITOR'S NOTES

FIRSTLY, on behalf of the Magazine staff I would like to take this opportunity of wishing all our readers the best of seasonal greetings for 1965-1966.

On behalf of the Magazine and its readers I would like to extend our thanks and appreciation to S.-Lt. P. R. Park for his efforts over the past year as Treasurer, and to welcome S.-Lt. J. E. Thompson into the vacated chair. S.-Lt. Park was drafted temporarily to Aden for a couple of months as B.M.D. Officer H.M.S. *Sheba* and at the time of writing, will be shortly taking up his new appointment with the B.M.D. team at Plymouth, rendering safe 'rouge' 'Oggies'. We wish him the best of luck! S.-Lt. Thompson has duly been issued with a green eye shield, shirt sleeve bracelets and croupier's rake.

The Diving School in *Vernon* has again had a draft chit. The last move was from the old *Deepwater* to this building and now we are shifting house again to the gound floor of Creasy West building. For those who have climbed the iron stairs outside the old offices and nearly suffered a heart attack in doing so will gain some consolation from this fact, if nothing else.

Sports wise we have acquitted ourselves quite well in Rubgy, Soccer and Volley Ball. It does not seem to be fashionable to run around with up-turned walking sticks anymore and unfortunately Hockey has not been played at all this season in the Division.

Our congratulations to the team who represented the Division at the B.S.A.C. underwater swimming championships held at Aldershot this year. They were placed first in the competition, having swam against some good opposition from the other B.S.A.C. clubs.

Coming back to the old, old story, it is thanks to our writers of articles that we have again compiled a magazine that we hope is both varied and interesting in its coverage. However, we are still not receiving enough news from ships diving teams. The Regulating Chief Diver's crystal ball is working too much overtime on future drafting commitments, etc. to allow us any time with it to see what you've been up to around the world. So once again please spare those few minutes of run ashore or diving time to write and let us know what you have been doing. It does not have to be a pure diving story; yarns about how you and your best 'oppo' had a good run ashore and how he 'filled you in' are all good for a laugh. So how about it!

Royal Naval Diving Crest. Over the past two or three years there has been growing interest in the creation of a crest for the Diving Branch in the R.N. To get as many designs and ideas as possible it has been suggested that a competition should be run through the medium of this magazine. Therefore, all readers, who are interested, should submit their designs, etc. to this address. The winning entry will be awarded a £5 prize. A board of judges will be set up in *Vernon*, Lt.-Cdr. Gillam, R.N. being the Chairman. The Board's decision will be communicated through the magazine in a later edition, their decision being final. There is no limitation to the number of designs submitted by any one person, or the material used, though drawing cardboard or paper is suggested, in preference to dustbin lids or toilet walls, etc. So all you 'Arty' types with nothing to do and who fancy a chance at earning a tax free 'fiver', get your thinking caps on!

Lets Get with It—2

APPARENTLY my writing is so atrocious that even the Editor could not understand the last article. Consequently, the printed article was entitled 'Lets get on with it,' and I swear that any similarity to the original article was purely co-incidental. However, I hope that you received the main gist of the message.

Lets try again with the second article, in which I hope to ride my favourite hobby horse, namely 'U/W Vehicles.' Before producing the meat however, I feel that a short history of U/W Vehicles, as it affected yours truly, would not come amiss.

It all started in 1954, during the Summer leave period as a matter of fact, when I happened to be the Duty Diving Officer, and, having little to do, I came upon Lieutenant Commander J. Brookes (Ret'd.), who was engrossed in trying to make what I subsequently found to be a British Mk. 2 Chariot work. He found this vehicle under a coal heap at *Dolphin*, where it had been since the end of World War II, so its condition can well be left to your imagination.

The reason for unearthing this craft was that Lieutenant Commander Brookes had been nominated as Technical Advisor for a film on the life of Commander Crabbe, called 'Silent Enemy', in which three Italian Chariots would be required to be built and driven. Lieutenant Commander Brookes wished to use this particular craft in order to train the lucky C.D.s who would be operating

these vehicles. To cut a long story short, I was the man on the spot, was most thoroughly trained, and became a fanatic ever afterwards. How does one explain the exhilaration of soaring through the water with a large vehicle at finger tip control, of hovering in mid-water and of the feeling of accomplishment on surfacing at exactly the right spot, at the right time after a long drive on the bottom on just a compass, depth gauge and watch ? From this it was an easy step to get involved in the actual construction and trials on the three Italian craft.

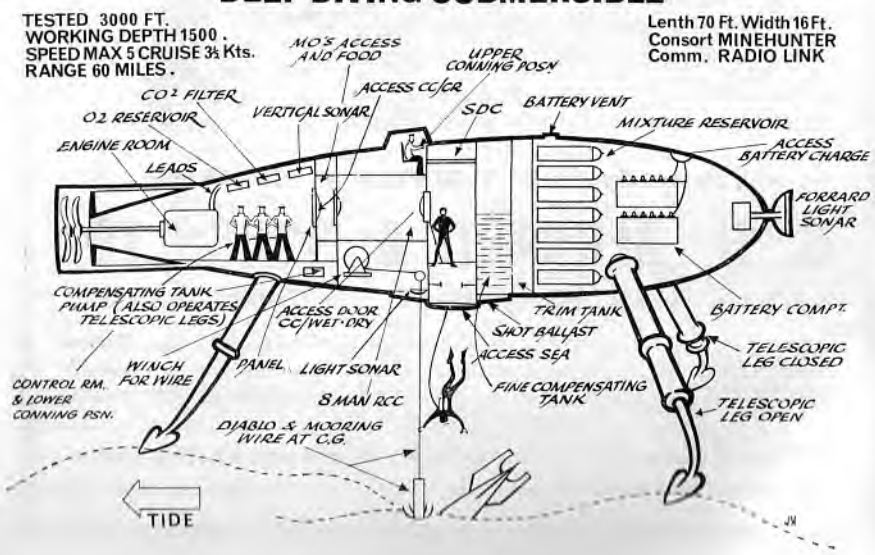
On completion of the film these craft were given to the C.D.'s and, with the original British Mk. 2, formed a nucleus for a thriving little set up at Horsea Island. Every spare moment was spent in maintenance, driving and improving these craft, the whole business being kept alive on a shoe string. It was a short step from this to a discovery that nine submersible canoes were still crated up at a machinery yard in Greenock. They soon joined the fold and launching ramps were completed for them at Horsea Island.

The Mini sub then made its appearance. This one was hard work because it had to be tandem pedalled. Later still, C.D.'s could be seen U/W in most peculiar positions as they drove their latest discovery, a pedalled propeller with a seat only, which was stuck up I-don't know-where by I don't know-what!

Various other contrivances made their entrances at this time including encased car batteries with propellers to tow divers and the Rebikhoff Pegasus vehicle, which was a real U/W fighter 'aircraft'. This could fly upside down and loop the loop forward as well as backward. It was bedlam at Horsea, but any C.D. who happened to be there, could savour the delights and be converted.

This was the position before yours truly went to the Med. What is the situation now ? It is, I am afraid, a case of 'Where have all the Chariots

DEEP DIVING SUBMERSIBLE



gone ?' However there is a renewed interest at higher levels in the enormous possibilities of these vehicles. In fact, as has always been appreciated by the enthusiasts, the requirements are now being clarified. From being at a period similar to the days of the invention of the wheel and thinking, 'How can we use this thing now that we have invented it ?' its possibilities are now becoming clear.

As I see it, there are two outstanding and immediate requirements.

1 A Deep Diving Submersible, in which the divers can decompress in comfort and safety, and which is completely independent of surface conditions, *i.e.* 'Four point moors' and a 'Work-main-derrick by-hand' mentality.

2 A light, cheap, battery-driven propulsion unit to work with modified light jackstay searching equipment, as the laying technique of this jackstay is now in excess of the speed and endurance of U/W swimmers. This propulsion unit could also be used as the 'maid of all work' in general diving duties.

I will deal with the Deep Diving Submersible first. Now that the Deep Diving Trials Team have proved the feasibility of operating on the Continental Shelf, the requirement for a submersible is obvious, in fact I think, essential from the safety point of view. I can forsee a very nasty situation in the event of a hard surface blow, with the S.D.C. down. What then are the basic requirements ? With further trials in mind, I would say that a working depth of 1,500 feet would be a good beginning and the submersible should consist basically of the following compartments:—

(a) A submersible decompression chamber permanently attached and with access to

(b) a compression chamber, possibly the existing ten man C.C., also with access to

(c) a combined crew space/control room.

(d) Fitted around this combination would be the engine room, cylinders and batteries, which, in these days, can be free flooding compartments.

(e) To balance and control the whole, trim and compensating tanks would be fitted.

The craft would be about the same size and shape as the existing Deep Diving Vessel, *Trieste*.

The whole craft would be capable of being used as a mobile observation chamber at atmospheric pressure until the divers are required to exit for work. Limited mobility would be obtained by a battery driven engine, capable of a maximum speed of 5 knots for 24 hours running time. Vertical movement would be obtained by tanks operated by a pump, the craft being guided to and from the bottom by a winch wire. This then is the basic picture. (See sketch on p. 6). The 101 additional items to make this a safe going concern cannot, of course, be included in this article.

The envisaged swimmers propulsor would be a comparatively simple thing. A car-type or silver-cell battery, enclosed in a cylinder, would operate a motor driven propeller through a push button and have a life of 90 minutes at 1½ knots. Divers could operate it on all jackstay searches. The main advantages, of course, would be to:—

(*a*) Cut down divers fatigue.

(b) Assist in stemming tide.

(c) Extend the search area.

(d) Overcome navigational U/W problems, as compass, depth gauge and watch could be attached to the vehicle.

Here then is the case for the re-introduction of submersibles. So come on 'Lets Get With It.'

JAE RAY.

H.M.S. "Rhyl"

OUR story starts with *Rhyl* in dry dock at Portsmouth last January. The members of the diving team joined with the second phase on the 7th. The first thing to do was to get the team working together and this was achieved mainly at Horsea Island Lake in temperatures usually below 40 degrees F.

Our first laugh came when the Diving Officer — very safety conscious — was nonchalantly walking down the boat deck, swinging the 177 'Safe to Transmit' key — then, horrors — splash! — he dropped it! Luckily *Rhyl* was docking down again. Divers were piped to muster on the Q.D., gear was got ready and 'Wally the Bats' (it's his feet you know) wallowed on the bottom (in his natural element) came up with his toothless smile — and of course the key.

Portland loomed near and spirits dropped — the stories that get round! It wasn't so bad though — in fact, in a pleasant and humorous way [at times, the work-up for the diving team did exactly what was intended. We all learnt from our mistakes.

September 13th saw *Rhyl* leaving harbour heading for the Med. At Gib. we did a couple of dives, one of them exped. Each time the team leave the Q.D. the Cox'n can be heard screaming from the boat deck 'Lobsters' — but the poor man still starves.

From Gib. through exercises we went to Rhodes where there was good diving and a few specimens of amphorae sherds were found. More exercises followed and eventually, Malta, Naples and back to Malta for a fortnights 'rest' (?) after all the exercises. It is hoped to arrange an expedition with the help of St. Angelo boat pool and the good auspices of the F.C.D.T.

Our commission was originally phased MED./HOME, but, on sailing from Portsmouth, the Captain informed us that we were to do a stint on the Far East Station. We are looking forward to the diving in those clear and warm waters.

To all you diving types. Gurgle and (Hic!) cheers.

Rhyl Diving Team:—

Lt.-Cdr. Powys-Maurice
Sub.-Lt. Self
Midshipman Broadhurst
P.O.Wtr. Polkinghorne
P.O.El. Abell
L.M.(E) Amey
A.B. Walters
R.O. 2 Deveney
A.B. Hughes
R.E. M. Boulton

What the Sappers Really Do

FROM reports in the press and articles in Diving Magazines I'm sure most people have, by now, gained the impression that we spend most of our time either breaking new frontiers of science 6 foot under the water, or searching for gold at the bottom of Roman wells! We therefore thought the time had come to rectify matters by disclosing what the submerged Pongos at Marchwood really are up to.

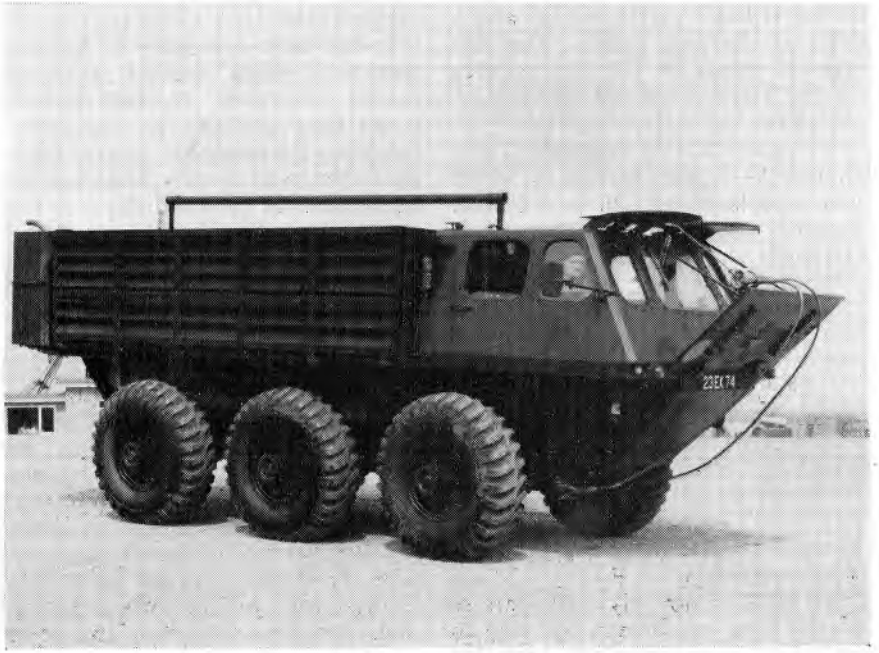
Traditionally, the sappers have always been responsible for getting the Army across water obstacles. This used to—and still does—involve bridging and rafting operations. However, it has now become clear that modern warfare demands a far greater degree of mobility over the ground than in the past, and of course, large concentrations at bridging or rafting sites create ideal targets. Amphibious vehicles that can cross water obstacles relatively unaided are therefore appearing in a variety of shapes and sizes. Some are still in the development stage, while others are already in service. These vehicles either have their amphibious characteristics built into them, like the Alvis Stalwart which requires no preparation before entering the water, or they rely on simple, quick adaptations to turn them into a 'boat'. Other vehicles, such as heavy armour, do not attempt the impossible but 'snorkel' along the bottom.

"Stalwart in Action"

In order for them to be used effectively various aids are required. Under this heading comes the diver, who must assist the vehicles both before and during a crossing: before, by carrying out a reconnaissance of the river, and during, by attending to any vehicles in trouble. The reconnaissance of the crossing site must include the production of an accurate cross-section of the river bed, measurements of bank angles, evaluation of the soil conditions on the river bed and the location of any obstacles. This then is our main task. In addition, there are many attendant jobs in connection with the use of amphibious vehicles, plus of course, the usual underwater searches, demolitions, etc.

The natural habitat of the submersible Sapper is therefore likely to be the murky depths of muddy rivers. This raises certain problems. It is extremely important that accurate work is obtained from the divers, and there is no need to emphasise the difficulties encountered in currents that can reach 4 knots, and visibility which is non-existent. New techniques and tools have therefore to be produced, and we are very grateful to the Admiralty Materials Laboratory who are helping in this work.

There is another branch of the Army which is also interested in underwater work. On July 15th the Royal Corps of Transport will be formed out of the R.A.S.C., the Transportation Branch of the Royal Engineers and other small elements from other Corps. This new Corps will be responsible for transport in the Army, including water transport. It will therefore run a variety of craft including the L.C.T. fleet. Divers therefore come into their own in the ship's husbandry role with under-



Stalwart with 'speast' board erected

water propeller changes, clearing fouled propellers, patching and all the other tasks which occur.

Diving Equipment

Since our diving commitments do not call for oxygen or mixture breathing, our basic set is compressed air. We adopted the Heinke Lung in 1961, which has proved remarkably satisfactory. Admittedly there are various improvements which could and should, be made, however, the set itself is giving good service all over the world. Its chief asset from the Army's point of view is that it can be tested and maintained by the divers. A considerbale amount of time is devoted to maintenace and fault finding on the courses, which is essential if divers are to keep their own equipment working when they are operating in small units.

To charge the cylinders we use the Dunlop compressor, which in this case differs from the Naval version in that it has a petrol engine, and a different charging panel. This has take-off points at 120 atmospheres for the Heinke set and 200 atmospheres for suit inflation bottles.

We expect that the Heinke will give another 5—7 years service by which time a replacement will be required. Basically the Army requirement is extremely simple. The set must be robust, reliable and must not need specially trained personnel to maintain it. As always, cost is another factor to be borne in mind, but this is unlikely to jeopardise obtaining the correct equipment. We can see no reason why the next generation of breathing apparatus used by the Army should not be joint service. A very good liason exists with S. of D. which could eventually lead to Army representation in A.E.D.U. Much could be done, not only to standardise on the basic equipment, but also to ensure the Army gets any specialist underwater tools it requires. A practical start has been made in the right direction with the Admiralty Materials Laboratory.

Training

All Army divers are initially trained at the R.E. Diving School. The basic course lasts four weeks and is similar to the R.N. Ships Diver's Course, except that the underwater tasks taught vary after the 'link cutting stage' has been passed. We also put more emphasis on fairly long surface swimming.

In addition we run instructors courses lasting 8 weeks. Having passed one of these a senior N.C.O. can instruct on a basic course after working for a period on the staff of the school. A diving centre has also just been opened at the Advanced Watermanship Training Centre in Kiel. This acts as a continuation training centre for divers in B.A.O.R. and also runs courses in the various sapper tasks.

It has been necessary to become somewhat single minded regarding course syllabuses. Nowadays there is no time available to teach anything but the essentials, and no space available to carry any non-essential equipment in a Field Sqn. The courses have therefore been tailored to thoroughly cover the essentials, but to cut out anything which is not imperative for the job in hand. As an example, Standard diving is now out.

In order to cater for the training a new school with heated tank, stores, workshop, classrooms, recompression chamber, etc., is nearing completion. In the meantime our temporary accommodation is bursting (literally) at the seams. However, there is alway room for navy blue visitors who will be very welcome, and remember, our beer is just as good as yours.

Diving in the Far East—

H.M.S. *Loch Killisport*

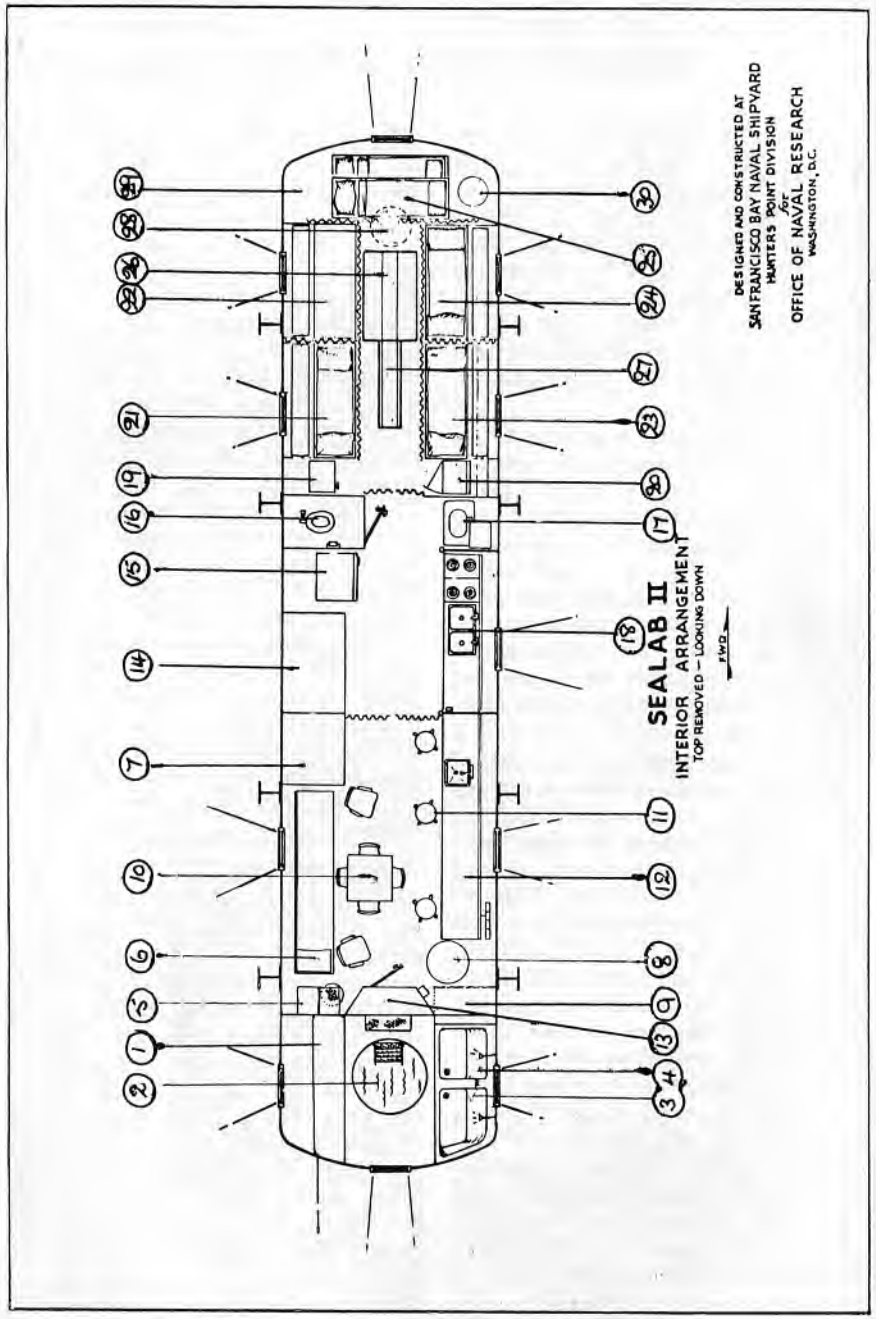
LOOKING back over our eighteen months in the Far East, I find that although we four Ships Divers have not spent a terrific amount of time under pressure, what diving we have done has covered a fairly wide range, and has mainly been interesting work. The pity is that many other jobs could have been taken on, had we not been limited to oxygen depth.

Our biggest and most interesting job came up last year during one of our many N. Borneo patrol stints. We were sent to the assistance of the Chinese freighter M.V. *Chopin* which was high and dry on a coral reef in the Sulu Arch. On arrival, the ships divers were sent to *Chopin* as part of the salvage team. On our first under water inspection run, we found her to be laying on four large mushroom-type pedestals of coral.

Her forefoot had been bent into a right angle, and was letting water into the forepeak. There was a dent on the port side, running from the forefoot to the bridge, one that you could have lost a sea boat in. The remainder of the port side from keel to water line was generally dented, plates sprung, and rivets missing or loose. The starboard side had got off lightly by comparison; it only had a few dents and some rivets loose, and a small slit in the after fuel tank.

The first job was to get the two foreard holds pumped out, so that *Killisport* could attempt to tow her off the reef. To do this, these holds had to be cleared of their cargo of peanuts and Ratan. In this part of the operation divers were used to keep the roses of the Snorer pumps clear of peanuts. It was quite amusing to see a 'Dip Chick' break surface through an almost solid mass of soggy peanuts, inside a ship's hold. Eventually, after a terrific amount of muscle work by one and all, the holds were cleared. We then found that the pumps were unable to hold their own with so many leaks in the ship's bottom. So the divers went down and commenced what turned out to be a long job of hammering in soft wood wedges into the sprung plates, slits, and rivetless rivet holes. It must be appreciated that for the whole period that the ship was on the reef, she was moving around in a swell. So we found that we would wedge a plate and at the next moment, another would open up or the just plugged would open wider and the plugs would fall out. Eventually the leakage was controlled so that the pumps could hold their own and *Killisport* could tow her off the reef and escort her back to Tawau.

While in Tawau we spent a few more days plugging up more splits and rivetless holes with soft wood and soft lead, while the chippy and his men cement-boxed the double bottom. Eventually the Insurance people gave her a clean bill of health and permitted her to proceed to Hong Kong to refit. It was interesting on our next visit to Hong Kong to see photos of *Chopin* in dry dock, showing clearly the wedges still in place after sailing from Tawau, North Borneo to Hong Kong. During the period spent working on *Chopin*, we dived a total of 61 hours between us. During our Borneo patrols we always



managed to get a variety of jobs, such as pulling handfuls of sea snakes out of our own inlets, coppering the bottoms of Malay Police Boats which had run over rough teak logs at night and stripped their skins, clearing foul screws and searching for small arms lost in the waters of border creeks.

However all diving was not carried out in the fast running muddy waters of Tawau. We often stopped at one of the small coral islands off the coast and went diving for pleasure. This is where we would have appreciated S.A.B.A. or S.D.D.E., as the vis, colour, fish and scenery must be seen to be believed. I could not attempt to describe them, unless I was a poet and an artist. So I am afraid that the limit of 25 feet left us rather frustrated at the time.

Other jobs carried out in Hong Kong were the laying of a new jackstays for the buoys in the boat trot, changing a 162 window on *Killisport* and generally keeping the ship's and basin's inlets free of plastic bags.

That just about covers our underwater activities for the commission to date, So from us to you. goodbye and good luck—see you down below sometime. Ship's Diving team consists of :—C.P.O. L. G. How,C.D.I., L/Sea Dave Haddem, S.D., Lea/Sea Mitchell, S.D., and Mechanician Albert Finnegan, S.D.

Sealab II Introduction

SEALAB II is the second in the U.S. Navy's 'Man in the Sea' project the ultimate aim of which is to make it possible for divers to live and work at depths of 1,000 feet. The first phase that took place last year saw 4 divers living and working for eleven days at a depth of 193 feet off Bermuda. Stage two which was scheduled to take place sometime during the summer of 1965 at La Jolla, California, approximately ½ mile from shore, was for two teams of men each to live and operate from an underwater 'home' at a depth of 210 feet for a period of 15 days each. It was also intended that two of the men would stay down for the whole period of thirty days. The two teams of aquanauts comprising of civilian scientists, engineers and marine biologists as well as naval divers, thus a varied and detailed number of tasks could be undertaken. The work each team would endeavour to complete while on the bottom included:—

(i) The installation of an underwater weather station for the measurement of currents, temperature, visibilities and pressure variations within 30 feet of the seabed.

(ii) The capture and close study of fish, fish tagging and observation of other marine life.

(iii) Human performance tests including those of strength, manipulation, co-ordination, assembly, visual and auditory. The results of these tests to be recorded and analysed.

KEY

(1) Swim Gear Stowage. (2) Entry/Exit to Sea. (3.4) Showers and Baths. (5) Television Set. (6) Lab Bench. (7) Fan Room. (8) Water Heater. (9) Can Stowage. (10) Table and Chairs. (11) Stools. (12) Lab Bench. (13) Comp' Lock. (14) Electric P'wr/Light. (15) Reefer Stowage. (16.17) Heads. (18) Galley. (19.20) Clothing Lkr. (21.28) Bunk Beds. (26.27) Folding Tables. (28) Escape Hatch. (29) Stowage Space. (30) CO_2 Can'tr.

(iv) The observation of individual behaviour within the 'home', a record of the reactions when living in a confined space and breathing an unusual atmosphere for a comparatively long period.

(v) Heavy duty task to include, salvage of a section of hull using injected foam technique, patching a section of damaged hull using a stud gun, securing of lifting pads to a heavy object and the evaluation of a collapsible salvage pontoon. The jobs would be subsequently tested and evaluated.

(vi) 'Bounce' Dives to a maximum depth of 330 feet.

The underwater 'home' is a cylinder 12ft. in diameter, 57ft. long and built to withstand a hydrostatic pressure equivalent to a depth of over 400ft. The hull is fitted with an upper conning tower access for surface use, and two accesses on its underside for use on the bottom. The normal entry when submerged is through the access in the after end around which is a shark cage, while at the forward end of the hull is an emergency escape hatch. Inside the hull is a concrete floor providing the fixed ballast, and around the upper section are four water tanks for the working ballast. The interior is divided into four compartments which, working from the entry hatch forward are—dressing and shower room, laboratory, galley and living quarters. The dressing room is separated from the laboratory by a special dam; this provides a water trap and for any

SEALAB II on barge at the Long Beach Naval Shipyard shortly before being put in the water for towing to La Jolla, California, and stationed 210 feet below the ocean's surface.

rise or fall of water in the access due to tide or barometric pressure variations. There are eleven portholes fitted round the hull, thus allowing observations to be made from inside the 'home'. The electrical power for heating and lighting and the running of equipment like the air conditioning unit, will be supplied from a shore station with an alternative supply available from the attendant surface craft. The breathing gas made up of 85% helium, 11% nitrogen and 4% oxygen will normally be supplied from cylinders secured to the outside of the hull, but an emergency supply will be available from the surface craft. A chemical CO_2 obsorber is fitted in the 'home'. The cables for the alternate power supply and the pipes for the emergency gas supply will be permanently connected from the surface craft to Sealab II, together with the necessary cables for communications, closed circuit television and the means for monitoring instruments within Sealab.

When positioned on the seabed the atmospheric conditions in the 'home' will be a pressure of 112 lbs per sq. inch, humidity of 60% and temperature of about 85°F. The rather excessive temperature is to allow for the loss of body heat due to breathing the predominately helium gas mixture. To keep the atmosphere reasonably fresh a special charcoal unit is installed to remove odours. A fresh water supply is laid on from the shore.

A porpoise christened 'Tuffy' is participating in the Sealab II operation, for the purpose of research into the training of sea mammals for underwater tasks. Tuffy has already been trained to dive on command to depths of 130 feet, to respond to an acoustic signal from a distance of more than 500 yards and to home on a diver at a depth of 85ft. It was hoped that by the time Sealab II project commenced, Tuffy will be able to carry a guide line to a lost diver, and carry messages and small packages between surface and diver and between divers on the bottom.

Two observers from our own Navy Department, one from R.N.P.L. and another from the Experimental Diving Unit, attended the Sealab II project. It is hoped that summaries of their observations will reach the Editor in time for this issue of the Magazine.

G.A.F.

Honeymoon Patrol

THIS ship was commissioned for a Home/Far East G.S.C. and just to be difficult was promptly sent to the West Indies Station.

It all started when the Team was busy clearing polythene bags from the ship's inlets while she lay alongside at Greenock. The Police drove up in a very smooth Jaguar and asked whether we would dive to look for a car reported a few berths away. Despite the chill water, we readily agreed. The spot selected was conveniently under the horns of Her Majesty's Ship *Barmaid*. (Can you imagine a better name or place for such operations ?) Very soon our divers emerged from the murky ooze and confirmed that there was indeed a vehicle there and to the police Inpector's obvious relief, it had to be admitted that there was no body in it. Since the wire plumbed almost exactly, the job of raising this 'heap' from twenty feet of water in the alongside berth was made easy.

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H.M.S. VERNON SUB-BRANCH. HOURS OF BUSINESS: FRIDAYS 1130-1230 HOURS

When the car eventually broke surface it was possible to detect words to the effect that Kilroy had once upon a time been around—or perhaps that was the missing body's name ?

The next highlight in our commission came by way of a dome change in which the ship's divers assisted. Unfortunately, this was in January when our minds were already in warm sunny seas but our leaking suits and numbed fingers proved otherwise.

The Haven of 'Berma-du; Ireland Island and the 'Trap' eventually loomed over the horizon and in fact each time they have done, so have jobs for the boys.

Our next visit to Bermuda was in February this year after a splendid time of chasing around the Bahama Islands in Gemini dinghies. Whilst on our underwater rounds one day, a large crack was noticed in one blade of the port propeller. This was no hairline crack but one through which daylight could be seen! Consternation clouded the Captain's face as the Diving Officer triumphantly surfaced holding a perspex tracing of the crack which was some 15 inches long. Since there was no dry dock available we were hoping to have a shot at changing the screw underwater while alongside in Bermuda. Perhaps fortunately for us, no aircraft could be found with sufficient endurance and capability of flying a spare prop. out to us. Much to the disgust of the ship's company the ship had to be steamed to Halifax, N.S. for docking. As the temperature dropped from 85°F to 6°F, so did the Diving Officer's popularity!

The ship arrived looking like a Christmas tree under 6 inches of frozen spray. We can guarantee that this is the only ship which frostbite has attacked whilst on the Bahamas Patrol! Since main steam had to be shut down, the ship rapidly became like an ice box and warmth was sought ashore. After the first night, the D.O.'s name was no longer 'Mud' and from the second day onwards Halifax was marked up as a 4 star run ashore. Our diving friends in H.M.C.S. *Granby* looked after us extremely well and we welcomed the opportunity to see how the other lads worked. It was with some regret that we left for the sunny south a few days later.

Our job of policing the Bahamas is certainly different from the normal run of work and it provides splendid opportunities for swimming in the clear waters around the uninhabited islands, topping up with 'rabbits' at the 'P.X.' in Key West and the occasional good run in Freeport, Bahamas.

We have acquired 3 gemini dinghies and 40 HP outboards to go with them for beach landing and boarding parties whilst on partol. With a few of our own mods. incorporated we now have an excellent diving boat for all types of work (including banyans). Our Team has become proficient in laying searches to find most things that people drop into the water, but perhaps it is work on our own ship's hull which has proved of most interest.

Like most ships of this class (Type 15), the old lady leaks a little, the latest addition being a hole in the sea tube main inlet. On two occasions the divers have had to remove the bars on the hull and a patch has been placed over the hole by crawling up the tube. (We have found our new toy, D.U.C.S., invaluable for this type of work. From the diving side, this operation has been a success, although the M.E.O. still has his

doubts. Currently, we are confidently waiting for the next hole to appear!

The ship recently went on a good will visit around the Caribbean. Amongst other places, this included stops at Cristobal (Panama Canal), Willemsted (Curaçao) and the Windward Islands. At Curaçao we made friends with the members of the local sub aqua club who were kind enough to take us diving. Here we were shown around a very beautiful undersea garden on the edge of a reef with many types of coral formations and, of course, fish galore. (Had we been suitably equipped the sickbay would probably been in business and the fish laughing their heads off.)

Towards the end of our cruise, we were inveigled into helping the electricity authority of St. Vincent to lay an underwater power cable across a narrow channel. This had its problems, the least of which was to get the cable to unwind from a reel in a very ancient barge. The subsequent sea bed inspection showed it to be well and truly laid as is the wont of our diving team—Press on *Relentless*!

Lt.Cdr. Welby, S.W.D.O.
Lt. Shaw, (Diving Officer), C.D.O.
L/Sea Eastland, S.D.
A.B. Massey, C.D.*
A.B. Beech, S.W.D.
A.B. Jameison, S.W.D.
M.E.1. Levett, S.W.D.

Underwater Escape from Aircraft—

TRIALS AT GLEN FRUIN

by Lt.-Cdr. E. A. BALDWIN, Royal Navy

TRAGICALLY each year aircraft ditching accidents take their toll of Royal Naval aircrew. In some cases, the aircraft crashes into the sea at speed and nothing can be done for the crew. However, operating from carriers, many of the ditchings are at low speeds resulting from aircraft engine failures on the catapult, catapult failures, arrester wires parting on landing and so forth. It is in these accidents that underwater escape systems can play their part. Leaving the pilot or observer to clamber out as best they can is not good enough for a variety of reasons.

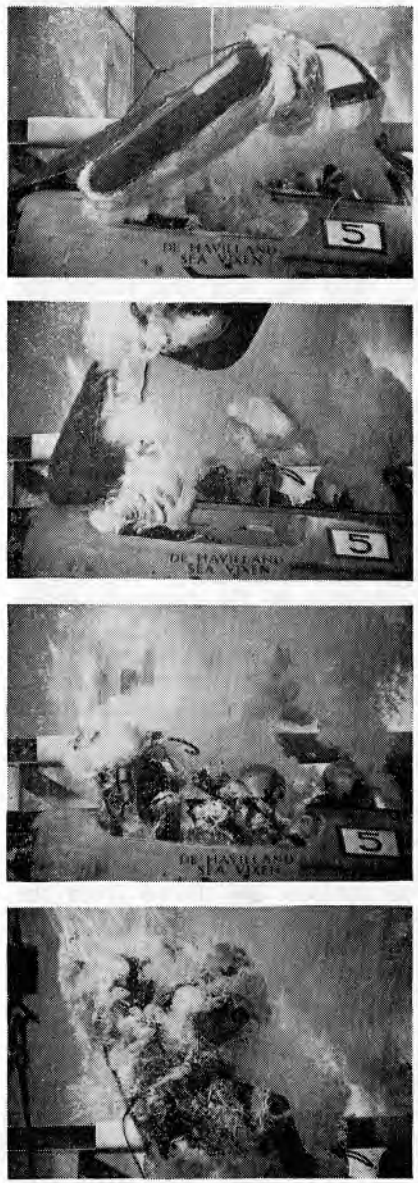
For example:

(*a*) The crew may be unconscious or semi-conscious following impact.

(*b*) Possibly shocked and panicked, the pilot may find even the simplest task impossible.

(*c*) Gone are the days of a simple aircraft seat harness with one or two connections to the man. The combined harnesses are complex and connections between the man and the aircraft include oxygen, radio, air ventilation for his suit and anti-G. These services normally pass through a single connector for simplicity.

(*d*) The cockpit is almost impossibly crowded with equipment and black boxes and the clearances between man and potential snagging hazards are measured in fractions of an inch.



Canopy Jettison and Underwater Ejection from Sea Vixen

It was decided, therefore, to instal in Naval aircraft an underwater escape system. This system, ideally would:

(*a*) Automatically jettison the canopy. An override would permit manual jettison.

(*b*) Automatically, with a manual override, eject the aircrew from the sinking aircraft, whatever the attitude of the aircraft, down to 100 feet.

(*c*) During ejection, sever all connections between the aircraft and the seat and inflate the pilot's life jacket.

(*d*) After ejection, separate the pilot or observer from his seat.

This is achieved by giving the appropriate aircraft firms a Ministry of Aviation contract to design and develop a system for a particular aircraft. The Mechancial Engineering Department at the Royal Aircraft Establishment, Farnborough, keeps a watching brief at this stage and advises as necessary. When the trial installation is complete and fitted into the cockpit section of the aircraft this department conducts proving trials of the system. These are carried out at the Admiralty Hydro Ballistic Research Establishment, Glen Fruin. Some of the tests are, initially, with dummies but the majority are 'live'. The subjects are drawn from the Mechanical Engineering Department and the R.A.F. Institute of Aviation Medicine and are all Naval divers. The senior medical officer from I.A.M. is responsible for the physiological aspects of the trial and the safety of the live subjects. Clearly the diving effort is more than just providing live subjects in tests of this sort and therefore H.M.S. *Vernon* is requested to assist. The number of divers asked for depends on the size and complexity of the trial, and among their numerous duties are preparing the fuselage and framework, maintaining a selected differential pressure in the cockpit during a test by operating a dump valve on the fuselage, assisting in the photography and, in particular, acting as safety diver for the live subject.

'Glen Fruin' is a small isolated Admiralty establishment in the hills between the Gareloch and Loch Lomond. The centre of the establishment is a large building which is one half offices and laboratories and one half tank. The tank is approximately 100 feet long 30 feet wide and 40 feet deep, contains 1,000,000 gallons of fresh water, and, on one side, consists entirely of plate glass panels. Any test can be controlled and witnessed, therefore, from inside the building. The top of the tank (where, unfortunately, most of the work is done) is open to the atmosphere and, in January or February, the temperature is far from temperate. The nearest town of any size is Helensburgh, ten miles away, and it is here that the team lodge in hotels, boarding houses or the Church of Scotland Canteen. It is the liquid resources of Helensburgh, also, that the teams attempt to drink dry during each trial—so far with a notable lack of success.

Each day at the Glen it is hoped to achieve one 'shot'. This consists of preparing the fuselage and perhaps carrying out a ballast run in the tank to confirm that the weights are correctly distributed for the aircraft attitude to be tested. The lighting, consisting of a number of verticle banks inside the tank, has to be checked and adjusted as necessary by diver. The cameras have to be made ready. Since nearly all the analysis has to be done by studying the films at slow speed or frame by frame, the photographic coverage is very comprehensive and would normally consist of:

(*a*) **Underwater**:

Two 16mm., high speed, black and white cameras.
One 16mm., colour camera.
(These are operated by civilian divers from the Instrument and Ranges Department of the Royal Aircraft Establishment, Farnborough.)

(*b*) **Through the Glass Side of the Tank**:

Two 35mm., high speed, black and white cameras.
One 16mm., high speed, black and white camera.
Two 16mm., colour cameras.

and

(*c*) **On Top of the Tank**:

One 16mm., colour camera.

The instrumentation, also has to be checked. This varies but normally covers such things as differential pressure across the canpoy, depth of water in the cockpit, indication of drainage pumps running, etc.

The hub of each test is the control room. Here the officer in charge and the Glen Fruin controller are situated. They are in voice contact with the tank top, the diving supervisory, the cranes and the external photographers. They are also in visual contact with the subject, the safety divers and the underwater photographers. Signalling to the personnel in the water is normally done by flash bulb or by use of the underwater lighting. One diver is briefed to do nothing but watch over the live subject. Incidentally the thumbs-up or thumbs-down signals are never used in these tests as confusion could easily arise in the vertical or inverted attitudes. The 'O' of O.K. formed by forefinger and thumb indicates all systems GO, anything else means 'get me out of here'. When the fuselage has been lowered into the correct position, the lights are switched on, cameras are started, the subject commences his 10 seconds count-down and then ejects.

All is then not over. A considerable amount of work remains in recovering the fuselage and seat, drying out equipment and preparing for the following day's shot. The day's events are discussed and any changes and improvements planned. These discussions are continued unofficially and informally into the evening over a 'wee half'. At the weekends, activities are varied. Most members of the team take a busman's holiday and go off to scarch for shellfish. Loch Fyne is a favourite site. However, canoeing and hill-climbing also have their enthusiastic followers.

To conclude, the trials described are memorable, not just because they are interesting and enjoyable, but because they are vital. Everyone feels that he is playing his part in saving life.

QUOTE OF THE QUARTER

From R.N.B. Divisional P.O. to C.D.3 joining Barracks:—

'Oh! a C.D. Why haven't you done a conversion course to ships diver ?'

Diving with H.M.S. Lion

SINCE the ship recommisioned in April 1964, diving operations on *Lion* have been varied and interesting.

Having shaken down the ship's diving team on service commitments and ironed out a few snags, we settled down to look forward to some diving in warm waters.

An expedition dive took place following our 'Med.' work up to give the divers a period of relaxation in pleasant swimming conditions. One of the ship's three-in-one whalers was loaded with the diving equipment, and left the ship one fine afternoon, motoring out of Grand Harbour along the coast to St. Thomas's Bay. On arrival everybody was keen to get into the water, and consequently there was some reluctance as to who should be the stand-by diver. However, this was soon resolved and diving began. The water was beautifully clear which made swimming and diving a real pleasure. The bottom was rocky interspersed with sand and weed. There appeared to be no fish in that particular area which was rather disappointing, as some of the diving team had high hopes of returning to the ship laden with countless varieties of fish and sea life. On completion of the diving everyone was ravenously hungry and ate with relish all the sandwiches and pieces of pie, which pusser had kindly provided, and drank large quantities of beer and lemonade.

The usual day to day diving jobs which arose were carried out with success and are listed below:—

a Inspecting seawater inlets of various pumps to ensure the gratings were not choked with weed.

b Surveying the Propellers, 'A' Brackets, Stern Glands and Zincs for signs of erosion and damage.

c Plugging sea-water discharges to enable repairs to be effected on eroded pipes and valves.

d Inspection of Sonar dome for suspected leaks.

e Cleaning the sea growth from the propellers before the quarterly full power trials.

On one occasion a Petty Officer lost his spectacles over the side in Grand Harbour, and came along to the diving Officer and asked if they could be found. He said that without them he was unable to read Daily Orders, and as they were the only pair he had, he did not know what to do. Fortunately they were found quite quickly and he was indeed most grateful.

An interesting and unusual diving operation was carried out off Comino Beach between Malta and Gozo. Previously a buoy had been laid by the *Aisne* to mark the boundary of some dangerous rocks which hazarded the entry of small boats going onto the beach. This had broken adrift during rough weather and *Lion*'s diving team were given the job of laying a new marker buoy on the same spot using the old sinkers, provided they could be found. This proved more difficult than anticipated. A buoy newly painted with red and white quarters complete with sinkers and wire was provided by the Boom Defence Depot at Malta, and a diving boat was kindly loaned to us by the Med. Fleet Clearance Diving Team. The divers set out early one afternoon from Grand Harbour and arrived some two hours

later off Comino Beach. Fixes were taken to put the boat in the position of the original buoy and the anchor let go. Circular searches were carried out from the bow and stern, but unfortunately proved fruitless. The boat was moved to a different position and new fixes taken. This found us in the middle of a string of crab and lobster floats from which we had some difficulty extricating ourselves.

The anchor fouled one of the pot lines and this had to be hauled in to free it. Eventually it was cleared, but by this time the pots were minus a few cork floats which had been neatly trimmed by the screw. Further fixes were taken and the boat anchored in another position and diving recommenced. The weather was gradually deteriorating and we found ourselves riding an uncomfortable swell from the sea, with the boat snubbing the anchor cable. More cable was let go and diving continued. Suddenly there was a muffled report and the boat started to drift astern, gaining momentum as she went. The divers were brought inboard and the engine started. Hauling in the anchor cable we found that the securing shackle on the anchor had parted. It was now a question of guessing where the buoy should be laid, and any thought of recovering the old sinkers was disregarded. Fortunately sometime previously a Maltese fishing boat had been seen rounding the rocky area and it was therefore known approximately where to put the buoy. The boat was taken to the spot where the fishing boat had made its turn and the new sinkers with the buoy attached was heaved over the side, making the diving boat fast to the buoy at the same time. The divers went down again to ensure the sinkers were lying flat on the sea bed and the line not fouled. Whilst they were doing this they discovered the original sinkers laid by *Aisne* not more than six feet away. We certainly couldn't raise them so had to be content with the knowledge that at least the buoy was in the right place and that we'd achieved what we'd set out to do, albeit with a little bit of luck.

Most of the 'Med.' diving has now been covered, except for the inspection of the bows, when *Lion* returned to Malta again after being in collision with one of H.M. ships on the Forth in Scotland.

The diving team have made several interesting visits to other diving centres and units, namely the French diving school at Toulon, the Royal Engineers diving centre at Kiel, where they carried out a beach survey and swam compass courses with the Army divers, the experimental diving centre at Alverstoke and the French Sub Aqua Club at Casablanca.

This has now brought *Lion*'s diving activities up to date. We look forward to the future with interest and anticipation and hope we shall get as much fun as we have in the past.

LION'S DIVING TEAM is as follows:—

Diving Officer Sub.Lt. Richards
CSBA Soulsby
ERA Honeychurch
Shpt. Bennetts
Shpt. Ling
M(E) Allison
Mech. Price
E.M. Zwart
Marine Mullett

Divers who have recently left us are Shipt. Stokes, who is doing the Artificer diving course at *Vernon*, M(E), Clayton who is qualifying as a clearance diver, and M(E) Coombes who has joined *Dolphin*.

M. T. H. RICHARDS
Eng. Sub.Lt.
Diving Officer.

Terror Diving

ONCE again a line or two from the F.E.C.D.T. just to keep in touch.

We had thought that a quiet period was forthcoming and just what we deserved, this was not to be. On the 15th March the Australian Mobile Clearance Diving Team descended on us, leaving all in their wake more than a little shaken, and breathless. Headed by Lt. Roberts and C.P.O. Jones this gang of marauders plundered and pillaged to such an extent that within a week we were asking them if we could please borrow some of our gear. Naturally they didn't do much, except drink gallons of our coffee and almost all of *Terror*'s beer. One of their gentlemen did leave his mark however, I believe he charged a Mercedes taxi head-on in a moment of exuberance and was seen wearing a plaster collar for weeks afterwards. I almost forgot to mention he was on foot at the time! We did manage to press gang half their team onto the M.F.V. and get them to Pulo Tioman, and in fact their assistance and humour was much appreciated during their stay which was all too brief.

On April the 12th at Nanga Gatt two helicopters had the misfortune to collide, so the M.C.D.T., being the only ones in the section at the time, flew at short notice to assist as best they could in what proved to be atrocious conditions. Six knot river speed, and nil minus visibility made diving well nigh impossible. Grappling and dragging operations were severley hampered by the current and sunken logs. Those of us that know Ted Crispin, here on known as stumpy, can get a more detailed account of this mishap for the price of a large 'bitter'. Having sorely taxed the patience of all concerned, we bade farewell to our cobber cousins on the 23rd May, and set about the mammoth task of squaring off the stores.

Since there is no rest for the wicked they say, the F.E.C.D.T. has been kept busy with Fleet exercises and propeller changes, interspersed with trips up the coast to mine hunt and to recover a helicopter which had ditched 45 miles N.W. of Penhang.

The latter proved to be a fruitless task as the aircraft had settled in more than 180 feet of water.

The parrots at Kluang once again had their mating season and were 'all shook up' when the boys visited the Quarry for demolition work and further development of the dam-cum-swimming pool.

Cracked dockyard walls and bubbles at night have received our attention as required; in addition we have perfected methods of searching the bottoms of various sized ships and floating docks. In June we were called to recover two bodies in a car from the Peirce Reservoir. It was not a very tidy way to commit suicide, according to the divers concerned. The following Saturday the complete organisation swung into action to search for a phantom frogman under a frigate in the Naval Base. Various other tasks have come our way, but at the time of writing they are still within the limits of 'classified.'

On the instructional side we are still hard pressed. It seems we now have all the R.N. out here so that classes are going through non-stop. Occasionally, we wonder if the Guzz and Safeguard staff are having a quiet laugh at our expense. No offence meant of course, but there

cannot be anyone left at home to train!

The arrival of C.P.O. Ernie Foggin brought us up to date on the latest news from *Vernon*, whilst Tom Norman is still attaching buttons to his No's 6 suit and insists on being called 'chief.'

We in the Far-Flung would like to add our wishes of success to the incoming Editor, and to express our appreciation to Gibbo for his past efforts. Having carefully studied the photograph of him in Vol. 12/1 we were surprised as we have always thought his structural frame would have been black like the rest of him, but the camera doesn't lie—or does it ?!

T.G.G.

Efficiency of Divers Breathing Neon or Helium at Increased Pressures

by Dr. PETER B. BENNETT,

Royal Naval Physiological Laboratory, Alverstoke.

IT is my intention in this article to consider some of the more recent experiments on the narcotic action of inert gases carried out at the R.N. Physiological Laboratory. The term 'inert gas' is used for gases which are able to cause changes either psychological or psysiological without undergoing any change themselves whilst in the animal or man. Thus the nitrogen in the air we breathe does not react in a biochemical function inside the body but is merely breathed in and out unchanged. The changes due to breathing such gases at increased pressures are considered in some detail in a new book by the author to be published in December.*

The well known effects of exposure to air at high pressure, the so-called 'narks' resulting in impairment of the divers performance similar to that produced by alcoholic intoxication, is caused by the increased partial pressure of nitrogen with associated factors such as the density of the gas breathed and the oxygen partial pressure. The latter cause an increase in the carbon dioxide tension in the body which increases the narcotic effects due to nitrogen.

Other gases, similarly inert, can also cause signs and symptoms of narcosis or even anaesthesia. The so-called 'Noble gases' Xenon, Krypton, Argon, Neon and Helium are all effective in causing narcosis or anaesthesia depending on the pressure at which they are breathed. Probably the best indication of their narcotic potency is given by the solubility of each gas in fat *e.g.* olive oil. (Table 1). The lower the solubility then the lower the narcotic potency of the gas. Helium has the lowest solubility of this gas series but due to its low molecular weight diffuses very rapidly, causing decompression problems. Xenon at the other end of the series is very soluble with a high molecular weight and will cause anaesthesia at atmospheric pressure.

* The Aetiology of Compressed Air Intoxication and Inert Gas Narcosis. Pergamon Press. Oxford.

The Narcotic Potency of Neon

The oil solubility values for neon have only just become available after difficult experiments both in this country and the U.S.A. These infer that the narcotic potency of neon should be between nitrogen and helium but rather more close to helium. The British Oxygen Company has very kindly donated a quantity of crude neon (80% neon/20% helium) to enable some preliminary measurements to be made of the true narcotic potency of neon.

Psychometric tests were carried out on 10 subjects breathing a mixture of 65·6% neon/16·4% helium/18% oxygen at 7 ats.abs. (200 feet) giving a neon partial pressure of 4·8 ats.abs. (152 feet). This was compared as to narcotic potency with the same nitrogen partial pressure by exposure to compressed air at 5·7 ats.abs. (190 feet).

The tests used were those with which many of you who have been to R.N. Physiological Laboratory will have done at one time or another. In passing it may be a suitable time to remind those of you that are required to do these tests that they are not, as so many of you seem to think, tests of your intelligence. We are merely interested in the **comparative** performance on a percentage basis between that on the surface and that at depth under varying conditions. Many of the tests may not seem very related to the practical arts of diving. However they do tell us a great deal about the **comparative** efficiency of the diver whilst exposed to various environmental conditions. As such they are of significant value in pushing forward the frontiers of diving and their use should never be underestimated nor taken too lightly!

The tests in the neon experiments were simple arithmetic *e.g* 89×6, excluding 0, 1, 5 and multiples of 11 and a co-ordination test requiring ball bearings to be picked up with tweezers and dropped through a small hole. The neon/helium/oxygen mixture was supplied from a cylinder inside the pressure chamber to a non-return mouthpiece via a reservoir bag. The average percentage change in performance compared with that on the surface is shown in Table 2. It may be seen that breathing air, there was a 12—15% fall off in performance, compared with little or no effect with neon. Indeed, breathing noen, the subjects did better with the ball bearing test than on the surface. This is what we would expect if there was no narcosis because on repetition of the test, learning factors tend to improve your score. Additional tests at 10 ats.abs. (300 feet) on 2 subjects showed a similar improvement. The number of sums correct improved from an average 8 on the surface to 11·5 at 300 feet whilst breathing the neon mixture. Similarly the number of sums attempted increased from 10 to 12 and the number of ball bearings in the tube from 11·5 to 13. There were no sensations of narcosis. Moreover, whereas the men breathing neon had no decompression difficulties, the attendant on air developed severe itching, rash and acute niggles.

Recently Dr. Schreiner of the Union Carbide Corporation, U.S.A. (Ocean Systems Inc.) exposed 2 divers to 20·7 ats.abs. (650 feet)

breathing neon with no marked psychological changes. As with helium, speech was distorted, but was still intelligible.

The very poor solubility of neon accompanied by its high molecular weight meaning a slow rate of diffusion, make this an interesting diving gas. These factors indicate that it may be more suitable than helium as regards decompression sickness and it has a similar low narcotic potency. The question of the cost of this gas in large quantities compared with helium is still however being discussed but there can be little doubt that we have not heard the last of neon in diving.

Efficiency Whilst Breathing Helium during Deep Diving

Based upon the sensations and performance impairment found at 4 ats.abs. (100 feet) in men breathing air, similar narcotic levels should theoretically be present at 450—500 feet breathing helium/oxygen. Narcosis equivalent to 300 feet on air should be found in men breathing helium/oxygen at about 46 ats.abs. (1,350 feet). These depths will vary rather widely due to the sensitivity of the individual plus the added effect of retained carbon dioxide due to the increased oxygen partial pressure and density and viscocity factors. It is the view of Hannes Keller, that 3 ats.abs. (1,000 feet) will probably be the limit of helium/oxygen diving and he, after all, has been there and knows what it feels like.

During the deep diving experiments at the R.N.P.L., psychometric studies were made on divers at 19·2 ats.abs. (600 feet) and 25·2 ats.abs. (800 feet) whilst breathing 5/95 oxygen/helium. The tests used were arithmetic and the ball bearing test as already described, together with a multichoice reaction time test.

After a test at atmospheric pressure the men were tested as soon as possible on arrival at depth. In the 600 feet experiments another test followed an hour later and every half-hour subsequently until decompression 4 hours after the start of the dive. A further test was made at 300 feet during the decompression.

Four of the six divers showed marked impairment of their performance at 600 feet, which was sometimes accompanied by dizziness and nausea. In some cases the decrement in performance was as much as 60% in the ball bearing test and 50% in the number of sums correct. The reaction time test was not however much affected. A marked tremor of the hands, arms or even the whole body was often noted. Its presence was emphasised by the fact that the most marked impairment in performance was at the ball bearing test. The tremor has been labelled the 'helium tremble'. After the first hour or so at pressure there was a gradual improvement.

The tremor and dizziness were also present in subjects who showed only slight impairment at the tests but they seemed able to exert enough self-control to overcome this handicap. When the men worked hard on a rowing machine inside the pressure chamber they generally felt better. Similarly in the sea trials from H.M.S. *Reclaim* off Le Lavandou, the 'helium tremble' was seen to cause difficulty in adjusting straps and headgear.

This would not seem to be classical inert gas narcosis or 'narks'. The fact that this condition is most severe during the early part of the dive followed especially on working, by a slow improvement, the dizziness and the tremor are all unusual features. The most likely cause would seem to be changes in the acid/base balance

of the body due either to an increase or decrease in the body carbon dioxide.

Further experiments with 4 divers at 800 feet showed that the performance impairment was still more severe. Indeed the increased impairment between 600 feet and 800 feet (Table 3) is so severe that 1,000 feet would seem to be the limit of oxygen/helium diving unless we can discover the cause of the impairment. The levels found at 800 feet are comparable with those found at 300 feet in subjects breathing air. As these dives were of only 20 minutes duration it is not known if or how long any improvement would take to occur with time.

Other experiments at 300 feet and 400 feet in men breathing oxygen/helium show that tremor and performance impairment also occur at these much shallower depths. However the deterioration lasts only some ten minutes before improvement and it is naturally not so severe. This then seems to be a new phenomenon in diving and one that will require much careful study in the future to determine its cause and the method of prevention.

Table 1. Solubilities and Molecular weights of some inert gases compared with narcotic potency.

Gas	*Molecular Weight*	*Solubility in Oil*	*Narcotic Potency*
Helium ...	4	0·015	least
Neon ...	20	0·019	
Nitrogen ...	28	0·067	
Argon ...	40	0·14	
Krypton ...	84·7	0·43	
Xenon ...	131·3	1·7	most

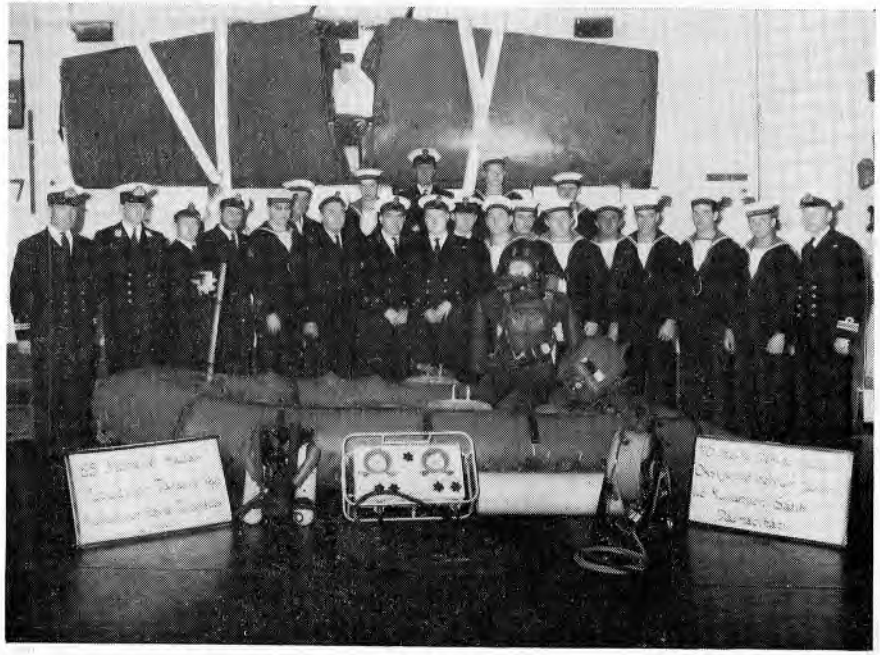
Table 2. Comparative deterioration in performance of 10 subjects exposed to a similar partial pressure of either nitrogen or neon.

	Nitrogen (Air 190 feet abs.)	*Neon* (65·6 Ne/16·4 He/18 O_2) (233 feet abs.)
Number of Sums Correct ...	—12%	—3·3%
Number of Sums Attempted...	—12%	—1·7%
Number of Ball Bearings ...	—15·6%	+2·7%

Table 3. Relative percentage deterioration in performance in men breathing 5/95 oxygen/helium.

	Mean of 6 Divers at 600 feet	*Mean of 4 Divers at 800 feet*
Number of Sums Correct	—18%	—42%
Number of Sums Attempted	— 4%	— 6%
Number of Ball Bearings	—25%	—53%

Centaur Diving



The Team

Lt.Cdr. J. M. Bingeman (Diving Officer)
Lt. R. K. Ledsom
Mid. D. J. Gregory
Ch. Mch. B. P. Nicholls
R.E.L. Mch. G. Smith
P.O. R. J. McConnell
E.R.A. A. Ratcliffe
E.R.A. F. Muscroft
Mech. S. Robinson
O.A. G. H. Plant (Diving Maintenance)
L.A. D. R. Kincaid (SAR Diver)
E.M. (Air) R. E. Ricquish (SAR Diver)
L.S. P. McCormick
L.S. E. A. Hartley
L.S. J. M. Simpson
A.B. M. Hammel (Diving Storekeeper)
A.B. G. S. Haydon
A.B. T. S. Galliford
O.S. P. Astle
M.(E.)1 D. Mulley
M.(E.)1 W. P. Dives
Ck.(S) A. Percival
N.A.M.(O) T. Short

ONE year has elapsed since '*Centaur* Diving' appeared in this magazine. The Team, though broken up and drafted, can look back nostalgically on happy occasions and underwater adventures throughout the world. I'll now try to recall a few of the lighter moments and incidents from the latter half of the commission.

The ship's geminis have been a god send, and without them many of the diving occasions would never have occurred. To find reasonable diving conditions at Singapore, members of the team on five occasions transported two geminis by lorry to the Malayan R.N.V.R. Base, K.D. 'Singapore' on the south side of the island. Their jetty makes a useful launching site for the trip to the 'Two Sisters,' two rocks five miles south of Singapore.

Lost articles recovered have topped the list of successes, and earned many a 'tot'. However, one diver was really seen off when N.A.A.F.I. lost a crate of beer from the gangway storing chain. The said box was quickly brought up only to have mysteriously changed to twenty four cans of fizzy lemonade! Another incident concerned the worried First Lieutenant of a C.M.S. who somehow managed to let go both ends of his anchor cable with a reputed Rate Book value of £118 per shackle. He was greatly relieved when the Diving Officer found the missing cable.

At ships husbandry the team was most successful, and in many cases helped to prevent a premature docking. Noted jobs were as follows:—

'B' Evaporator seacock sealed on two occasions; the port rudder which nearly did a *Victorious*; and the starboard stern gland which was externally sealed for the Engineers to carry out internal repairs. By the way don't complain that your attendant R.F.A. is too slow or you will find yourselves polishing their propeller on a Saturday afternoon at Subic Bay! However, we were credited with improving her speed by one and a half knots.

The final six months have been a complete contrast from the 'Fighting C's' active role at the Lakonia Incident, Tanganyika mutinies, Aden Radfan air strikes and Malayan Confrontation which highlighted the first leg of the commission. This excitment has been replaced by a pleasant higher harbour/sea ratio and the divers have sampled the delights of 'Med.' diving. Unofficial wreck diving was a new adventure to many of the team, and Gibraltar sub-aqua shops have done a roaring trade in spear guns. The diving store keeper was kept busy bulling up the equipment for the hanger display at Instanbul shown in the team photograph.

Recreational diving in this ship has proved a popular and worthwhile pursuit, and a termendous stimulus towards raising the standard of diving. While I'm not advocating this to replace regular training on the ship's bottom, it has enabled many of the divers to obtain four or five dips per month.

Submarine Escape Trials

PART II

READERS of my last article on this subject must have thought that I was illiterate: I have now learnt that the draft for a lecture does not make a good magazine article.

So much for laziness.

The last instalment of the escape story left the Submarine Escape Training Tank trials team having completed the 200 foot series, and hoping to get approval to go on to 450 feet.

This was granted and Upshot Four was planned.

The success of the 200 foot trials had proved that the stysem, which includes the Single Escape Tower (S.E.T.), the Hood Inflation System (H.I.S.) and the Submarine Escape Immersion Equipment (S.E.I.E.) Mark VI (a modified immersion suit with detachable hood) was good. A prototype S.E.T. was therefore built in the Submarine Escape Training Tank building, but not in the main tank. To provide 600 feet of water for flooding the tower a large air loaded water reservoir was built and connected to the tower flood valve. The 'depth' can therefore be selected at will by varying the air pressure. As there is no 'sea' round the tower, the top hatch cannot be opened when the chosen depth is reached, so, instead of a steady and pleasant ascent through the sea to the surface, the occupant gets rather a variable decompression at an average of 9ft./sec.

Another artificiality is caused by the shore use of the Hood Inflation System. This system provides air at 1 P.S.I. above tower pressure. While the tower is being pressurised all is well, but on reaching depth the H.I.S. keeps on supplying 1 P.S.I. more, and more again. At sea, of course, the top hatch opens and the build-up does not occur, but in the S.E.T.T. S.E.T. the unhappy occupant is very liable to get swept on at an ever increasing rate well past his intended depth. As the H.I.S. is busy on these occasions trying to catch up with itself, no cool fresh air reaches the hood and the heat of compression causes 'Baked Face'. This is not as bad as it sounds, but I choose this name in the true tradition of divers ailments like the Black Froth, the Chokes, etc.

On occasions these runs ended with either the hood collapsing onto the face of the man inside or water coming up inside the hood and covering his face. With the pressure coming on fast and with no means of inhaling, this was an unhappy experience for our team members. Sometimes the H.I.S. failed earlier due to another unforeseen artificiality. However, it was known by all of the team that, taking a deep breath at Atmosphere, they could go to at least 4 Ats. without further air. (This is the equivalent of taking a breath at the top of the S.E.T.T. and dropping straight to the bottom, an everyday practice). In the same way, with lungs full at 3 Ats. (66ft.) a man can go to 12 to 14 Ats. (350ft.—450ft.) without inhaling further, and without damage.

As the hood did not ever collapse instantly, and the occupant of the S.E.T. always had his lungs full at least until the pressure had risen to 3 Ats. or so, this was good enough to go the maximum depth expected in the trials. Knowledge of this didn't make these incidents any more fun, all the same.

As for rates of compression, 0ft. to 450ft. in 15 seconds is about as fast as a man should be put under pressure if he is going to be sure of clearing his ears. In trials we stuck to around 25 seconds for this depth so that we would have no ear trouble.

The limits for pressurisation and de-compression are difficult to establish without 'wastage', but 0ft. to 315ft. in 8 seconds was achieved through a mechanical failure and only resulted in perforated ear-drums and 85ft. to 0ft. in 1 second was done with no damage. This last was done totally immersed and it is a peculiar sensation to blow a 20 litre bubble in a second.

The trials team arrived in Malta in very good shape despite the work-up and it took a long weekend in Malta to change all that. By our second day there the Doctor was getting worried. He and I did some investigation that evening in some of the bars but found that all was fairly well, though we did hear one member saying over and over 'If we can do these escapes, *anyone* can'.

In fact, when the trials started all were 100% fit.

Of the actual trials little need be said. We worked from H.M.S. *Orpheus* moored between two buoys on the 100 fathom line: by adjusting her bow and stern ropes she could adjust her depth.

The series at each depth was preceded by one or two unmanned runs on the tower to check the pressuration rate, then manned runs continued until the whole party of ten had gone.

As each man surfaced he was met by a Med F.C.D.T. gemini and taken to *Miner VI* where the pot was rigged. During the first series at 100 feet the F.C.D.T. manned the S./M. casing to control the press photographers. Despite this, one lensman got above the hatch and an escaper nearly scored a bulls eye. This so unnerved the former that he pointed to the surface mouthing complaints about being hazarded. I await a D.C.I. on this — 'C.O's of sunken submarines are to ensure that escape towers are not pointed at pressmen. No escapes are to be made until the range is clear'.

Deeper than 100 feet it was uneconomical to keep divers on the casing, and escapers were watched leaving the upper hatch on closed circuit television from inside the submarine. This excellent aid worked perfectly throughout, operated and maintained by Messrs. Thacker and Johnson of A.U.W.E. The Underwater floodlights were less successful but did well enough. The film they took is startling since the camera only ran for the actual exit and the apparent rate of fire is about 10 seconds per man, rather like an underwater Keystone Cops film.

The average escape was in fact as follows:

1. Dressing escaper — less than a minute (and not counted in total cycle time as each man should be dressed well ahead of his time).
2. Escaper enters tower, plugs into the H.I.S. reports ready. Hatch shut. 30 seconds.
3. Tower flooded to vent height at 1 At. 30 seconds.
4. Pressuriation after vent is covered or shut. 25 seconds.
5. Hatch open — exit. 4 seconds.
6. Shut hatch. 20 seconds.
7. Drain tower. 1 minute.

8. Various delays for checks of valves and hatches, last minute inspection of escaper. 1 minute.

Total time for one complete cycle 3½ minutes. which can be speeded up to 3 minutes.

It is interesting to note that a man at 1 At. in a submarine at keel depth 500 feet may, 90 seconds later be on the surface. (Keel depth 500 feet = Escapers depth 475 feet).

Altogether 86 ascents were made from between 100 to 500 feet.

To prove that this escape method does not need special training, a party from H.M.S. *Orpheus* made ascents from 75 foot then 100—125 feet. They all enjoyed it so much that they asked for a 200 foot run. However, time did not permit, and when they had done 200 feet they would have asked for 300 feet and so on. One of the *Orpheus* team wore his spectacles throughout.

This performance set the seal of approval on the system. One of these days we shall hear of the ship's company of a submarine say to their Captain, 'Please, we don't want a make and mend, we want to go to sea and do some escaping'.

The Med. F.C.D.T. were very hospitable and helpful all the way. They were most correct in their saluting too; at least, underwater. I never saw a salute in air (though I'm sure they must do it) but they had countless photographs of themselves saluting underwater; in the bridge of *Orpheus*, on the casing, swimming by or leering into the ever-open eye of the telly. Perhaps it is because the right arm underwater weighs less and can therefore be raised more easily? But what about drinking? Divers drink much more ashore than underwater.

We were all very happy to have them looking out for us, and to know that we were being picked up by people who know what the problems were.

In the event we had no trouble at all except for a bruised ear and a bit of sun-burn.

What for the future?

We are now having a training S.E.T. fitted in the maintank at *Dophin* and proposals have been made for experiments and trials from deeper depths.

H.M.S. "Repulse"

DURING May this year, the Far East Clearance Diving Team had the very great and possibly unique privilege of carrying out a brief diving survey on H.M.S. *Repulse*.

Approval for this operation was granted on the grounds that it would be good training value as well as being of unusual interest. Although *Repulse* is not officially designated as a War Grave it is regarded as such and stress was placed on the requirement that the ship was not to be entered and nothing was to be disturbed externally. This trust was faithfully observed.

H.M.S. *Repulse* lies some 45 miles N.N.E. of the island of Pulo Tioman off the East coast of Malaya. Being so far from good navigational aids the initial location of the wreck had to be carried out by a suitably equipped Frigate. H.M.A.S. *Yarra* was the one chosen for the task. Her mission was successfully carried out

and a datum dan buoy was laid some three days before diving operations were scheduled to begin.

The location of this datum marker by H.M.S. *Barfoil* (acting as Diving Support Ship) and M.F.V. 164 (with the Diving Team embarked) was initially thwarted by rough seas and heavy rain and it was feared that the marker might have dragged well clear of the wreck or even have sunk.

Fortunately H.M.S. *Ajax* was in the area on her way back from Hong Kong and was able to assist. She located the marker and confirmed that it was still close to the wreck. By this time daylight was fading and the first day's work had been lost. However, *Barfoil* had laid a very accurate heavy marker alongside *Repulse* and diving was able to commence the following morning; which was, happily, a calm and clear one after the previous day's storm. Of the 5½ days remaining one more was to be lost due to rough weather and, in the closing stages for no accountable reason, the tide changed its working pattern and ran more strongly, further hampering diving operations.

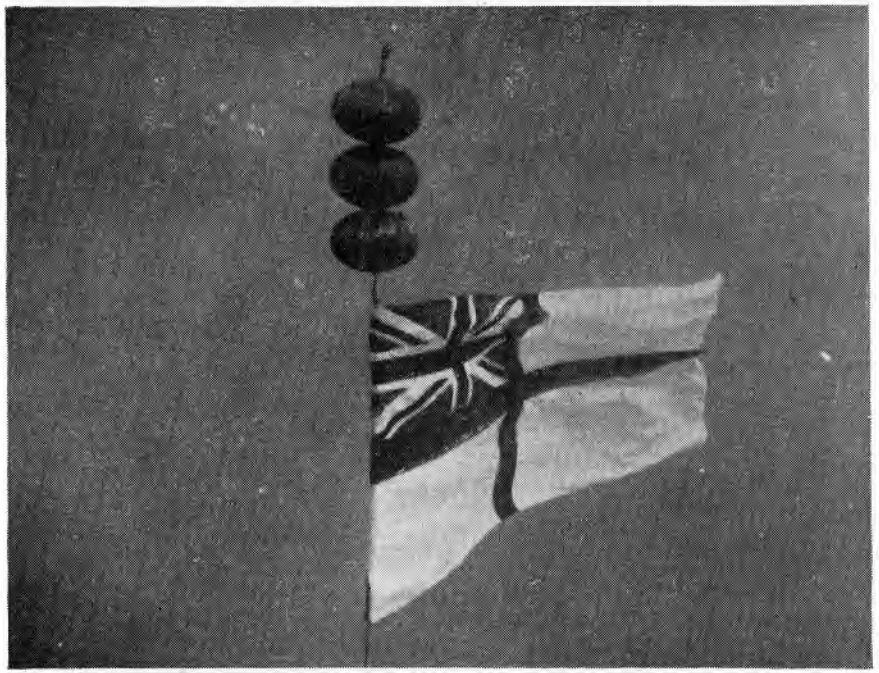
Diving conditions, generally, were excellent. The water was very clear and, needless to say, warm. In fact, underwater visibility was so good that the silvery shape of *Repulse* could be seen from the surface of the sea through a face-mask, before the sun rose too high and veiled her with the increased reflection from the mass of particles in the water.

Those that claim to have seen *Repulse* from the air and to have clearly seen her mast are mistaken and have in fact seen the shadow area cast by the bulge keel. For this majestic and awe-inspriing ship lies on the sea-bed almost completely capsized to port with her starboard bilge keel uppermost and her decks under-hanging the horizontal by about 30 degrees. She lies in a mean depth of 180 feet with the stern in slightly deeper water of 196 feet, perhaps caused by a tidal scour created over the years by prevailing ocean currents. The bows lie in a heading of 196 degrees (true) which, were one to extend it on a map, ironically passes through Singapore from whence this magnificent ship set out on her ill-fated mission 24 years ago this December.

The hull is in very good condition with remarkably little marine growth other than a scattering of sea eggs, a few anemones and small clams about 8 inches across. On the wooden decks, which are bleached white and have lost their caulking, hang a mass of oysters. Fish life abounds and the first customers normally seen on the way down were large shoals of barracuda, static and staring with those big beady eyes. Highly coloured angel fish and parrot fish were always present around the wreck and also, occasionally, larger and more fearsome inhabitants in the form of big grouper (or Jew fish) over 6 feet long, twice as broad as the average man, and having a viciously spiked long dorsal fin. These parochial creatures were given a wide berth, needless to say.

The only sign of action damage was a large jagged hole some 20 feet aft of and slightly above the starboard bilge keel from which twisted pipes and machinery grotesquely protruded. The theory put forward that the 15 inch turrets fell out when the ship capsized is certainly not so in the case of 'Y' turret, which was seen to be properly in place and trained aft.

It was our intention, had *Repulse* been upright and her mast intact, to replace her battle ensign prior to leaving the area. As this was not possible, a mast was made up of a 60 foot span of dan wire supported by three elliptical floats instead and this was 'keel hauled' into position and secured to its own part round a propeller shaft. From this 'mast' and immediately below it was sewn a six breadths White Ensign which was last seen proudly billowing out in the tide. D.P.R.L.



"Follow on To"
Living in 'Sealab' II

by C. C. WILTON-DAVIES, *R.N. Physiological Laboratory*

MOST people know by now that Sealab II was a technical success, but few people outside the teams would be quite sure how to answer an invitation to stay in Sealab III. To assist in this task, I went to great trouble and expense to pick up some tips on the art of living in Sealab when I was really supposed to be observing the scientific side of the experiment in September.

To begin with — getting up in the morning. It was found necessary to keep within reach of a good handhold for the first few minutes of every day. The tendency to fall over was very strong until the mind could adjust itself to the realisation that the walls really were not vertical, and that it was unwise to try to stand up parallel to them. This of course was simply due to the sloping seabed, which made the teams christen

Sealab the 'Tiltin' Hilton'.

Communications were very much better than in Sealab I, and no undue sense of isolation was experienced this time. The telly could be watched off duty, and the Sealab was linked to the public telephone system. Many wives must have been immensely comforted by being rung up at night to hear 'Quack, quack, quack, quack'. Of course, business calls to the surface could go through the unscrambler and these were easily intelligible, helped both by the unscrambler and 20% nitrogen in the atmosphere breathed. In addition to these speech links was a fascinating device called an Electrowriter. The sender merely writes his message on the flat bed of the instrument, and a pen at the other end of the line reproduces it, handwriting and all. Drawings can be transmitted in the same way.

As well as nitrogen, the atmosohere in Sealab II contained 75·75% helium and 4·25% oxygen. The high thermal conductivity of the helium meant that the temperature in Sealab had to be kept up to 80° or 90° Fahrenheit for comfort. The amazing diffusing power of helium brought another problem; T.V. cameras were mounted in Sealab so that the surface team could keep an eye on things, and these were in oceanographic cases tested to pressures of 20,000 feet of sea water. The helium managed to get in through the 'O'-ring seals and extra grease, and once inside, its high thermal conductivity altered the electronic focus of the cameras and destroyed the picture. Eventually the cameras had to be taken outside so that they peered in through the windows; this was more to their taste, and they behaved perfectly afterwards.

The low oxygen content removed all risks of fire — it was found impossible to light cigarettes and candles, and an electric stove was provided for cooking. The helium conducted the heat away from the elements so fast that they would never glow, and a number of minor burns were sustained while seeing what had gone wrong with the stove. Again because of this, water could not be made to boil, although this was probably a good thing. Boiling point at that pressure is about 300° F, and the water temperature actually achieved of 284° F was high enough to reduce cooking times to seconds. Food of course was a major topic of conversation, and there was great despondency when it was found impossible to cook pancakes. Tastes had to change in many little ways; some painful experiences with tongues being sucked into airspaces of boiled sweets produced an early requisition for jellybabies.

The good communications and the mixed team — no, no women, just scientists and engineers to leaven the divers — helped to keep morale high, but visitors were always welcome. One of the most popular was Tuffy, an Atlantic bottlenose porpoise flown 150 miles by heilicopter just to drop in on the divers Tuffy was quite capable of earning his keep though; in one test, he brought down a bag of tools to Sealab, waited while one end of a line was attached to his harness and took it out to another diver 75 yards away on the bottom before surfacing after a total time of one minute 10 seconds. This was only a test, but the second man could really have been lost, with visibility at 25 feet.

Tuffy made a number of other, less spectacular tests around Sealab, but the result of one of his dives exceeded expectations. Curious about what was going on down there

that was so interesting to a porpoise, a wild sealion decided to have a look inside Sealab as well.

The U.S. Navy is very interested in porpoises, and many expect them to become as useful to the diver as the dog is to the policeman or security guard. I was fortunate enough to be allowed in to the Naval Missile Centre at Point Mugu, where about a dozen porpoises of various species are under training. In one tank were a pair of Tuffy's close relatives, Pacific bottlenose porpoises, Alice and Dash. Both took a great interest in me as a new arrival with a foreign accent, and Alice obviously took a fancy to me. She brought a plastic hoop over to my side of the pool and left it floating near my hand. Like a true gentleman, I pretended not to notice (Dash was bigger than me and had far more teeth), but Alice thought I was playing hard to get, and spat a mouthful of water at me. I took the hint and threw the hoop, and Alice was soon showing me that she could throw back as well as fetch the hoop. I often wonder if she yet has enough experimental evidence to decide whether British men are better training material than Americans.

Certainly porpoises and men seem to be learning from each other, and it is difficult to decide which has more to offer. A blindfolded porpoise can distringuish between a ball bearing $2\frac{3}{8}$ inch in diameter and another $2\frac{1}{2}$ inch when both are falling through the water, so they have a lot to teach us about sonar. It is difficult to know what to offer in exchange. Porpoises respond to rewards and incentives rather than to punishment in training, and it is common to give little presents of fish for good behaviour. During some tests with porpoises in the open sea off Hawaii, however, divers found that carrying a bag of fish, when the porpoise escort was on detached duty, seemed to attract too many sharks for peace of mind. After some negotiation, the porpoises agreed to accept plastic tokens which could be exchanged for fish when the porpoises purse was full. They'll be paying income tax next.

I have been promised some tapes of porpoises noises recorded in known situations like capture, release, feeding, etc. The idea is to play them back to British porpoises to see if they speak the same language. Mating calls were included too — I shall have to be careful to whom I play those. I shall end up being chased by a school of males carrying placards 'Yankees go home',

It is hoped that this guide will help those who have to decide whether or not to stay in this type of 'hotel'. No document of this length can claim to be comprehensive. This one is at least unbiased, since I could not afford to lose my observer's status by actually going down to Sealab.

Experiments with Crocodiles

DURING 1964 the Sub-Aqua sections of the Salisbury and Bulawayo Police have often had to dive in crocodile waters. It was therefore decided to conduct experiments to determine whether 'crocs' could be scared away by noises made either by the diver or his attendant on the surface.

A suitable floating cage was constructed for the diver big enough to give him movement and also to contain some 'noise making' gadgets.

The tests were divided into two parts:

(*a*) to find the effect of underwater noises on crocodiles.

(*b*) to establish the psychological effects of crocodiles on divers, i.e. increased excitement automatically increases breathing rate, therefore using up the air supply more quickly.

An 8 foot crocodile weighing 500lbs. was used for the test. This was put in a swimming pool and the cage was lowered into the water complete with diver and noise-making gadgets. Each noise gadget was tested and the reactions of the crocodile were noted via a D.U.C.S. worn by the diver and connected to a recorder on the surface.

The cage was then moved closer to the crocodile and the tests repeated, and in the end members of the team were able to swim free within three feet of the crocodile. During the tests, photographs were taken and it is understood that these will be available in due course. Although the results of the tests are not conclusive, all members of the team were satisfied that crocodiles do not present as great a danger as was at one time thought.

Note:

It was interesting to note how long a crocodile could stay submerged before surfacing to fill its lungs. The experts claimed this was no longer than 30 minutes, but this particular crocodile surfaced once every three or four hours.

Observations:

If you are working on an accoustic mine and you meet a 'croc' you have the choice of two evils:

(*a*) Make a noise and get blown up.

(*b*) Keep quiet and add yourself to the diet of one CROCODILE.

This article is condensed from one in ihe *Underwater News Sheet*, by kind permission of the Surrey Constabulary.

SOUTH SEA DIVING

For those divers whose ships stop off at the Gilbert Islands on their way to and from New Zealand there is a unique way of fishing, as practiced by some Gilbertese fishermen, and related by Sir Arthur Grimble in his book, 'A Pattern of Islands'.

The Gilbertese hunt in pairs, one as 'bait' and one as 'killer'. Swimming just off a reef at low tide they watch underwater for movement in rock crevices. On sighting a tentacle the 'bait' dives, arouses the octopus' interest and allows himself to be embraced by its long arms. The 'killer' then dives and, as the octopus tries to sink its horny beak into the 'bait', the 'killer' jerks the 'bait' away from the crevice, breaking the octopus' anchoring grip. The 'bait' then kicks hard for the surface, and lays face upward, thus exposing it to the 'killer' who, holding the head, then sinks his teeth between the eyes, killing the octopus instantly.

So if, you want a little sport that is out of the ordinary talk your chum into being the 'bait', borrow a set of false teeth if you're squeamish and, with a little bit of luck, you will have a pretty good Ditty to spin when you get back home!

Letters to the Editor

As readers are already aware the F.E.C.D.T., past and present, will soon be sporting their new tie, which, according to page 31, Vol. 12/1, should be quite conspicuous. Despite much research and communication with the Zoological Society we have not yet been able to define a Frogmenton. However, an experienced cheese label collector suggests it is related to the Oggie Oggie bird, while a Chinese sooth-sayer is certain it is the trade name of a type of chukker boot. So the mystery deepens, but perhaps the learned editor could shed some light on the problem ?

Signed DEEP IN THOUGHT.

Editors Note

In fact originated from the frogman who took too long getting on the job. So had ½ ton Sinkers tied to each leg to speed his descent.

F.E.C.D.T. TIES

At long last, and after the usual production delays associated with British Industries, we are happy to announce that the Far Flung C.D. Ties are actually on the High seas, heading this way, and should have arrived here by the time you read this note. Available to past and present members of this team, the cost of the tie is one guinea each (including postage) payable by cheque or postal order to Lt.Cdr. D. Lermite and addressed to H.M.S. *Terror*.

D.L.

Our Man Near Havana

(Our How to Get a Quiet Number Without Really Trying)

SO there I was—it had really happened—I had a draft. Standing peering through the misty rain up at the steel juggernaut that was to be my home for the next nine months, I must have cut a brave figure on the jetty, next to my battered Kit Bag (which had seen a few seasons in '*Vernons*'s Lay Apart Store), the taste of the Diving School coffee still fresh (?) in my mouth. It seemed strange that only a few minutes before I had been enmeshed in the security of the school, surrounded by friends wishing me luck. Even through their hard exterior veneer did I not see a trace of admiration ? For was not one of their select number to be hurled to the cruel sea, on, of all things a General Service Ship!! My whole being wanted to scream out—Compassionate reasons! P7R! Suez Wound!!—but no, after all, I was British so with stiff upper lip (a complaint common amongst Diving Store coffee drinkers) I stepped out to sail for those distant horizons.

So there I was preparing to board the *Whirlwind*. Picking up my kit

From Left to Right
BACK ROW Mid Edsell, S.D. L/Sea Walton, S.D. A.B. 'Happy' Day, C.D.3
Mech. Owens (*Maintainer*) A.B. Oldale, S.D. Lem Adey, S.D.
Lt. Litchfield, S.W.D. Lt. Mclaughlan, C.D.O. Lt. Harrow, S.D. Mid. Westberg, S.D.
Cdr. A. Checksfield, C.D.O., Ships Diving Officer

and adjusting my cap to a rakish angle (helped by my Kit Bag) I stumbled up the gangway.

Looking back now, those first few hours weren't so terrifying as they first appeared. Apart from that first strange ritual—which I still take part in now and again—where everybody runs around carrying out ancient pagan rites on orders from a strange metal box on the bulkhead (sorry wall), which booms out mumbo-jumbo, like, 'Let go four,' or 'Take turns two and hold', I've settled in, and am one of the many who are at present keeping the sea lanes open!

It wasn't as hard as I had first imagined bringing the ships divers round to the C.D.s way of thinking. They already had a good grounding in our ways, this being provided by the Skipper, who prefers to remain anonymous, but to anyone who knew him when he held 'The Chair,' no more needs to be said. 'Big Ar'fur' hasn't changed a bit.

There's not a lot of pure diving news from me. We've had our dips, of course, but nothing to warrant any changes to the Diving Manual. The interesting part of our little world is the fact that we seem to have collected more gear than is at present held in *Vernon*. The buzz was we were going to salve the *Royal Oak*. We didn't of course, but we did a few good jobs on the George, the Albany, the Sailors Return, etc.! But under the veil of secrecy that shrouds our diving in the West Indies come little snippets of news that would make any divers blood pump round—'Doubloons' and 'Pieces of Eight.' Whether the fact that the Diving Officer has bought a crutch, parrot and tricorn has anything to do with it, I'll leave to your imagination.

At the time of writing, we're half way across the Atlantic. After waving farewell to the green hills—well, grey hills anyway—of Chatham, we are looking forward to six months of diving in and around the West Indies. Speaking for myself, I'm still enthralled by the prospect of drinking my own tot. Everywhere we went in U.K. out of the blue and purely by accident of course some of the crowd showed up, including 'Ginge' Snell from his lonely outpost at Shotley, all the crew of the *Bossington* at Chatham, who incidentally are claiming to help Chief 'Taff' Packer run Chatham and Lieutenant McClaughlin, who came aboard for a month. So you can see its been an expensive U.K. leg.

Before I end this Pulitzer Prize entry, I would like to refute the theory that sailors hands are 'every finger a marlin spike and every thumb a fid.' Have any of you tried to put your finger through the lay of a 3″ extra-spesh' berthing wire ? Damned painful. After trying this method I can honestly claim that this diver has, every finger a 'Walls' sausage, each thumb a 60 watt bulb! Perhaps its due to the fact that I'm not a sailor, who knows.

Well as *Whirlwind* sails into the setting sun, leaving behind it a solitary R.A.s little brown case bobbing in its wake, a silent epitaph to the C.D. who went to sea, this is your man near Havana signing off.

'HAPPY'

AN ODE FROM 'WHIRLWIND'

We've had our fill of the U.K. cold,
And its damp and dismal air.
With our sets at the dip, we're away
from the fold
To try for the Spanish gold.

The talent onboard is quite a hoard—
A shower, to say the least.
'Work hard, play hard!' is oft to be
heard
Who sez Captain Bligh is deceased ?

cont. foot p. 50

STOP PRESS FROM F.E.C.D.T.

H.M.S. TERROR

Dear Ed.

It was disappointing to receive the last copy of the Magazine only to find that our contribution was missing. Our fault of course as we tend to forget things like catching the Editor before he goes on Seasonal Leave. However, here goes — and with the assistance of a turbo-jet forked stick perhaps this epistle will arrive in time for the Winter Edition.

Although in fact the un-classified activities of the F.E.C.D.T. during the past three months does not make exciting reading, the term 'classified' can be in both an official and self-inflicted sense. For having listened with poised pen to the accounts of Chief Norman and members on their return from an assault on Hong Kong in July, the scribe was reminded of the various disasters that can happen to his beer and baccy if the details of the exploits of 'the last of the big spenders' ever appeared in print. With that thought in mind and having seen the 'bill' headed 'The Hong Kong Hilton', suffice to say it must have been a good run.

Back at work, Seremban provides constant employment such as keeping an eye on the ammunition dump in the deep hole, since a surprising amount seems to get washed ashore.

Two session of under-water demolitions, followed, viz, (1) there moval of a rock pinnacle in the fairway near Pulau Ubin, and (2) assisting our collegues in 'Hubberston' to dispose of two 1,000 bombs. Between bangs some pieces of aircraft were re-covered, having fallen into the sea off Johore Bahru from a passing 'plane.

The R.C.C. came into its own for a period in September when an ambulance arrived bearing two Chinese divers in dire need of recompression. It was a little difficult to get any concise information at first, as neither of the patients spoke English, but the gist of the matter was that they had been setting fish traps at about 200 feet somewhere in the China Sea and had omitted to carry out 'stops' and were pretty far gone. At time of arrival they had been suffering from 'Bends' for three days.

L/Sea. 'Dave' Coote acted as attendant diver, a task which caused him to figure in several paragraphs in the Malaysian *Sunday Times* and several U.K. papers.

The therapeutic table part (1) is bad enough but one patient 're-occurred' at 60 feet at 2.30 a.m., so down they went again. At almost the same time another local hospital 'phoned to report that it had sent another 'Bends' case to the Naval Base and that it should be arriving shortly. Within the hour the ambulance, portable R.C.C., mobile crane, and the duty watch of electricians had arrived. The whole operation progressed smoothly and quickly under the watchful eye of Lt. Hicks, C.D.O., and Surg. Lt.-Cdr. Beckenham of H.M.S. *Victorious*. The late arrival was treated on part 'A' and, in due course, emerged in good health and humour, Chinese style that is. Surg. Lt. McKay, a Ships Diving Officer, had to be dissuaded from administering enemas all round as revenge for his being called out by his colleagues, working on the principle of 'I'm up — why should he get away with it ?'

Meanwhile, one of the first pair slowly recovered the use of his limbs during the day and became enthusiastic with his exercises, though little improvement was evident in his companion. In the fullness of time they emerged, long of beard and short of temper, with a net result of one greatly improved, one no-change and one Chinese speaking Clearance diver with a man sized thirst for ale. Conclusion — I hope the same team is at hand if I ever 'get' a Bend, and we will award a case of 'Scotch' to anyone willing to publish a Diving Manual and Stoppage Tables in 69 dialects of Chinese.

We have had the builders in again and we now sport our own concrete launching ramp and gemini forecourt, whilst the 'brickies' are erecting a new compressor house in rear of the hangar.

There is a rumour that Ernie Foggin is contemplating a 'take over' bid on the old hangar to grow tomatoes, but to date this is unconfirmed.

At the time of writing everyone is busy shovelling up a Royal Air Force *Javelin* off Changi Point, one of a pair that ditched last week. Being in only 20 feet of water, it is a bit of a problem for our friendly Bar Boat H.M.S. *Barfoil*.

Despite all the work there is always a spare minute to two to answer orders by last minute members of the F.E.C.D.T. for ties, price one guinea including post and packing. Cheques and Postal Orders should be addressed to:—

Lt.-Cdr. Lermite, F.R.C.D.T.,
H.M.S. *Terror*.

Hope it's not too early to wish everyone a Merry Christmas and a Happy New Year from the Far Stretched, I mean East. T.G.G.

We've dived our way round U.K. Ports
And the continent had its share;
Belgium and France—we've dived there too
For spoils that are always there!

But now we must sail and bid farewell
To these chilly old English shores.
So spare a thought for that pair of the sea
Big 'Arf' and 'Happy,' his C.D.3.

The Rising of the *SUN . . . ITU*

ON Sunday 18th July 1965 the chartered yacht *Sunitu*, displacement 9 tons, was involved in a collision with H.M.S. *Mersey*, R.N.R.. off *Vernon* Pier. The yacht was holed on her starboard side, and sank within a few minutes. All her crew were rescued by the Camber Tender *Alice II*. It obviously had to be raised as soon as possible as it constituted a hazard to shipping entering and leaving Portsmouth Harbour, as she was laid on the bottom between *Vernon* Pier and Beach Road Pier.

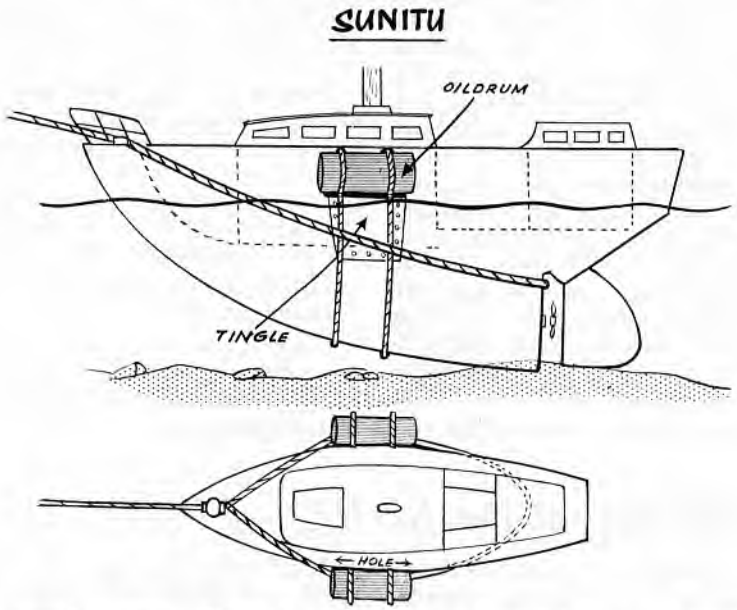
After many inaccurate fixes the yacht was finally located by a fix which was tendered to us by a diver who viewed the whole incident.

The first divers report was that she was laying on her starboard side, which was, as we found later, badly holed. The idea was first to get the yacht upright on an even keel. This was achieved by inserting a 20 man life raft in the after cabin of the yacht and inflating it. Unfortunately the sliding hatch of the cabin gave way leaving a jagged edge, which consequently punctured one section

of the raft. Although this additional bouyancy did in fact bring the yacht on an even keel, the mast actually breaking surface, work had to be stopped as tidal conditions were adverse. The next slack water was 0900 the following morning.

On Monday morning it was decided to strip all loose rigging, and any other gear which was sculling in and around the yacht. This then gave us a clear start. The first idea was to secure three 45 gallon oil drums either side of the hull. This proved only part successful because of tidal conditions and securing facilities. In fact two oil drums were secured which did help in keeping the *Sunitu* upright. It was then decided to push another 20 man life raft down the forward hatch. This was done, and proved very successful, the yacht now being on an even keel in a state of neutral bouyancy, her keel touching the bottom. In this state it was decided to tow her into *Vernon* Creek, to a position under the crane, where we could lift her out in one piece. For the tow a large nylon hawzer was passed around the hull (shown in diagram) and brought to the D22 (Diving Tender). She was then towed slowly into *Vernon* Creek, gradually rising on the way, because of the gradient of the sea-bed.

"THE RISING OF THE SUN-ITU"



Once under the crane, strops were passed under her hull and she was raised to the surface complete. A tingle was fitted over the hole, and after a survey by shipwrights, and an insurance agent, she was towed to Camper Nicholson's of Gosport for repairs.

Although this task was completed with 'makee Learnee' equipment the availability of lifting bags would have been a boon. B. & T.

Any more for the "Pot" ?

DIVERS do not often raise their eyebrows, but the duty divers managing the 'Pot' at *Vernon* on the night of the 7th December last year did so when a blue, bloated, incoherent body was passed into the chamber on a Niell Robortson stretcher.

It was the body of a young engineer who had developed a complication of the Bends known as hypovolaemia. His trouble was that the plasma had moved out of his blood vessels into his tissues so that there was not enough blood circulating round his body to keep the circulation going. The precise cause of the shift of his plasma is not known, but it was a reaction to the decompression routine used, after he had developed Bends following a four-hour session in a nearby tunnel, working under a pressure equivalent to 80 feet of water.

His initial symptoms of cramp-like pains in the legs came on during routine decompression following his first shift.

The pressure time diagram (diagram 1) shows how two sessions of therepeutic compression over a period of 15 hours were applied. After the first he still complained of stiffness in the leg and the second, more prolonged compression was carried out. During the later stages of this he developed abdominal pains, vomitting, and pains in the knees. On reaching atmospheric pressure it was noticed that the abdomen was distended and purple patches (pressure bruising) were present.

Because of this complicating turn of events he was transferred to H.M.S. *Vernon*. This involved a journey by ambulance of about two hours before further compression could be carried out and during this period a considerable deterioration took place. On arrival at *Vernon* he was moribund. He was conscious but becoming confused. He looked bloated and his trunk and limbs were becoming covered with discrete purple patches. He complained of tightness in the chest and of difficulty with his breathing; and pains in his abdomen, shoulders and knees. He was in a state of shock and it was impossible to detect a pulse or any blood pressure. He cried out with anxiety 'For Christ's sake do something'.

A near fatal delay occurred during which he was taken to a Portsmouth Hospital to obtain help with intravenous transfussions before recompression, and an opinion on the cause of the pain in his abdomen. During this period his cries for help became feebler, he became mentally confused and the purple patches in his skin coalesced so that his whole trunk and most of his limbs were purple. Visibly and palpably deteriorating he was transported hastily back to the *Vernon* compression chamber, and moribund even to a diver's laconic eye he was compressed to a pressure equivalent to a depth of 165 feet of water.

There was an immediate improvement; the pulse became stronger, the breathing improved, the state of consciousness recovered and the confluent purple patches fragmented. Symptomatic improvement continued but he remained extremely ill, and at a pressure of 100 feet, intravenous transfusion was carried out. Twenty hours later he was removed from the

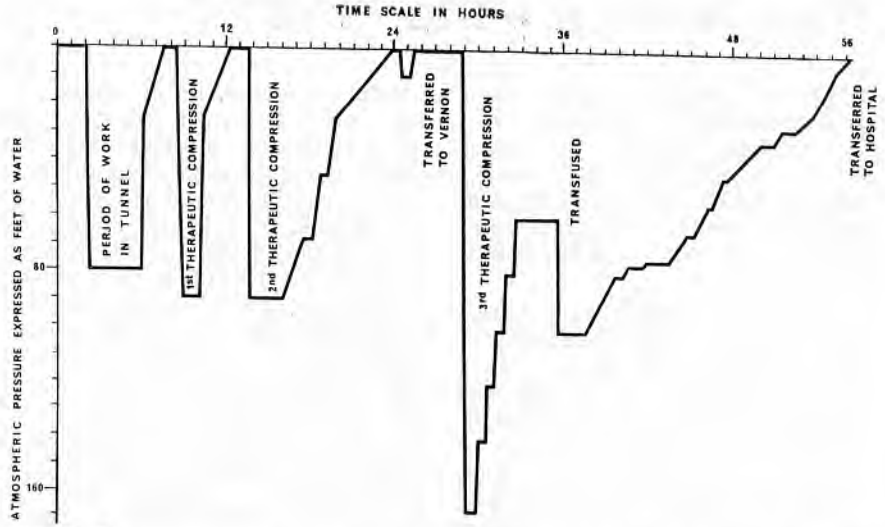


DIAGRAM I

This shows the pressure to which this man was subjected, firstly in the tunnel, then in the compression chamber at the site, and thirdly at Vernon.

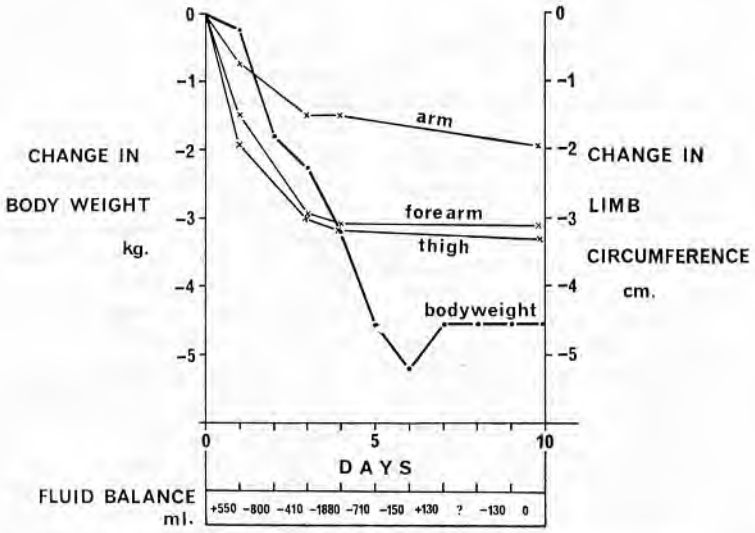


DIAGRAM II

This shows the changes in weight and limb circumference which occured during his recovery, thus demonstrating the elimination of plasma from his tissues.

National Sport Diving Championships 1965

IN early August an invitation from Aldershot (Dolphins) branch of B.S.A.C. was forwarded to the C.D. Diving School in H.M.S. *Vernon*, to take part in the National Championships which were to be held in the Aldershot open-air pool on the 18th September. The invitation was acknowledged and a team consisting of P.O. R. Pilling, P.O. L. Maynard, P.O. R. Lusty, L./Sea. J. Quinn, L./Sea. G. Denton and L./Sea. T. Curry began practicing for the event in the Pitt Street Baths. The practice consisted of sharing 'sets' (using Ex'ped Diving gear), changing sets, dressing and undressing. The lessons learned from the Crystal Palace venture had been worth while.

On the day of the championships the Aldershot Pool was set up with underwater tasks. Briefing was by tape recorder, ensuring that all teams had exactly the same knowledge.

The teams were split into two groups of two. P.O. Pilling and P.O. Maynard were first to enter the water, taking 22 minutes to complete the circuit plus 4 minutes penalty time. It was interesting to note that some teams took in excess of 1 hour to complete the course. The first half of the teams were allowed to pass on any hints to the remaining half of their respective teams and P.O. Lusty and L./Sea. Quinn completed their circuit in 19 minutes, 20 seconds with penalties of 2 minutes. These combined times were sufficient to win the C.D. Team 1st place overall.

At the presentations, during the Club dance that evening, the C.D's asked that the winning Trophy be presented to the top amateur team, the London branch of B.S.A.C. The trophy being a large Silver Rose Bowl. However, having also won the trophy for the most efficient team, the C.D's did not come away empty-handed.

Our thanks are due to the Aldershot Club who did a fine job of organizing the Championships, and we hope that the Navy is invited to take part in more of these events.

A visit is planned for the near future, when we hope that the London Branch of B.S.A.C. will bring their trophy, offering us the opportunity of photographing it for a future edition of the Magazine.

A.D.

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chamber and transferred to the intensive care unit of a nearby hospital, where he remained for the next four weeks.

The alert and good humoured attention which this very sick man received from the duty divers was impressive. Curiously enough he was aware of their care and concern even when he was most ill. The good spirit of the divers was reciprocated subsequently with good spirits of a bottled variety.

The attendant developed a Bend in the knee after the 'patient' had surfaced, and had hismelf to be recompressed. The divers' eyebrows had by this time returned to the straight and level, because of their own diverse diseases they do not turn a hair.

SURG. LT. ROWTON LEE.

PROMOTIONS AND ADVANCEMENTS

S./L. L. Donald (R.A.N.)
S./L. L. Churcher
P.O. S./L. J. Hendricks
P.O./C.P.O. R. Compton
P.O./C.P.O. T. Norman.

To C.D. I
P.O. Burrows
P.O. Rees
P.O. Campion
P.O. Walker
P.O. Harrison

To C.D.*
A.B. G. Porter
A.B. H. Trotter
A.B. E. Roberts
N. A./M. (2) J. Curtin

To C.D.O.
S.L. O'Driscoll
S.L. Stewart
L. Shepard
L. Barrett

"So this is what they do with their holes when they don't find oil"