undercurrent®
THE PRIVATE, EXCLUSIVE GUIDE FOR SERIOUS DIVERS

P. O. Box 1658, Sausalito, California 94965
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Vol. IV, No. 6 June 1979

Baja Expeditions, Sea of Cortez, Mexico

—*Cruises for divers and nondivers alike*

I've never had the pleasure of meeting good ol' Murphy, the savant who said "if anything can go wrong it will," but I have evidence he was a traveling diver. At Undercurrent we've been fortunate that most of our trips have come off without a hitch, but an itinerant correspondent of ours was not quite so lucky. Nevertheless, his story is worth telling and, as you'll read, the trip is worth taking.

--C.C., Undercurrent Travel Editor

For some time I have contemplated diving the Sea of Cortez, that sedate sea separating Baja California from the Mexican mainland, but diving facilities there are either primitive or nonexistent. Unless one pulls his own boat and compressor, one will spend one's time free diving from the beach. Up and down Baja there have been a number of false starts in the dive business, and those who fail often blame Mexican law, which limits the participation of foreigners, including us well-meaning gringos. Regardless, Baja Expeditions, a San Diego outfit, has been running a number of cruises there for eight years and added diving cruises last year.

Contemplating a tour of Baja in my Winnebago, I called Expeditions' honcho Tim Means to see if I could forego the standard package (which includes a flight from San Diego) and join the boat in LaPaz in January. He concurred and my buddy, a freelancer writing a piece for a magazine prettier than Undercurrent, and I, cut a deal with him. As we prepared to leave San Diego, a downpour washed out the Mexican highway. We were stuck. Hoping to leave a week or so later, I called Means and learned the next dive trip would be in July. Expeditions would be serving whale watchers, nature lovers and cave painting buffs the other weeks, so unless I joined one of these trips, where diving would be less than prime, I would have to cancel the boat trip. I shrugged my shoulders and in February joined the nature lovers.

At the rickety loading pier in LaPaz we met the air arrivals and loaded our gear aboard a skiff for the short commute to the Baja Explorador, a 120-foot, 45-year-old (but nicely refurbished) ex-marine research vessel. Here, we learned that three others were divers, but they had been told, so they said, that this was a diving trip (it seems that because the nature trip was not filled a few divers were induced, apparently a bit deceptively, to join). They were not happy as we set to sea, anticipating less diving then they had expected, but my buddy and I were now very happy, anticipating much more diving than we had expected.

As one accustomed to the cattle boats run off the coast of California, I found my 2-3 person stateroom with closets, vanities and sinks, quite luxurious by comparison. Most of 22 passengers have single bunks although some doubles are available. We unpacked our gear, received a briefing from the delightful and energetic tour leader, Mary Shroyer, and went to sea about two hours late. Soon a stiff breeze and rough seas--small craft warnings would have been up if Mexico had such--forced us into the lee of an island for supper and sleep. The winds continued the next day, but we managed to sneak at half speed--four knots--to a sheltered cove for some dives.

I had come for winter diving and expected the full wet suit conditions: 65° water, visibility 30 to 40, perhaps 50 feet. Summer and fall it's 80° water and usually 100-foot visibility, although tidal flow can drop the visibility quickly. Conditions might have been better had we visited the best dive sites, but our first obligation was to the nature lovers, so we dived sites close to their walks, foregoing better dive sites where there would be nothing for them to do.

Mexico's Chief of Aquatic Recreational Activities, Professor Ricardo Presbitero has called the Sea "the world's aquarium," and American biologists know this is not talk to promote tourism. The waters are rich. Surely I had some bad dives, as I would expect on a nondiving cruise. When the nature lovers were getting their jollies, we struggled along a barren bottom of boulders with a few fish too small to see even with a Microsight. But on the other end of the spectrum, we cavorted at arms length with 40 sea lions at a washrock called Los Loberos (The Sea Lions). Their smiles and bubbles matched ours, as shutters clicked and these marvels literally swam circles around us. Surfacing later brought a cacophony of "whoopees" and "all rights" as we dressed for a second dive.

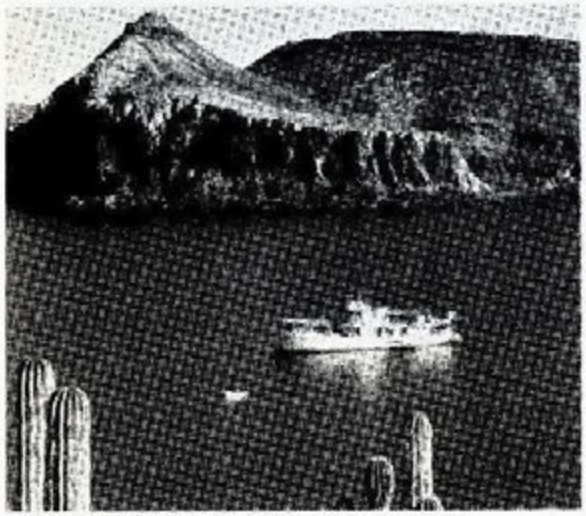

Photo Courtesy of Tim Means, Baja Expeditions

The bottom of the Sea of Cortez was mostly sand and boulders, with scattered corals, grazed by starfish and an occasional crown-of-thorns. Water temperature prohibits the profusion of reef building corals, but gorgonia, laden with delicate scallops, are common enough to add interest to the terrain. Yet during two tides a day the plankton-rich Pacific rushes in and supports an extraordinary and unique range of fish life. A diver accustomed to the Caribbean will be surprised at his discoveries. On

Undercurrent (ISSN: 0192-0871) is published monthly by Atcom, Inc., Atcom Building, 2315 Broadway, New York, NY 10024, (212) 873-3760. Second-class postage paid at New York, New York. This guide is available to the diving public by mail subscription only. To maintain its independence, *Undercurrent* carries no advertising.

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one of our first dives we encountered the beautiful golden grouper, a guinea fowl puffer with white spots on a black velvet body, a 2-foot bumphead parrot fish, and the Sea's own varieties of Angel fish. We viewed plenty of triggers, butterflies, and giant damsels. Occasionally we saw small mantas and sting rays, and a one-foot electric ray, annoyed that I had poked its tail, turned quickly and shot me sixty volts. Shocked? Not me. Pufferfish and the giant porcupine fish inflated at my playful prodding. Twenty-pound and even larger grouper peeked from the rocks, Nudibranch, garden eels thicker in girth than their Caribbean counterparts, and the large, hard, local sea cucumber were visible on every dive. Occasionally, a lobster or scallop jumped into my hors d'ouevres bag. Since the boat allows no spear-fishing, my shots of the large black sea bass (50 lbs. up to 150, so my buddy claimed) were reserved for my camera. And remember, we were not at the best dive sites.

The Sea itself is tricky. On one dive we entered into a slight chop and forty minutes later returned to three-foot waves. Strong currents can appear or change in minutes, mainly in response to the great flow of tidal waters, which lend credibility to stories of divers being swept away forever. The crew of the Baja Explorador, however, are prepared for the conditions. Dives are from one of two 18-foot outboard skiffs (pangas); divers simply roll off the skiff, tour with their buddies, and when they surface, are met by the smiling skipper who has been following bubbles. The rules for diving are uncomplicated: Divers must be certified, they must dive with a buddy, must wear a BC and use a submersible pressure guage. Steel 72's, backpacks and weight belts are provided. Personal gear is stowed in seat lockers on the upper deck.

The Baja Explorador is well kept by Manager Ted Waltham and his wife, L.A., who both go to no ends to please their guests. In fact, I would go to sea anywhere with the Walthams and their efficient, but seldom seen or heard, crew of the captain, three engineers, three cooks and three deckhands/boat drivers/gear handlers, all Mexican nationals. The boatmen exhibited more common sense, caution and concern than most anyone I've had the displeasure of riding with. In rough water I felt confident of their ability to make my boat ride the safest possible. The ship, too, was operated with full safety in mind; on two occasions they even scrubbed the intended course for longer alternates to bring comfort to those aboard with a weak belly. Indeed, a tight ship.

But no strong belly was needed to delight in the basic Mexican cuisine served family style at 8 am, 1 pm and 7 pm. The food was not hot and peppery; sauces were provided on the side for those who wished to wash out their pipes. Breakfasts began with juices (from tomato to papaya), and the entrees might be eggs rancheros, machaca, cactus omelet or french toast, accompanied with fresh tortillas. Watermelon, cantaloupe or jamaica juice preceded the luncheon soup (cheese, spinach or fish) and the entree, a tostada, quesadilla or fish fingers. A salad accompanied. There might be fresh fish or lobster for dinner, or perhaps carne asada, shish-ka-bob or a curry along with frijoles. Snacks would often appear during the day and coffee was always ready. Night diving was available, but I'm ashamed to admit that after the complimentary wine with dinner, a couple of cocktails (tequila 50¢, brandy 60¢, mixed drinks 95¢, Mexican beer 45¢) I preferred sitting fast for an evening slide show or for the septuagenarian ex-vaudeville entertainers who happened to be aboard or, on the last night, for the roast of everyone present, which was organized by the divers. On one night when I wanted a quiet time, I indulged in books such as John Steinbeck's Log of the Sea of Cortez, which I found in the tidy little library aboard.

Yes, I would return, not for the nature walk trips, but for the special dive trips. In fact, the three other divers aboard have already made their plans

to return. But the nondive trips offer an advantage to the diver with a non-diving mate; one can dive and the other can trek through the wilds, under the tutelege of a biologist. It's a fine boat and crew, my only reservation being that a few of the items advertised--air conditioning, dark room, etc.--have yet to be installed. The tours begin in San Diego with Friday night lodging, include airfare to LaPaz on Saturday, everything but liquor aboard the boat from Saturday to Friday, night lodging in LaPaz and a Saturday flight back to San Diego. An October dive trip costs $745, and two July/August Bio-marine seminar trips with biologists are $795. For a brochure write Baja Expeditions, PO Box 3725, San Diego, CA 92103 (714/297-0560). If you have a good-sized group, write directly to Ted Waltham at Expediciones Baja, S.A., PO Box 120, LaPaz, Baja California Sur, Mexico (telephone 2-16-92) for chartering information.

E.D.

1970-1976: Sport Diver Deaths Number 893

—*Case studies show the causes*

For several years the University of Rhode Island National Underwater Accident Data Center (NUADC) has issued reports documenting and analyzing the deaths of scuba divers in this country. Near the end of 1978 they completed and published a computer analysis of divers' deaths between 1970 and 1976, providing an impressive analysis of the causes of diving deaths in this country. The results of that study make an important contribution to understanding sport-diver deaths and preventing future mishaps. Following, in two parts, is a synopsis of those reports.

General Underwater Fatality Statistics

An astonishing number of sport scuba divers—893—were killed while diving, during the seven years from 1970 to 1976. With the exception of 1975, a greater number were killed each year than the previous. About 8% of the deaths were women.

The greatest number of deaths, 211, occurred in Florida, followed by California (186), Washington (65), Hawaii (44), Massachusetts (27) and Michigan (22). The high and increasing fatality rates in Florida and California reflect an increasing use of these recreational areas by casual diving visitors. In 1975 and 1976 California deaths numbered 40, 28 fewer than the previous two years. The decrease may very well reflect an impact of the government review and subsequent diving safety laws passed in Los Angeles in late 1974.

Nearly 19% of the deaths (121) occurred in caves, mainly in Florida, where many new, ill-equipped and untrained divers, meet their fates. The following scenario is typical of the cave fatality.

Three young men from a Middle-Atlantic State recently complete a basic scuba course in their home state and travel south to Florida to try out their newly-acquired skills. Following a few open-water dives on the Florida reefs, they start back up the coast. The temptation to try the beautiful clear springs of Northern Florida is too much to resist. They start

(continued on page 5)

Women and Diving

Not long ago dive advertisements featured men in wet suits and women in bikinis. Few women dived. A woman who wanted to be an instructor was discouraged from taking training, and once she passed, often had a hard time finding a job.

Times have changed. The industry, mindful of the money at stake, now actively recruits women into the sport and designs equipment to keep them diving. We suppose that the economic reality of this vast number of women with money to spend was the primary force behind the change in heart, but certainly there are members of the male-dominated industry whose consciousness runs deeper than the profit motive. At least we hope so.

Next January the Diving Equipment Manufacturers Association (DEMA) is staging its annual show in New Orleans, Louisiana, a state whose legislature has not yet ratified the Equal Rights Amendment. Hundreds of business, trade, educational and political associations have agreed to support equal rights for women by not holding conventions in states where the legislatures still consider women secondary citizens. Given the importance of women to the diving industry, it would seem that DEMA could make an important statement by joining the boycott and moving its convention elsewhere.

their dive without thinking that they are weighted for saltwater, and although they seem a little heavy at the surface, they disregard it. The crystal clear water of the spring is fascinating; although they agreed before the dive not to enter the caves, one of the boys pokes his head in just a little way, then a little farther. Heck, this isn't so bad, he thinks, and gestures to the others to follow. Once in the cave, he realizes that he is constantly pushing himself off the cave floor because of over weighting. When he turns around with a feeling of apprehension, he finds the water boiling with the murk he has kicked up while bouncing along the bottom. Which way is out? He cannot see his friends. He kicks harder and stirs up more mud from the cave floor. In confusion, he tries to rise, only to bump his head on the roof of the cave. His buddies at the mouth of the cave dare not enter when they see the murky cloud coming from the entrance. Minutes pass, and the buddies finally resurface and contact the authorities. Hours later, two trained cave divers using proper safety lines, lights, and other important cave diving gear recover the boy's body about 20 ft. from the entrance—so near, yet so far from safety.

"...a substantial number of deaths occur in relatively shallow water."

In this instance, one person died. Tragically, such folly often leads to more than one death. During 1976, NUADC recorded seven instances of cave diving in which two people died. Six of these occurred in the Florida caves, and one double death took place in the Blue Hole area near Santa Rosa, NM. NUADC has not been able to establish the number of people who engage in cave diving nor how frequently they dive, but there is no question that cave diving is the most dangerous of all sport-diving activities.

It is particularly important to note that a substantial number of deaths occur in relatively shallow water. For example, in 1976 half the deaths occurred during dives of 30 feet or less, and 90% of the deaths occurred on dives of 100 feet or less; only four were deeper than 130 feet. The seven-year figures indicate that approximately fifty percent of the scuba deaths occur on dives in less than 40 feet of water, and 25% of the deaths occur on dives which do not extend beyond 20 feet.

In one incident, the victim was diving with three others and hunting for large helmet shells. All four divers went down the anchor line to a depth estimated at 125 ft. (none of the divers had depth gauges). The victim was last seen at the anchor with two large shells. He signaled that he was going up, and that was the last time he was seen until his body was recovered some hours later (at considerable risk to the recovery team). The victim had given no indication of problems either before or during the dive. He was on bottom about 20 minutes before his last signal that he intended to surface.

An examination of the equipment suggested that he had gone down without setting the 'J' valve in reserve position, and probably ran out of air while trying to lug the heavy shells to the surface. Four obvious errors contributed to this accident: the absence of depth gauges; too much time at that depth, creating a decompression requirement and the probability of running out of air; the apparent misuse of the reserve air supply; and finally, a complete breakdown of the 'buddy' system.

Another depth-related fatality occurred off the coast from San Jose Beach in Monterey County, CA.

The victim, with one buddy, descended to a depth of 250 ft. using air. The survivor indicated that he was feeling severe effects of nitrogen narcosis long before reaching the bottom and stirring up the mud. The resulting murky water forced the survivor to give up and start to ascend, leaving the victim on the bottom. The body has never been recovered, and an expert investigator from the area indicates that other such fatal deep dives in that particular location have also resulted in the body never being recovered.

The number of fatalities attributable to ice diving is on the rise; there were nine in the first five years of this study, but in the next two seven people died. 1976's under-ice dives involving fatalities are typical of the patterns noted in past years.

In early spring 1976 one incident occurred in a river area connecting two of the Great Lakes. The

Defective Retaining Band and Mask Maintenance

The U.S. Navy reported recently that a defective mask retaining band caused one of their divers' masks to flood. They say that the potential hazard exists in two models of U.S. Divers Masks, #5037 and #5086. The Navy said that:

"If the lens retaining band is bumped or compressed towards the top center of the mask, the locking device can come apart. This happened to one scuba diver. He was unable to maintain a seal around the lens and the mask flooded."

John Cronin, President of U.S. Divers, told *Undercurrent* that U.S. Divers has a combined sale of 98,000 of these two models and although they have received a few routine complaints about mask fit, the only defective band complaint came from the Navy—and that about nine months ago.

Apparently this same clamp is used on masks sold by a number of other manufacturers also, so it would make sense for every diver to check the retaining band on his mask before his next dive. In fact, if you're like most of us, and never check the mask retaining band before any dive, it might make good sense to check it right now.

dive by three persons began from the shoreline with some light, honeycombed ice some distance from the shore. The water depth was only about 6 to 8 ft., but the ice became thicker as one progressed from shore. The divers were towing a small float that soon became hung up on the thicker ice. Leaving the float behind, the three proceeded farther under the ice cover and soon became separated. Two of the divers noted they were getting low on air and proceeded to the under surface of the ice where they were fortunate to be able to chip their way through, ditch their gear, and climb onto the ice-covered surface. At this point, they had no idea where the third member of the party was, although they searched the ice surface for signs of bubbles for a few minutes before calling for assistance. About two hours later, recovery divers located the victim face down on the bottom, out of air and only 15 feet from the newly opened hole in the ice.

"In 1976, four deaths may be attributed to regulator maintenance."

Again, there were obvious violations of safe-diving principles: violating the one-on-one 'buddy' system by having three divers operating at once and no safety personnel on the surface; diving under ice without a surface-tended safety line securely attached to each diver; and abandoning the only surface float that might have led the victim to safety.

The only other under-ice event involved three divers in a midwestern lake with a 10-inch ice cover through which they had cut a hole about 3 ft. in diameter. Two of the divers had received certification (C-card) from different agencies, the third apparently had no certification. All three entered the water without any safety lines. A short distance from the hole, diver #1 (no C-card) had some difficulty; his tank appeared to slip loose from his back pack, and in the confusion, he lost a fin. At this point, he indicated to diver #2 that he was low on air and they began to buddy breathe. As they moved closer to the safety of the exit hole, diver #3 indicated that he too was running out of air, and #2 commenced buddy breathing with him as well as #1. At this point, #2 realized that he too was about to run out of air so he rushed to the opening in the ice and yelled to bystanders who gave him another tank. Although he went down again, he could not find either of the other two divers. He returned again to the opening and urged bystanders to get help and then proceeded to dive again, eventually finding one of the victims. The second victim was not found until police recovery divers arrived.

Deaths of divers diving from private boats, as opposed to charter boats, continue to be a problem in several areas of the country, especially Florida. Examples of typical boat-based accidents are:

The New Jersey coastline has long been a popular wreck diving area catered to by various charter vessels. On one such excursion in spring 1976, a 24-year-old man who had been certified about a year, but who had little actual diving experience, lost his life. Diving a wreck in about 60 ft. of water, the victim apparently thought he was running out of air and instead of pulling his reserve rod, he yanked the mouthpiece out of his buddy's mouth and refused to return it. In a matter of seconds, he spit out the buddy's regulator, dropped his weight belt, and made an uncontrolled ascent to the surface where he was immediately spotted by a boat crew; others in the water went to his assistance. He was brought aboard the boat in less than 3 minutes and could not be revived despite continuous resuscitation efforts.

In another such incident, a group of out-of-state divers visiting the Florida Keys completed a 100-ft. dive and found very rough water when they surfaced, including a current that seemed to be taking them farther from the boat. The victim had been attempting to bring up an old anchor that he had found on the bottom. After working hard to raise it for a few minutes, he apparently gave up the effort and proceeded to the surface with his buddy. Both ran out of air on the surface, and the victim seemed very tired. His buddy relieved him of his speargun, and they both tried to swim toward the boat on snorkel. When the buddy looked back, the victim had disappeared, and the body has never been found.

The Relationship Of Equipment to Fatalities

In 1976, four deaths may be attributed to regulator maintenance. In one the diaphragm was dirty and in another it was dried out, cracked, and brittle. In a third case the regulator was reported to be hard breathing, obviously in need of overhaul and adjustment and in a fourth case, (and in a buddy's near death) the first stage froze in 38° water.

In 1976, six cases (five in California and one in Washington) showed kelp or seaweed entanglement as a factor. **One of the California cases occurred when the diver attempted to dive too close to the intake point of a kelp processing plant and literally became so entangled that it took others operating from a boat many minutes to cut him free. The other five cases follow a pattern long established in such entanglements. Typically, the entanglement occurs following a long cold dive with the diver low or out of air as he attempts to surface, only to find surface access blocked by a thick carpet of kelp. As the situation worsens, the diver thrashes about making the entanglement even more difficult, and eventually panic and death follow.**

Three other external entanglement cases were detected in 1976. **One diver, operating alone at an inland lake resort, swam into a maze of anchor lines beneath a dock with only 2 or 3 ft. of visibility. He became severely entangled; the body was not found**

until 24 hours later.

Two of the 1976 entanglement fatalities occurred while wreck diving in separate instances in two of the Great Lakes. The first of these took place on a wreck 140 ft. deep when the victim became entangled in old fishing lines. His buddies tried, but were unable to free him before he ran out of air and drowned. The second wreck entanglement case involved a very inexperienced diver who entered a wreck 80-ft. deep, stirred up the silt, and was found with his arm wrapped up in electrical wires.

"In at least 191 incidents the personal flotation device had not been inflated."

The one case of equipment entanglement has a number of incredible aspects to it. **The victim was a man who weighed about 250 lbs. and wore heavy dungarees and tennis shoes during the dive. He was warned in advance of the dive to avoid possible entangling in the crotch strap of his vest if he should drop the belt. The victim carried a nationally recognized certification as a diver which indicated he had about 4 years diving experience. When he entered the water from a small boat, he was wearing two weight belts totaling *32* lbs. He immediately became separated from his companions and surfaced to tell people in the boat that he felt somewhat heavy or over weighted. He was advised to drop one of the belts. Sometime later the victim was found in 20 ft. of water with both arms and legs floating upward while his body was held down with both weight belts entangled in the vest crotch strap.**

Of the 893 deaths of scuba divers in this study, in at least 191 incidents—21%—the personal flotation device had not been inflated. The degree to which inflating the vest would have helped the diver is uncertain, but the figure of 191 is indeed astonishing and suggests, at least in part, that divers have either not been trained to use their vests or that their mental state during an accident is such that they fail to inflate the vest.

The inflator cartridge plays some role in these deaths. In one case, the firing device had been so severely corroded that the cartridge could not be fired. In another case the buddy tripped the victim's cartridge by accident and he was later found trapped about 40 ft. deep under an overhanging rock ledge.

Next issue: *Part II of the NUADC report.*

Basic Scuba, A Text for Beginners

—*"At 360 feet I found it difficult to breathe."*

A few months ago, Van Nostrand Reinhold Company, a major New York publishing house, published the "Enlarged Second Edition" of Fred M. Roberts' *BASIC SCUBA*. On the back of the cover are two quotes touting the first edition of the book.

"All-in-all, a useful addition to any diver's library" (*Yachting Magazine*).

"This is a superior work. It provides an amazing amount of technical information in a fashion that is completely readable and understandable. . .Very valuable" (*The American Red Cross Magazine*).

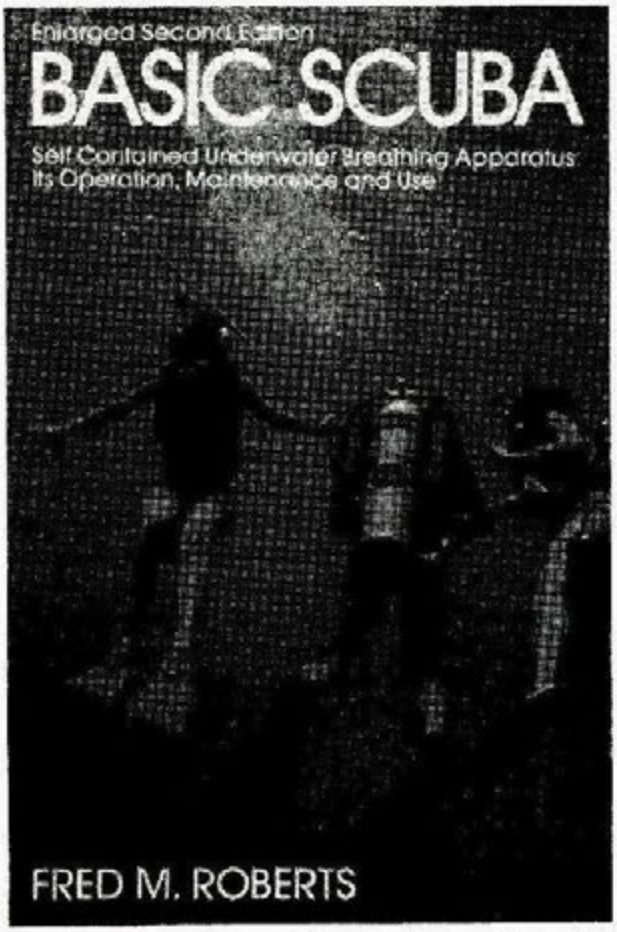
On the outside back cover, the publisher further lauds the book. "These quotes on the first edition of *BASIC SCUBA* are typical of the praise this important book received. Now completely revised, it is *the* book on the operation, maintenance, and safe use of all makes of Self-Contained Underwater Breathing Apparatus. . . .This edition fully describes all types of breathing apparatus brought onto the market since the book was first published. . . .*BASIC SCUBA*, a truly valuable guide, is every sport diver's bible. If you are a diver, or plan to become one, this is the one book you will want to have."

The heart of the 488-page book is a 245-page chapter (yes, 245 pages) entitled "Diving Lungs—Scuba Operation and Use." Here, the fortunate reader gets a technical description of how current equipment works and how to troubleshoot and repair each individual regulator brand on the market. In many cases the schematics of the regulators are also included. If you own any of the following regulators, the book is a must: Norseman, Divair, Dacor Dart, Demone Mark II, Northill Air Lung or Air-Mite, Scuba-Star, Rose Pro, Nemrod Snark III, Malibu Diver, Aqua Master, DA Aqua Lung, Fathom, Reef Diver, the Voit V-11 Viking 40, or the Hydro-Lung Supreme. If you don't happen to have one of these regulators then you might be interested in the maintenance and repair of the Dolphin Full Face Lung, the Scott Hydropak, or the Desco Saf-T-Eye Full Face Mask and Regulator.

No doubt the beginning diver will find the chapter on equipment useful. Here we learn that only the Seamless Nemrod Mask has safety glass—two layers of glass sandwiched over a sticky layer of plastic—and that the "Hawaiian snorkel or swim pipe functions as a regular snorkel except that to clear the tube the diver must reach up and hold the ball in its seat with his fingers and blow into the mouthpiece."

Roberts' section on flotation devices is especially interesting. Self-rescue devices, he says, "are now available from most diving equipment manufacturers. Some may be folded into a small packet and

inflated by means of a small carbon dioxide cylinder" which is squeezed. For example, the Res-Q-Pak is connected to the diver by means of a frail plastic strip with a snap on the end so that when the inner wings inflate it will not get away from the diver. Roberts informs us that "The U.S. Divers Float is attached to your chest and circles the neck. It will give some support to the head, but is not as effective as a collar type life jacket." According to the author, one type of army surplus inflatable belt is available. "This uses seltzer tubes and circles the waist only. . . After the mechanism is squeezed and the tubes discharged the diver is very cramped about the middle as the belt expands. I have found this squeeze objectionable and it is very difficult to fire the cartridges with a glove-enclosed hand."



Under the section on lights, Roberts tells us that commercial underwater flashlights "range in price from $3.00 to $4.00 for a rubber enclosed light, to $25.00 for one made of plated brass. Special rubber bags are available to put a regular flashlight in, securing the bag with a firm tie. An emergency device available to nearly everyone can be rigged using a mason jar. Just put your flashlight into the jar—be sure to turn it on first—and seal the cap. This method reduces battery life, but it does work reasonably well."

In the chapter on "Learning to Use Scuba," Roberts describes various techniques for controlled breathing (which some unsympathetic people may call "skip breathing") and then discusses his favorite. "The method I use is to take a large breath very slowly, this may take 10 seconds, then hold it for a count of ten (not necessarily ten seconds) and exhale very slowly for about 10 seconds. Thus a single breathing cycle may take me 25 to 30 seconds. Normally you breathe about every 6 seconds. Theoretically, I can extend my diving time 5 times my normal time; in practice, however, it is more on the order of 3, due to lack of economy in other functions, such as buoyancy correction when shooting movies. On some occasions it was possible to dive at 52 feet for over an hour-and-a-half with a single 70-cubic foot cylinder which normally would last only 30 minutes at this depth. With practice and a touch of 'Scottish' blood, you can draw a cylinder down to a pressure so low that the remainder can be easily held in by thumb pressure over the valve opening."

In his chapter on "Self-rescue and Water Safety," Roberts discusses a variety of dangerous sea creatures. He says of the moray: "He has a very bad reputation, and he has earned every bit of it. . . .They are pugnacious, always ready to attack anything that swims on the least excuse." He also tells us that "the killer whale has earned its name by its ruthless and ferocious attacks on anything that swims. They have been known to come up under ice floes and knock seals and people into the water."

In the chapter on rubber suits, Roberts discusses the advantages of neck entry, waist entry, and front entry suits, noting here that "some divers object to the wad of material that hangs in the front after the seal has been made. He discusses the problems of attaching gloves, suggests four methods for making the seal, including one contributed by Chicago divers, who "cut both ends out of a tin can, large enough to pass a hand through, and slip this tube over the wrist and under the cuff," permitting the glove to be pulled up over the exposed end and then taping it for a water-tight seal.

Roberts uses his long diving experience to highlight many of his points. For example, in describing nitrogen narcosis he tells us:

"How does it feel when you have narcosis? Perhaps you have read about such things as the air tasting metallic, the desire to give your mouthpiece to a fish, or feeling as though you are on cloud number five. Unfortunately, I have never felt any of these. At a depth of 175 feet I have felt as though a band were being drawn tight about my head, becoming tighter as I descended until finally a pain like a hot iron at the base of my neck formed. All this time my head felt as if it were full of cotton.

"At a depth of 360 feet I became unconscious, but I do remember some of what happened after this point, although events seemed like a dream. At some point between 360 and 380 feet (the maximum depth reached on air) I found it very difficult to get enough

air. The urge was to drop the mouthpiece and open my mouth and inhale. Fortunately I had taken the precaution of strapping the mouthpiece on very tightly before starting. Later this urge passed and I felt in a dreamy world of the past. I thought I was somewhere else, at times my mind wandered over things I had done before.

"Finally I began hearing strange noises like the sound heard when a car sounds its horn close by and then continues on into the distance. It was caused by reduced pressure and my ears clearing while I was unconscious. I regained consciousness at about 320 feet and the narcosis disappeared completely at 175 feet. Unfortunately I did have a hangover from this dive—a two-week headache."

By now it should be apparent that what we have found in a local bookstore in 1979, dolled up in a fancy new cover featuring a diver in a Dacor Nautilus, is a book so out of date it appears to be a satirical rather than a serious effort. In fact, in small print on the inside cover one may see that it was copyrighted in 1963 and although we have not seen the original edition, there is no evidence that a pencil was lifted to update it.

To experienced divers who know that divers today wear a BC, not a Mae West, and that pressure gauges (which are never mentioned in the text) are used to monitor air consumption, *BASIC SCUBA* is an interesting historical piece, sometimes amusing, sometimes informative, and sometimes even useful. It reminds us that once upon a time scuba diving wasn't just for everybody, but rather it was the preserve of tough guys who strapped on twin tanks with double hose regulators, took them as deep as they could go, and didn't have a notion about dump-valves, bottom timers, or automatic inflators. And a few of those tough guys, God love 'em, are still around to talk about it.

But the irony of *BASIC SCUBA* is that it was not issued as a historical piece, but rather was intended for sale to the novice interested in taking up the sport. Reissuing this obsolete material in a shiny new wrapper—with no effort to convey to the purchaser what he is really getting—is, we believe, damn irresponsible.

It is one thing to hoodwink a reader into buying an old James Jones novel by dressing it up in a 1979 cover (*Go to the Widowmaker*, somewhat about diving in Jamaica, is ten years old but today is redisplayed in bookstores). But it is something else to peddle an ancient instructional text, dressed up in a contemporary cover and claim, as the introduction does, that the book is "designed to help you understand and become proficient in the sport of SCUBA diving."

In the hands of a not-too-bright novice, who believes that the $7.95 he has paid for the book has just bought him the latest word on diving, the book is downright dangerous. If he follows the advice offered, which entirely ignores the quantum leaps in safety our sport has experienced in the last 16 years, our novice will find himself in deep trouble. The equipment and practices that meant safe diving in 1963 do not mean safe diving in 1979.

Freedom of the press assumes that publishers are responsible people. There is no evidence of that here. If a dangerous book, like an unsafe product, could be recalled this would be off the shelves in a second.

The Sport Phone

—A submersible Citizen's Band radio for divers

What is the utility of underwater voice communication devices for sport divers? For the most part, we have not considered the ability to speak to one another underwater a very significant contribution to the world of sport divers. Most simply we enjoy tooling around looking at things and, perhaps, pursuing photography, although we do acknowledge tha for some sport divers—treasure seekers, wreck di rs, night divers, serious photographers—the al ity to speak to one another can have value. Of c rse for instructors or other professionals, verbal communication is important.

On the other hand, the President of Sound Wave Systems Dennis J. Johnson, whose company produces the Sport Phone, obviously has a different view, which he presented to a Diving Equipment Manufacturers seminar group. We have paraphrased Johnson's argument as follows:

"Man is a thinking animal. He gets things done by communicating intelligently in learning, in work and in play. If he is unable to communicate freely he feels unnatural, constricted, isolated.

Emotional involvement in the sport requires a sharing of the diving experience—and sharing means communication. Voice communication underwater achieves that end and makes divers feel freer and more natural underwater.

Despite technical advances in recent years, diving equipment is still not helping divers feel more natural underwater. The industry has always approached the need to feel natural as a physical or physiological problem, but it is time to address it on a psychological level. We should be designing equipment that meets man's emotional needs—his need for

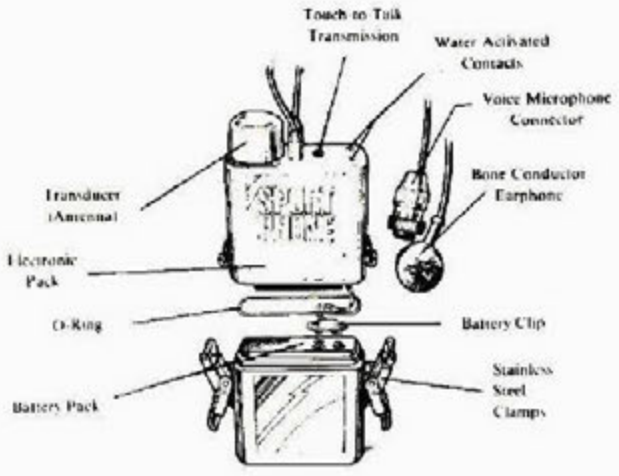
communication, interaction, feedback, reassurance and so on."

Surely Johnson's views have some validity, although we think he overstates the relationship between feeling natural underwater and being able to speak to another diver. Good divers feel quite natural underwater without the aid of electronic communication. And we have no doubt that communication, interaction and feedback contribute to man's emotional stability, but none of us require verbal communication every minute of the day, either above or below the surface. Under emotional stress, however, the ability to communicate will indeed help.

***"I was somewhat apprehensive about this device covering my face, perhaps because I had just seen the movie* Alien..."**

Nevertheless, while the ability to speak underwater is not essential for a sport diver to enjoy his dive, for some it will certainly increase the pleasure—and the safety. *Undercurrent* subscriber Bob Eliezer of Corapolis, Pennsylvania has written us describing how the Sport Phone has added a dimension to his diving.

"I was probably one of the first to buy a set of Sport Phones when they came out early in 1978, and have been absolutely thrilled at the added dimension to my diving experience. I really appreciate being able to talk to my buddy in 90 feet of pitch black water, when I need help getting a lobster out of a hole. I enjoy the fun of pointing out something special to my buddy and appreciate discussing why we ought to head off in one direction or the other, rather than waving arms to explain that I want to go back to a certain place to see if that huge bug is in the same hole it was the last time."

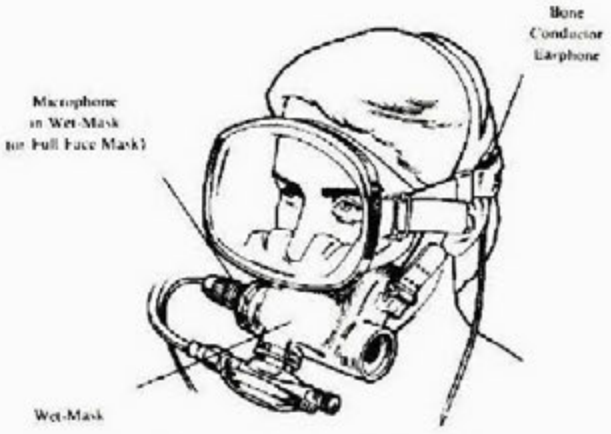


SPORT-PHONE'S ELECTRONIC CIRCUITRY

(Sketches from instructions provided with Sport-Phone)

With Eliezer's comments in mind we decided to halt our philosophizing and test the Sport Phones for ourselves. This is what our tester, Captain Nemo, reported.

The Sport Phone is a citizen's band radio which operates underwater. The breakthrough in mass production and marketing of citizen's band radios no doubt provided the impetus for an underwater CB and the manufacturer, Sound Wave Systems, has been able to produce a device within the price range of many sport divers: $197.50. Of course two are required if divers are to communicate to each other, but a device for listening only, called the *Wet Word*, retails for $146.



DONNING THE SPORT-PHONE

The *microphone* of the Sport Phone is located in the so-called "Wet Mask," a rubber mask which is strapped over the diver's mouth and creates an airspace in which to speak. The diver's regulator is fitted into the tip of the mask to provide air on demand.

The *earphone*, about one inch in diameter, is not placed in the ear, but in front of it, and held in place either by a mask strap or a hood. Sound is transmitted through the scalp into the middle ear.

The electronic pack and the battery pack are clamped into a single unit about 7 inches long, 3½ inches wide, and 2 inches thick and is worn on a tank or BC belt. The electronic unit is sealed, so there should be no potential water leakage problem, but an o-ring seal between the packs keeps the batteries dry. The unit is powered by ten 1.25 volt rechargeable NiCad batteries or eight 1.5 volt AA alkaline batteries. Underwater it weighs about one pound, above water, with batteries, about three pounds. Two cords run from the pack, one to the microphone in the mask, and one to the earphone.

Using the Sport Phone is simple. When one enters the water, the phone is activated automatically to receive messages. To transmit, the diver must place his finger on a raised screwhead located on the belt-mounted radio unit and leave it there throughout the message. And that's it.

Our Test:

As I strapped the Wet Mask over my mouth, cheeks and chin and plugged in the microphone, I was somewhat apprehensive about this device covering my face, perhaps because I had just seen the

movie *Alien,* in which a spaceman is attacked by a creature which positions himself about the same way. Nevertheless, once in the water I quickly became accustomed to the replacement for the normal regulator mouthpiece and was pleased to find that it sealed easily on my bearded jowls. At first I was slightly annoyed with the radio crackle in my ears, but I soon forgot the noise as I began to practice speaking. Our communication was garbled and we spoke too fast, but remembering the instructions, we slowed our speech, and within 20-30 minutes we were chattering like jaybirds.

About 75-80% of our words were intelligible and since the instructions say that we could expect to lose 15-20%, we were doing quite well in a short time. The loss of words, however, did *not* mean that we lost meaning of sentences; in fact we were able to understand the intent of nearly all communication during our first practice session.

I found some difficulty in placing the earphone correctly for the clearest reception but after experimenting, my buddy and I both determined that we got the best reception with the earphone slightly in front of and overlapping, but not covering, the ear.

Although I could understand some messages through the background sounds of my own exhalation or the sender's moderate exhalations, the device worked best when the listener did not exhale during reception and when the speaker exhaled normally. A diver using a Sport Phone will find it just about impossible to share air with an out-of-air buddy, so it makes good sense to be equipped with an octopus rig to handle any out-of-air situation. Furthermore, orally inflating a buoyancy compensator when wearing a Sport Phone is a mean task. The Wet Mask straps are worn under the straps of the dive mask, so removing the wet mask to inflate the BC is a complicated process. An automatic inflator must be standard gear, then, for a diver equipped with a Sport Phone.

I normally use a Poseidon regulator, but found it did not fit the Wet Mask and therefore had to borrow a Dacor Pacer for the test. Apparently, a few regulators which are particularly sen-

An Improved Sea Voice

Until last year Dave Williams would close his Illinois wholesale car business for the winter months and spend as much time as possible diving the Caribbean. One winter, while on a dive at Cayman, another diver swam up, pulled his glove over his mouth and spoke. An astonished Williams heard every word. Intrigued, he began experimenting with different glove configurations for underwater communication and eventually closed his business to pursue the commercial possibilities.

When satisfied he had a marketable product, Williams released the Sea Voice, an elongated bladder attached to a mouthpiece into which the diver speaks. *Undercurrent* reviewed the Sea Voice in the November/December 1978 issue. We found some liabilities in using the Sea Voice, not the least of which was having to take one's regulator from one's mouth to speak, but we did find that with practice, the Sea Voice would permit divers to speak with each other at a distance of up to 10 feet. As the distance increased, however, the clarity decreased rapidly.

After publication of our test, Williams called to inform us that the bladder we had tested was .0013" thick and suitable for close range only. They had marketed a second bladder .0019" thick for longer ranges, but had discontinued both, and now were marketing a single bladder about .0016", and asked if we would be willing to try it. We agreed, saying that if it had a significant effect on the quality of the communication we would alter our review.

We're pleased to report that with the new bladder, speech improved markedly over the previous tests. After the speaker and listener practiced, the listener had little difficulty understanding the speaker at ranges up to 30 or even 40 feet. Of course, some of the same liabilities still remain. For example, unless the listener is expecting a message and prepared to hear it, he may miss it entirely. If the listener inhales or especially exhales, the sound of breathing may easily overwhelm the message and make it inaudible. Nevertheless, with practice the device works reasonably well at distances up to 40 feet and, therefore, at $24.95 provides a very inexpensive means for underwater conversation.

We offer one caution. The device should not be used by novices or people uncomfortable during the dive. Because the regulator has to be removed from one's mouth and air breathed and rebreathed to speak sentences, the process could conceivably contribute to panic and an accident in an inexperienced diver. A good diver should have no problem.

The Sea Voice can be found in many dive shops or ordered directly from Sea Sonics, P.O. Box 94458, Schaumburg, IL 60914. Williams told *Undercurrent* that the band that holds the bladder to the mouthpiece had loosened on some models, but owners having a defective band may simply drop a postcard to request a replacement. He also said that should a driver drop out of diving, the bladder will make a fine hot water bottle.

sitive tend to freeflow with the Wet Mask, and may need to be de-tuned a bit before they can be used.

"An automatic inflator must be standard gear, then, for a diver equipped with a Sport Phone."

In the models we tested there were minor problems. The NiCad battery packs fit so tightly in the battery holder unit, they were nearly impossible to remove. The power supply connector needed to be twisted to snap it on the battery pack, which is not particularly difficult, but could have been made easier. The clamps used to join the two packs together are designed so as to not be opened inadvertently, but are therefore difficult to open intentionally.

The instructions are clearly written, but they are provided on the back of a 12"x 24" poster, obviously designed for advertising impact, and not diver convenience. The instructions ought to be printed in a small booklet which won't blow away when unfolded outdoors. Otherwise, they are candid, with limitations clearly stated: compared to surface conversation, expect a loss of intelligibility; communication between divers may be blocked if a large object (a boulder, a ship) is between them; for each 33 feet one descends, about 4% of the speech quality is lost; transmitting distance is shortened in a kelp bed; the maximum depth for usage is 130 feet, but 100 feet is preferred. A useful trouble shooting pamphlet also accompanies the Sport Phone.

(A Wet Word listening pack ($146) is offered for divers who need to listen but not speak, e.g. an underwater film crew which needs instructions from a director, but need not reply verbally). Curiously, a third diver in the water with us heard our conversations clearly without any device whatsoever. Apparently, the Wet Mask works similarly to the Sea Voice, creating an airspace in which the diver speaks which permits transmission of speech through the water. The effective distance for eavesdropping was limited to about ten feet.

Sport Phone Versus Sea Voice

If one is interested in speaking underwater should one buy two Sport Phones at $395 or two Sea Voices (see insert) at $49? Consider the differences.

The Sea Voice is clumsy to use because the diver must take his regulator from his mouth and use two hands; to use a Sport Phone all a diver must do is touch a screwhead on the battery pack. To hear a Sea Voice message the diver must be expecting it; Sport Phone communication is clear even if the diver is not expecting it. However, when the listener knows the message is coming from a Sea Voice it can be readily understood and may, in fact, be nearly as intelligible as a message from the Sport Phone. Communication with the Sea Voice is limited to 50 feet under the best of conditions, while the Sport Phone will work for distances up to 300 feet. The Sea Voice has no batteries to run dead, no parts to corrode.

THE SEA VOICE—FOR NONELECTRONIC COMMUNICATION

Still can't decide? If you want now and then just to point out a nudibranch, ask a question or say hello, the Sea Voice will suit you well. If you dive a lot and expect to carry on more serious conversations, you probably won't be satisfied until you get a Sport Phone.

Final Thoughts

Speaking underwater can get addictive. Surely it will make diving a little safer (although the hassle of the Sea Voice or the extra clutter of the Wet Phone complicate things a bit) and, in many regards, a bit more enjoyable. I can see how pleasant it will be discussing the beauty of a kelp forest, trying to figure out the antics of a school of groupers, or being called over to observe the discovery of a fellow diver.

Regardless, there is an isolation I enjoy underwater and I hate to give that up. Something tells me that my tranquility demands that I keep the Silent World silent. Though I enjoyed my Sport Phone conversations, I've decided not to buy one for myself.

But, I may be spoiled. I haven't been diving since the tests and wonder, now, if I will be able to get along without a few words from my ever lovin' buddy. I don't feel addicted to the conversations I had, but perhaps I'll take it along once more, just for kicks.

Comment: It would seem that our Captain Nemo is getting hooked on chit-chatting underwater. Apparently the people who market the Sport Phone realize that once a diver tries it he may indeed get hooked, so they have authorized their dealers to initiate a rental program to attract customers. Not many shops handle the Sport Phone yet, but a few calls around your community should uncover someone who will permit you to test it. For further information, you may wish to contact Conquest Marketing, 3176 Pullman St., Costa Mesa, CA 92626, (714) 540-2323.