

Robert “Red” Larsen wrote that this is a continuation from Part 7B, identifying some main topics and my knowledge of how we used, developed , or used the particular subject.

Diving Equipment – *SCUBA or CABA(Compressed Air Breathing Apparatus)*

On the West Coast in 1954, we were introduced to CABA during our initial course. When I look back on it, there did not seem to be a great deal of knowledge from our Instructor’s regarding this breathing apparatus. We referred to the system as an “Aqua Lung”. The breathing regulators had a “Canada Liquid Air” nameplate on them, plus a Serial Number. I just learned via the internet why these were labelled as such – in 1947 Emile Gagnan, co-inventor with Jacques Cousteau of the Aqua Lung, emigrated to Montreal, Quebec, and worked at Canada Liquid Air Company, developing more regulators, which were the old double hose type. They apparently were a single stage regulator, reducing the tank supply pressure from 1800/2000 PSI to the Diver’s over-bottom pressure, in one single control stage. You probably wonder why I would remember about the serial numbers? Well, these regulators took a mighty strong set of lungs to be able to draw in your air supply – compared to our more modern equipment, and some of these were much harder than others. Also, on the surface you could identify what Serial Number the Diver was using, by the sound of the exhaust bubbles! Number “1101” was always able to be identified in this manner(Jim Balmforth and I were discussing this feature recently when I travelled out to the West Coast). These air regulators were serviced and maintained by the Ordnance Shop in HMC DOCKYARD, and heaven knows what training they had! Every once in a while, we would have a regulator go into what we called a “free flow” condition, and believe me, it was a **“FREE FLOW”**, which means that the air from the tank comes blasting into one’s mouth without one having to suck in air!! At that time we had another Diver(Tender) tending us with a lifeline from the surface, and we also wore nose clips. I remember, sometime in 1954/55, they were testing out the principle of locating underwater swimmers by what I believe we call today, a “fish finder unit”. This was manufactured by an American company called Honeywell in Seattle, Washington, with the theory being that the Diver’s lungs were similar to the air sacs in fish. Now, having a lifeline on the Diver did not work out, so volunteers were asked to swim in Esquimalt harbour(30 to 40 feet depth)without a lifeline. The first volunteer started out, but soon surfaced in distress. I was the next volunteer so, with I dare say many “Hail Marys” to myself, I arrived on the bottom and swam a very considerable distance before surfacing successfully. The trial proved successful, as far as the “fish finder” was concerned, but with all the congratulations given to myself regarding swimming without a lifeline, you would have thought I had just walked on the moon. At another time after this date, I swam across the large Esquimalt dry-dock and back, checking for debris before they set the main gate in place, which again was considered to be an outstanding performance. It makes one smile when thinking of what our capabilities are today! Along with these regulators, the compressed air tanks(bottles) we used were 35 cubic feet size, most of which were double bottles, but we also had sets of triples. I can’t recall when we got the US Divers manufactured regulators, but I do remember the ease with which they delivered your air. I think the first ones supplied were single stage, followed by two stage regulators, which decreased the tank supply pressure to the regulator in two distinct stages – what a change for the good! Around 1957/58, Art Rowse initiated a regulator repair course with US Divers Company for us, after which we established our own regulator repair section. This was a great improvement us having to continually having to send our regulators to the Dockyard shops, plus we learned exactly how they functioned, and became very capable maintainers of this vital equipment. By this time, we were using 50 cubic foot air supply cylinders, which we then controlled and organized all the maintenance of on the West Coast. Sometime during the 1970’s, single hose regulators became available – but someone else will have to inform us of the date. The present CABA equipment is much more involved, and complicated I would suggest, as on my last Ships Diver requalification in 1990/91, I found myself overwhelmed by all the

paraphernalia I was required to wear. Because of winter cold water conditions, and Arctic operations, regulator “freeze-ups” became a hazard. A great deal of freeze-up trials were conducted at DCIEM to identify causes and solutions. I am sure that documentation of those trials are available somewhere, maybe Mr. Dave Eaton would know, and also the time line.

CDBA (CLEARANCE DIVER BREATHING APPARATUS)

Although on my first course in 1954, when we were supposed to be trained as CD’s(Clearance Diver’s), this actual Trade was not approved till later. In late 1955, Keith Powers was drafted to the West Coast Diving Unit to provide training in CDBA. About a dozen, or maybe more boxes of CDBA equipment arrived, but no CDBA masks or breathing tubes were included, therefore Keith could not conduct any training. I left the Navy after my 5 year hitch was up in February 1956, then re-entered again in September 1956. By that time, Keith had returned to the East Coast Diving Unit, but all CDBA equipment that was required had reached the West Coast, and CDBA training commenced in late 1956. Again, the level of the expertise of our Instructors was somewhat questionable, or perhaps I should say less than ideal! We were now dealing with pure Oxygen at pressures up to 2000 psi, so cleanliness (no oil residue) was paramount. Operation “Awkward” became almost a hated expression. This operation required Divers to change from ordinary working dress into our dry diving dress(we had just received the “Dunlop” dry suits) and be breathing pure Oxygen for two minutes, then jump into the water in a diving capability within five minutes after the order was given for operation “Awkward”. This must include the whole class of Divers and, if one was slow, we were all punished by requiring the class to do night dives that night – one certainly learned how to change fast! This, of course, created a problem, as we all **knew** the Instructional staff were not capable of doing what they were asking of us. I personally asked for a demonstration, but to no avail. In fact, I was threatened with dismissal from the Trade if I didn’t toe the agenda. Another scary fact, was that in almost every night dive, we would have someone pass out in the water. This did not instill confidence in this equipment. But, believe it or not, most of us survived, and were Rated Clearance Divers. As we became more experienced(especially after our Trade Group 3 course with Al Booth – a most excellent Instructor), CDBA was not as questionable as it was earlier in our careers. One thing we eventually sorted out, was that our time limitations in the gear was relevant to the brand of CO2 absorbent we were using. Of course, the Navy supply system shopped for the cheapest price. We eventually found out the only consistent and reliable brand was manufactured In the United Kingdom, which brand was “Sutcliffe Speakman”. Even then, we ended up sending a sample of each batch for testing of it’ CO2 absorption rate before approving the new batch. What the established rate was, I have no idea, but it ensured the average Diver could count on an average 60 minutes of diving time, under normal conditions, before his CO2 absorbent reached its limit. Overall, what we did learn, was a healthy respect for the limits of using CDBA, and respecting all the limitations it required. Of course this CDBA apparatus was used in conjunction with the Clammy Death suit already mentioned in Roy Busby’s write up in Part 5A of our history, so no need to expand on that, other than it was less than the ideal diving scenario. Again, the Diver’s activity level was governed by the CO2 absorbent capability.

CCDA(CANADIAN CLEARANCE DIVING APPARATUS)

CUMA(CANADIAN UNDERWATER MINE[COUNTERMEASURES]APPARATUS)

The nee for a better diving set to replace CDBA had been recognized for some time. Around 1974/76, the EDU(Experimental Diving Unit), now residing at DCIEM in Downsview, Toronto, was tasked to investigate a possible replacement set. A survey of other diving equipment available, or under development, resulted in several sets being evaluated at DCIEM. Among those sets evaluated were:- CCR1000, manufactured by Bio Marine(an American Company, which had a 1000 foot capability, electronic gas supply system, and could be used with multiple gas mixtures. The US Navy expanded on this set, and it became their Mk 15 closed circuit diving set, A Drager closed circuit set, probably an early model of the LAR 5, and

There was also a French set, the name of which I can't remember.

I had very little experience with these sets, as their evaluation had already been done by Ray Goullard (my predecessor, as the Chief Diver.

In 1978, myself in company with Mike Kooner, a Royal Navy Exchange Officer, was dispatched to find out other country's latest developments. We visited England, Sweden and Germany. In Sweden we tried out the ACSC set, made by AGA Spiro, which has since become INTERSPIRO. This was a re-breather and after diving it, we recommended buying a set for evaluation. The Oxygen supply was regulated by a mechanical bellows system, but the CO2 scrubber worked exceedingly well. This scrubber design is almost identical to what we now use in our CCDA and CUMA sets, so I suggest that was where the design came from. No other countries had any updates to their equipment.

Somewhere around 1980, it was decided to design and develop our own replacement set. This was done in conjunction with the Engineering firm, Fullerton Sherwood, located in Mississauga, Ontario. Owners of the firm were Dave Fullerton and John Sherwood. Both had worked at DCIEM as civilian Hyperbaric Engineers (especially with the Deep Diving Facility complex), and both had attended Ships Diver training before proceeding to private industry. The development of that equipment is best left to some younger members, such as CPO George Cox and CPO Milt Skaalrud, plus Dave Fullerton and David Eaton. The success of these sets are recognized by the many foreign Navy's who use this equipment.

Surface Supplied Diving Equipment. *Standard Diving dress*

I have no idea when the Canadian Navy first started using this gear. There were a variety of manufacturers utilized, and each had its own peculiarities, especially how the helmet and diving dress connected, plus how the compensating weights were suspended, for instance:-

Siebe Gorman – weights were suspended from around your neck and shoulders. Face plate screwed in. USN Mk V – used a weight belt suspended over your shoulders and face plate was hinged. Total weight on the surface was 205 lbs. Manufactured by Morse Diving Equipment, A. Schrader Son, Millar-Dunn Diving and Desco Diving Equipment.

John Date in Montreal, Quebec was a Canadian manufacturer of Standard Dress also.

Lightweight Diving Dress

This was a canvas diving dress, complete with hood, and supplied with a triangular shaped face mask. Air supply was generally a half inch diameter rubber hose married to a rope safety line. Some had a communication capability. Weight belt was considerably lighter, as were the boots. The complete set included a small canvas air bag externally, which in the case of air supply from the surface, gave you about three breaths to get to the surface. I don't recall ever using this part of the equipment, which was of US Navy origin. In later years, the mask was used independently with SCUBA dry and wet suits. The Swedish manufactured AGA lightweight diving mask was used for lightweight jobs, especially ship repair type tasks.

Kirby Morgan Band Mask

A more modern mask, designed by Kirby Morgan Ltd.

Superlight 17B Helmet

Around 1973/74, the EDU at DCIEM started investigating possible replacement equipment for the USN Mk V Standard Dress. By 1978 we had pretty well decided the "Rat Hat", developed by Bob Ratcliffe of Cal Dive (and later Oceaneering) was recommended. We obtained these helmets during our trials, through Phil Nuytten of Can Dive, for approximately \$4,600.00 (if I remember rightly) a piece. After some disagreement over testing of Phil's one atmosphere "Jim Suit" at DCIEM when we went to go to contract, the price jumped to about \$18,000.00 for one helmet. We at EDU decided this was unacceptable, and dispatched Gerd Mantel to Kirby Morgan in California. The result was that Gerd brought back a Superlite 17 helmet for evaluation. After extensive testing, and some recommended alterations by our Divers, which the company readily agreed with, the Superlite 17 replaced the USN

Mk V in the Canadian Navy. It is now used and recognized worldwide in the diving community. The "Rat Hat" is now an historical item which can be purchased on Ebay. I say well done EDU!

Diving Suits, Can Mk 1

Under this category, I'm talking primarily about suits used during SCUBA dives, etc.

In 1954 we were using a rubber based suit that was call Can Mk 1 Dry(supposed to be anyway)diving dress. This consisted of a rubber hood with a padded foam ear cover segment, a metal collar ring, rubber trousers together with a jumper with skirts that rolled up together to make the so-called watertight seal, which was then covered with a stretched rubber waistban. The cuffs to the jumper were a separate item, and stretched over a plastic type cuff band. The only dryness we found, was in the name! The weight belt was rubbed, with individual pockets for lead weights. We used angora wool underwear under the suit. Some underwear had padded shoulders to soften the weight of SCUBA tanks on the surface. Fins were the old Admiralty pattern type. Tame seals thought they we good eating, but that's another story.

Pirelli Suit

Next appeared the Pirelli seamless latex dipped rubber suit, which had a chest entry opening, sealed by a clamping piece. These suits were fairly good for keeping dry, however, due to their thin material were not very good, and could be easily punctured on sharp edges, barnacles, etc. Again, full one piece underwear was worn with this suit.

Dunlop Suit

I believe the next suit we saw were the British Dunlop dry suit. They were a great improvement, as the material was more robust, and could withstand rough contact with sharp edges, etc. They had a stretch neck only entry, which was quite a challenge, and a rubber hood sealed to the suit via a band type clamp. The use of a buddy to assist opening the neck to get one's body into it, was the best method for donning it.

All the above suits had no suit inflation capability and, unless you were able to exhale air into your hood via your face mask at deeper depths 60 feet and down, suit squeeze was a constant menace. A suit squeeze in the crotch area was most unpleasant! Also, a lot of reverse ear squeezes resulted form the incapacity to equalize your inner ear space

Wet Suits

About 1957/58, LCdr Bayfield Davis was posted to the West Coast Diving Unit. He had his own personal "Wet Suit", and persuaded several of us to purchase one our own. By this time, a reasonable pay rate for diving was available to us, so we completed many extra dives in order to get more money, which went towards buying our own wet suits, the cost of which was \$35.00 each. We were dealing with a well-known Vancouver gentleman(I no longer remember his name), but he was in the local diving fraternity for quite some years after our dealings with him. He measured each individual, and when completed, the suits were delivered to us. Anyhow, these suits were well-made and identified by the strips of yellow rubber down each arm. They were a great improvement as far as warmth and Diver comfort went, and we thoroughly endorsed getting these "wet suits". At that time, the "experimental shop" was on the East Coast, with Tommy Thompson in charge. Apparently they had tried out using wet suits, and had rejected them! I suspect they were not tailor fitted, and therefore only fitted where they touched. This made our request to be issued with wet suits, in lieu of the old dry suits, much more difficult. Suffice to say, that by 1959 we were able to convince someone to issue us suits for trial purposes. In 1959, on our way back from a mine Exercise in Kodiak, Alaska, we stopped off at Taku Glacier just south of Juneau, Alaska, making seven dives(there were 14 Divers on the Bay Class Minesweepers for this Exercise)to a depth of 140 feet in whatever the water temperature would be. Every Diver recognized the improved capability of the use of wet suits in cold water, and our report was well received. In 1961, the first West Coast team to go to the Arctic(I was one of them) were issued thick, extra heavy wet suits, and we used them successfully in all our tasking there. The secret of wet

suits of course, was to have them tailor fitted. It is to be noted, that our supply system later got badly burned by an Headquarters order for wet suits. Somebody in their wisdom thought that ordering Small, Medium and Large sizes would do the trick! My understanding was that this Company was from Hamilton, Ontario, and run by Ken MacAlpine. I don't think any of the order was usable.

Present Day Dry Suits

These suits were tested and evaluated by Jim Hewitt(at the time he was serving as a Royal Navy Exchange Officer)and Divers at DCIEM in the early 1980's. Jim Hewitt, Gerd Mantel and/or Milt Skaalrud should be good persons to explain this work, leading up to present day equipment.

I trust this story jars old memories, which will stimulateothers to provide additional input to our history.