FACEPLATE

SUMMER 1972

Special Warfare

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FACEPLATE

Vol. 3 No. 2

FACEPLATE is published quarterly by the Supervisor of Diving to bring the latest and most informative news available to the Navy diving community. Articles are presented as information only, and should not be construed as regulations, orders, or directives. Discussions or illustrations of commercial products do not imply endorsement by the Supervisor of Diving or the U.S. Navy.

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Editor-in-Chief
CDR William I. Milwee

Assistant Editor-in-Chief
LCDR Edson Whitaker

Managing Editor
Carol Jess

Art Editor
Ken Ross

Graphic Artist
Reecye French

. . . the official magazine for the divers of the United States Navy.

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Special Warfare Group Photos, P.H.C. Chip Maury, Inshore Warfare Command, Pacific; Old Master and Battelle, P.H.I. J.R. Huckins (D.V.) Experimental Diving Unit; Saturation School (pages 24-25), Official U.S. Navy Photo.

Salvage Brings From

From top: CDR J. J. Coleman, Supervisor of Diving, CDR R. B. Moss, Deputy Director of Ocean Engineering, and CDR R. G. Donnelly, SUPSALV Representative, Europe, discuss the morning's activities. Denis Irons, Oil Pollution specialist, describes the OOC Boom and its many uses in oil containment. Suzette Pinder assisted with registration for CDR Donnelly. James Walker and Helen Bebout from SUPSALV were program coordinators. Speakers for the conference pose with CAPT E. B. Mitchell, Supervisor of Salvage, second from right. From left they are, Charles Darley, Office of the Supervisor of Salvage; Billie Delanoy, Taylor Diving and Salvage Company; CAPT Mitchell, and Jim Helbig, CYCLO Company. Opposite page: Salvage officers LT Charles Macklen and LT Joe Grable give full attention to SUPSALV, CAPT Mitchell, at the recent Salvage Officers Conference.

Contractors, salvors, and divers from Europe, Asia, the Atlantic and Pacific were there with one subject in mind: salvage. About 75 salvors met at the Amphibious Base, Coronado, Calif., for the annual Salvage Officers Conference. SUPSALV organized the affair, and Deputy Director of Ocean Engineering, CDR R. B. Moss, chaired the conference which covered subjects such as oil pollution, detailing, commercial diving, and ongoing Navy-sponsored projects.

Following a welcome by CAPT R. F. Stanton, Commander Naval Inshore Warfare Command Pacific, CAPT E. B. Mitchell, Supervisor of Salvage, gave the keynote address. He briefly outlined the topics to be discussed at the conference and gave an update on the organizational progress made within SUPSALV in the past year. Next, discussing "Present Capability and Future Plans" of the SUPSALV oil pollution program was Denis Irons, SUPSALV abatement specialist. He explained that SUPSALV is now responsible for all oil spills from the surf line out. As part of the Open Sea Oil Containment Program, 6000 feet of boom have been constructed to be prepositioned in 2000-foot sections on three coasts. Abatement, containment, prevention and collection are all under study by SUPSALV according to Mr. Irons.

CDR R. G. Donnelly, SUPSALVREP Europe, presented a BBC film "Salvage at Sea," which was well received by the participants.

Activities of commercial salvors the world over were covered by Peter Barracca of Murphy Pacific Marine Salvage Company. He outlined several important projects which face commercial companies, such as the potential salvage in the Suez canal and the harbors of Bangladesh.

CDR J. H. Boyd, Assistant 140X Detailer BUPERS, was the next speaker of the morning. His subject dealt with the job of matching the right people with the right job, keeping in mind three considerations: the individual's desires, his career needs, and the Navy's needs. CDR Boyd expanded on these and other personnel considerations connected with the detailer's job.

Officers' Conference Salvors Together Around the World

The Realignment Program for ESSM Pools and Bases, which fills an important need for salvors, was covered by H. E. "Jack" Jackson, Head, Logistics Division in the Office of the Director of Ocean Engineering. Since the overhaul of the system in 1971, the effectiveness of the network of bases and pools which store, maintain, control and issue materials for emergency salvage operations worldwide has been greatly increased.

Opening the afternoon session was CDR John McElheny from the Fleet Liaison Branch (OP 943) who gave the group a look at the National Oil and Hazardous Materials Pollution Contingency Plan. He explained the changes in regard to funding reimbursement for cleaning up an oil spill and explained that a new instruction OPNAV 4740.6 is being issued to further clear up the matter.

A status report on Supervisor of Diving Programs was next, presented by CDR W. I. Milwee, Assistant Supervisor of Diving. The goals of the program are to provide the Navy diver with tools, techniques and equipment to work effectively, safely, and comfortably at depths to 1,000 feet now, 1500 feet in the near future, and 2000 feet eventually. His discussion next moved into four general areas, deep diving, the MK 2 DDS, the MK 1 DDS, and the MK 10 closed circuit mixed gas, underwater breathing apparatus. Experimental diving, the next cold water dive to 1250 feet and a wet dive to 1600 feet, all to be held soon, were briefly outlined.

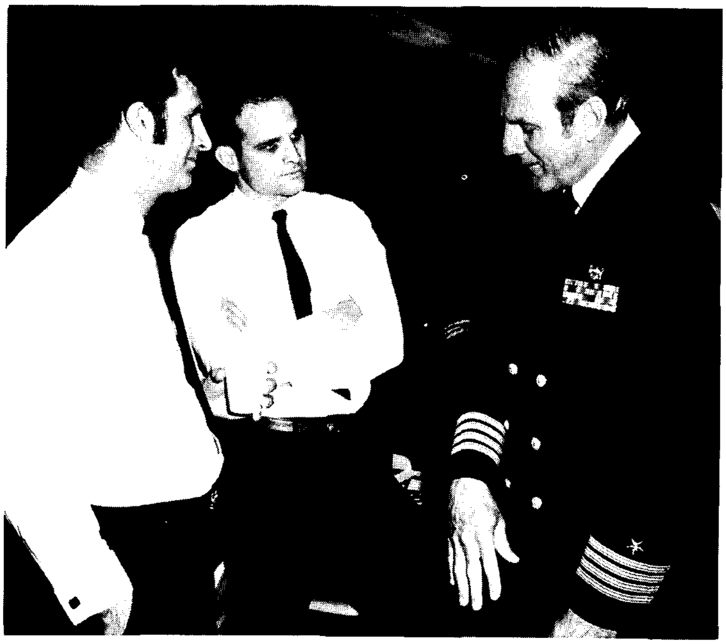
James Helbig of the Cyclo Manufacturing Company described the Pressurized Sphere Injector (PSI), a new buoyancy system which uses hollow spheres with two-way valves to lift wrecks from the bottom. The system also includes a pressurizing chamber and a flexible conduit to provide a simple method of ship salvage.

Dale Uhler, SUPSALV Ocean Engineer, who has been involved with the LOSS method of ship recovery, gave a slide presentation on the LOSS demonstration held recently.

The repair and reimplantment of the Azores Fixed Acoustical Range, AFAR (see FP Spring 72) in deep water was discussed by Earl Lawrence, SUPSALV Salvage Operations expert. The use of the CURV III vehicle was instrumental in the success of this project which demanded it to function in over 2000 feet of water.

Charles Darley, Manager for Certification in the Office of the Director of Ocean Engineering, covered the needs and requirements of diving equipment certification. He elaborated on the importance of certification to insure the safety of the men who use diving equipment. He described various publications now available for certifications procedures and which dictate the philosophy of certification.

Representing the New Orleans based diving firm of Taylor Diving and Salvage, Billie Delanoy discussed personnel differences between commercial and Navy divers. He pointed out that there is an increasing need in the commercial field for better educated, more intelligent divers to operate the sophisticated equipment necessary in saturation diving.



SOUNDINGS

WELDING IN WET SUITS

Welding in a wet suit, while authorized in the *Underwater Welding and Cutting Manual* (NAVSHIPS 0929–000–8010), should be considered an emergency procedure only. Wet suits should never be used for welding in fresh or brackish water as an extreme electrical hazard exists. In the event welding must be carried out and wet suits are indicated, the Supervisor of Diving should be contacted for advice.

NEW NUMBERS

Telephone numbers at the Experimental Diving Unit, Washington, D.C. and the Naval School, Diving and Salvage, have recently been changed. Numbers for the EDU now have the prefix 433 instead of the old OX3. The same change was made for the School. The last four numbers remain the same. Autovon number is now 288. The duty number for EDU is (203)433-2790.

FRENCH FIRM DIVES TO 1640 FEET

A chamber saturation dive to 1640 feet was carried out during February in the Hyperbaric Research Center of COMEX in Marseilles, France. Two commercial divers remained for 100 hours at depth in an oxy-helium atmosphere.

Preliminary results of the "Sagittaire II" experiment show the divers suffered symptoms of the High Pressure Nervous Syndrome which appeared in the 1000 to 1200 foot range. The divers were returned to the surface without further mishap.

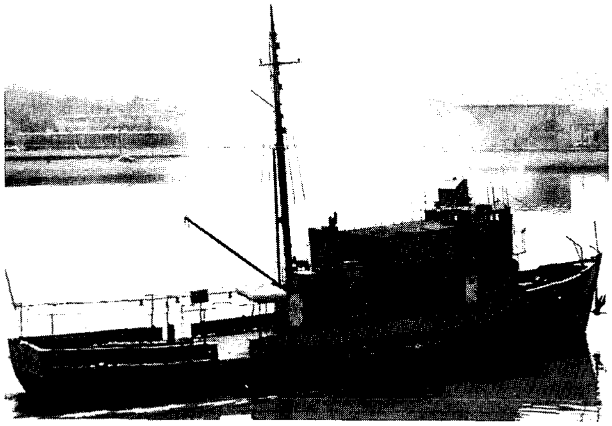
"FIVE BOAT" RETIRES TO NEW DUTIES

The YDT–5, a diving tender which provided a training platform for more than 100,000 divers in 29 years, is retiring to Florida like some of the divers she has seen through training may have done.

Built in 1941 and commissioned USS FEARLESS (AMC-80) in the following year, her first assignment was with the Inshore Patrol, Third Naval District. After her reclassification to YDT-5, she was converted to a diving tender in 1943 and was assigned to Naval School, Deep Sea Divers, Cape May, N.J.

1944 saw her operating from the school in Washington, D.C., training student divers in the waters adjacent to Maryland and in later years, Virginia.

The now ex–YDT-5 sailed to Green Valley School, Orange City, Florida, where children appreciate her proud history. Two YDT's (14 and 15), which can be used interchangeably for deep diving and salvage work, have replaced the "Five Boat" at the Naval School for Diving and Salvage.



EDU RESEARCH REPORTS

Non-DOD facilities desiring copies of the Experimental Diving Unit research reports (see FP winter 71) should address their requests to National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22151. The charge for each report is $2.00. DOD facilities can still obtain copies from the Defense Documentation Center (DDS), Attn: DDC–TSR–1, Cameron Station, Alexandria, Va. 22314 as reported in the Winter issue. Current reports now available are listed below.

Experimental Diving Unit Report 2–72. *Procedure for Calculation of Cumulative Pulmonary Oxygen Toxicity.* LCDR W. Brandon Wright. May 1972.

> Abstract: The use of elevated oxygen pressures in diving, treatment of decompression sickness, and hyperbaric oxygen therapy exposes the subject to the risk of oxygen toxicity of the lungs. At present no adequate guidelines exist to assist the physician in planning an oxygen exposure which will be safe from this hazard. An extensive multi-year research series recently completed by the University of Pennsyl-

vania's Institute for Environmental Medicine has allowed the development of a method of calculating an estimated rate of onset and severity of pulmonary oxygen toxicity in man for any oxygen exposure.

This report explains that method and provides tables that may be used to rapidly estimate the severity of pulmonary toxicity which may be incurred by any oxygen exposure.

Recommendations as to safe limits of oxygen exposures for various procedures are included.

Experimental Diving Unit Report 3–72. *Biomarine CCR–100 Mixed Gas, Closed Circuit Underwater Breathing Apparatus.* LT Alfred B. Quist, EMC Thomas C. King. May 1972.

Abstract: The Bio-Marine CCR–1000 mixed gas, closed circuit, underwater breathing apparatus was evaluated by the Navy Experimental Diving Unit during the period 12 October to 5 November 1971. The purpose of this evaluation was to determine the suitability of this equipment for use by Naval Inshore Warfare forces. Test results indicate that the equipment meets these requirements and that further testing is warranted and recommended.

THE MAN. . . NOT THE DEED

Reenlistment ceremonies are special events to most men, who sometimes go to extremes to make their particular ones memorable.

Senior BMC Carl M. Brashear recently reenlisted without much fanfare, but the man himself is somewhat of a phenomenon. A qualified Navy diver for 20 of his 24 years in the Navy, Chief Brashear was seriously injured in 1966 while working on board the salvage ship USS HOIST (ARS-40). The injury resulted in the loss of his leg and threatened to cost him his diving career as well. He fought that decision, and remains today one of the Navy's most respected divers. In June 1970 Chief Brashear qualified for Master Diver and now leads the diving force on the RECOVERY.

It was RADM Joseph L. Yon, Commanding Officer of the Portsmouth Naval Hospital, Va., at the time Chief Brashear lost his leg, who delivered the reenlistment oath.

WRONG NAME

In the article "Naubuc/Curv III Partnership" (FP, Spring 1972), the New London Laboratory, Naval Underwater Systems Center was inadvertently referred to as the Underwater Sound Lab. We regret the error.

HECTOR DIVERS BREAK ROUTINE IN BLUE WATER DIVES

Divers from USS HECTOR (AR-7), in what is believed to be a Repair Ship first, had the rare opportunity for a mid-ocean dive recently when both screws of a patrol gunboat became heavily fouled from a parted eight-inch nylon towing line.

The ship motion at times was quite severe. By straddling each shaft just forward of the strut and reaching aft to cut and unravel the line, two divers were able to clear the screws in about one hour. The greatest effort was expended in the necessity of just "hanging on." Divers described the experience as being "equivalent to the $1.00 special at Disneyland."

HECTOR is currently back in the dirty water routine of underwater inspections, plugs, cofferdams, bottom searches and dinged propellers. This blue water dive provided a welcome change for the "hard chargers" of AR-7. Divers currently assigned on board are LCDR C. A. Bartholomew, LT F. S. Wood, MM1 O. R. Schill, HT1 F. D. Ladue, BM3 D. L. Inskeep, HT3 R. S. Paul, and ET3 M. A. Cole.

HONORS and AWARDS

RADM RINDSKOPF RETIRES

After more than 35 years of Naval service, with a career including being the youngest commander of a submarine (at age 27) to Deep Submergence Systems Coordinator, RADM M. R. Rindskopf will retire in June. During his tenure in his current post, the U.S. Navy has regained its role as leader in the diving world. In a recent interview with FP, ADM Rindskopf commented on his participation in diving, "We have expanded at a tremendous speed and even now, with defense budget constraints ever tightening on research projects, we have continued to progress. I feel the next 10 years will be ones of greater exploration to greater depths, in an ever expanding awareness of the ocean's potential."

RADM Rindskopf has had the difficult role of coordinating all efforts to explore the ocean, not an enviable task. His efforts in behalf of the Diving Navy will be long remembered.

DR. FLYNN RECEIVES AWARD

LCDR Edward T. Flynn, Jr., MC USNR, was the recipient of the Meritorious Service Medal for his "lasting contribution to the advancement of man in the sea." For his participation as a subject in the Navy's first 600-foot cold water deep dive at Duke University as well as his participation as on-scene Medical Officer during the Mark 1 Deep Dive System Operational Evaluations which contributed to the highly successful completion of these missions, LCDR Flynn reflects "great credit upon himself and represents meritorious service in the highest traditions of the U.S. Naval Service."

EISSING GOES TO CIVILIAN FIRM

The Navy recently lost one of its foremost diving and salvage experts when HTCM (DV) Frank E. Eissing, Jr. transferred to the Fleet Reserve. For the past two years, Chief Eissing served with Harbor Clearance Unit One in the Philippines, Vietnam, and Hawaii. He entered the Navy during World War II and had previously retired in 1966. Because of his vast experience and knowledge of diving and salvage, he was asked to return to active duty during the Vietnam buildup. While attached to HCU-One, he served as Officer in Charge of the YRST-1, Chief Master at Arms, was instrumental in the salvage of the SS ROBIN HOOD, and in the development of a salvage curriculum for training the Vietnamese Navy salvors. Upon his release from active duty Chief Eissing will begin employment with a commercial diving firm.

MULTIPLE HONORS TO CANTALE

EM1 John A. Cantale, was the recipient of several awards at ceremonies held recently at the Naval Experimental Diving Unit, Washington, D.C. For his outstanding performance of duty at the Ship Repair Facility, Subic Bay, EM Cantale was honored with a Letter of Commendation for his unit which received the Meritorious Unit Commendation. For his service in Vietnam while serving with the Mine Division 112, Detachment One, EM Cantale also received a Meritorious Unit Commendation. The Petty Officer was also the recipient of the Meritorious Achievement Medal for ". . . diligent efforts and resourcefulness in the conversion and upgrading of a surplus utility land craft into a diving tender. . ."

REGULUS Succumbs To Typhoon Rose

SUPSALV picks up the pieces

On the morning of 16 August 1971, as the USS REGULUS (AF 57) was leaving Hong Kong Harbor, warning was received that Typhoon Rose had shifted course and was headed toward Hong Kong. The REGULUS steamed to the northeast, with a pilot, to anchor in the port typhoon shelter off-shore from the New Territories mainland section of Hong Kong.

By nightfall, the wind and rain had reached storm proportions. Shortly after midnight, the full force of the storm struck. According to the Commanding Officer of the REGULUS, the ship was anchored on both anchors and steaming ahead up to nine knots. At approximately 0200 on 17 August, the REGULUS was driven aground. About 40 minutes after the grounding, improved visibility revealed the 500-foot tall rocky outline of Kau I Chau Island, with the REGULUS caught on the sharp rocks at the base of the island.

Initial estimates of damage indicated that the ship was hard aground, buckled all the way through at frame 85 with a hole under the bow. The engine room was flooded to 35 feet and holds numbers two, three and four were flooded to 20 feet. The superstructure was warped and cracked, and extensive topside damage had been experienced.

An appraisal of the situation found that the immediate problem included prevention of oil pollution, spraying of dispersant chemicals on limited oil slicks, off-loading of sensitive effects, survey of the hull, and off-loading of personal effects, stores and debris which might generate hydrogen sulfide gas as they decomposed.

Off-loading of fuel, ammunition, equipment and debris were hampered by accumulations of hydrogen sulfide gas. Preventative Medicine Unit Six (PMU-6) in Pearl Harbor sent information on combating and working with hydrogen sulfide gas. Initially a 6-inch pump was rigged to circulate the water in each of the two affected holds, two and four. After 20 hours of circulation, the gas concentration in hold number two was down to two PPM. Two 10-inch pumps were rigged in hold number four. The 10-inch pumps not only brought the gas concentration level down to two PPM, but also were effective in removing decomposed foodstuff and water-soaked cartons.

Surveys of damage were made almost daily as salvage operations continued. The more thorough diver surveys progressively revealed the extensive nature of the damage. It was determined that the ship was cradled in rocks from stem to midships with the remainder of the hull resting aground its full length at high tide and approximately 4000 tons aground at the highest tide of eight feet. The buckle at frame 84 was cracked from approximately 26 feet above the bilge on the starboard side around to 10 feet up from the bilge on the port side. The bottom could not be seen, but the crack appeared to go completely across. There was a hole 30 feet long in the port side of the ship at the turn of the bilge.

Number two hold was penetrated by a protruding rock extending six feet into the hold. A two and one-half foot tear extended from the bottom upward for 12 feet. There were several cracks around the crushed-in area.

Number four hold was penetrated by a large rock on the port side. The rock extended inside the hull from frame 94 to frame 110 to a depth of about 15 feet in from the side and a height of 16 feet above the keel. Investigations of hold number four by divers in deep sea outfits revealed that the rock penetrated inboard to the shaft alley bulkhead.

The engine room was flooded to 35 feet. Surveys disclosed that the engine room was penetrated by a large rock on the port side. The engineering space hull plating was torn or missing from the hold at frame 94 forward to frame 70. In addition, there were three smaller rock penetrations in the engineering space.

The sub-board of inspection and survey, Yokosuka, made the report of survey on the REGULUS. The board found that the ship was unfit for further service because the material condition of the ship was such that the $4,306,400 cost of repairs and alterations required was disproportionate to the value of the service to which assigned. The board recommended that the REGULUS be stricken from the Naval Register.

The decommissioning of the REGULUS and the inactivation of Task Unit 73.4.2 on 10 September ended the salvage operations phase of the REGULUS conducted by units of the U.S. Pacific Fleet. Final breaking and disposal phase of the operation was accomplished by U.S. Navy Supervisor of Salvage through his contractor, Murphy Pacific Marine Salvage Co. LCDR James Bladh was the SUPSALV representative for the final phase.

Special Warfare Groups Tackle a Special Kind of Task

Special Warfare Groups were originally established in 1969 to coordinate and exploit inherent unconventional warfare, special operations, and counter-insurgency capabilities of certain specialized Naval units and to provide their direct command, control and administrative structure.

This article is the first in a series of three which will discuss various units of the Special Warfare Groups, what they do and how they operate. This issue features the Underwater Demolition Teams and the SEAL Teams.

The articles were written by Walter B. Hambright, a civilian employee of Ships Parts Control Center, Mechanicsburg, Pa., who works in support of the Navy Shore Based Units of the Fleet Operating Forces. Mr. Hambright wrote the articles on his own initiative from information he collected from a number of Navy publications, including ship and station newspapers.

The four specialized units operational in the Special Warfare Groups are Underwater Demolition Teams (UDT), Sea-Air-Land Teams (SEAL), Beach Jumper Units (BJU), and Boat Support Units (BSU). The Boat Support Units have recently been renamed Coastal River Squadrons (COSRIVRON). Personnel are highly trained in all aspects of Naval Special Warfare to react to action requiring their talents. They were formed to complement each other in the execution of their assigned operational missions.

UNDERWATER DEMOLITION TEAMS

In World War II, demolition men had a simple mission when they cleared Pacific Beaches for assault troops. At first, they wore full combat uniforms including helmets and kapok jackets. They were launched from LCM's at low tide to locate and destroy beach obstacles. In 1943, at Tarawa, the U.S. Marines suffered disastrous casualties because of an uncharted reef which prevented the assault boats from reaching the beach. The men traded in their cumbersome combat gear for face masks and swim fins and became the UDT's.

At the close of World War II, many UDT's were located off the coast of Japan. One of these teams was UDT-21 whose commanding officer, LCDR Clayton, received the first sword surrendered to American troops at Futtsu Saki Peninsula on the morning of 28 August 1945.

An Underwater Demolition Team consists of approximately 15 officers and 100 enlisted men, divided into five self-contained platoons.

UDT operations during the Korean conflict and in Vietnam engaged UDT personnel in hydrographic reconnaissance and demolition missions. In Vietnam, UDT's are responsible for the hydrographic reconnaissance of prospective landing beaches on enemy-held shorelines and the demolition of underwater obstacles to prepare the beach for amphibious assault. Their secondary missions include swimmer attacks against enemy shipping, SCUBA diving, parachuting, demolition of explosives; and they are the prime diver recovery teams supporting this country's space program. Changes since the early days include back shore reconnaissance operations and other missions employing the use of parachutes and swimmer delivery vehicles.

In 1961, a need for military units specializing in unconventional warfare was recognized by President John F. Kennedy. This led to the organization of SEAL Teams which were commissioned in 1962.

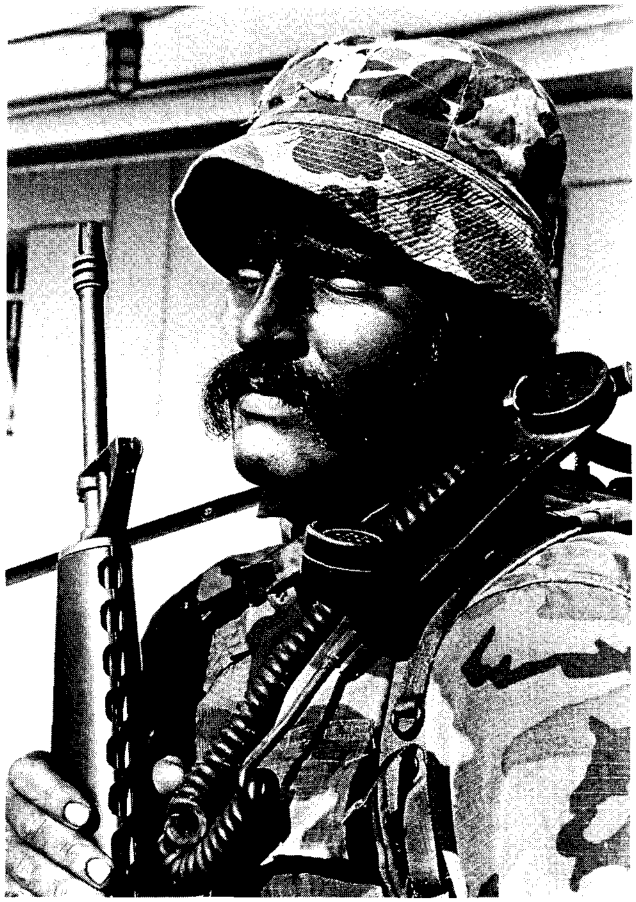
The SEAL's take their name from the elements in which they operate, sea, air, and land. They are specially trained to conduct unconventional and para-military operations. They operate from all types of surface ships and submarines and can be air-delivered into specific operational areas using parachutes or helicopters. The SEAL's are the Navy's experts in small unit tactics conducted in and around maritime and riverine environments. Wise in the ways of the jungle, they are always on the point, providing the eyes and ears for the foot soldier.

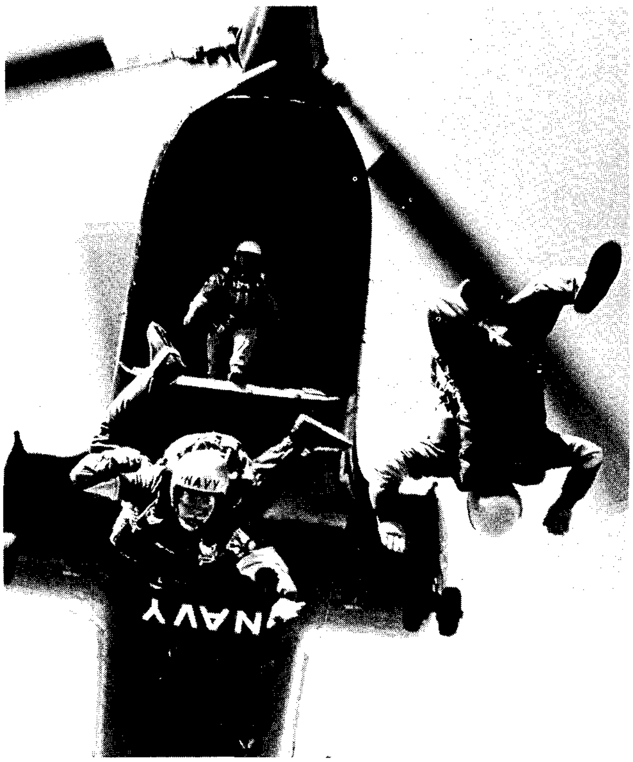
In the Vietnamese conflict, SEAL personnel have demonstrated their capabilities many times over. More than four hundred individual awards ranging from the Navy Cross to the Vietnamese Cross of Gallantry have been awarded them.

Engaged primarily in counter-guerrilla operations in the Mekong Delta, they operate in small numbers to raid Viet Cong strongholds, capture enemy political cadre, and gather valuable intelligence for large scale joint operations. SEAL's are utilized when the necessity for clandestine and deep penetration into enemy territory exists.

The basic requirements for SEAL personnel closely parallel those existing for the UDT's. All personnel are required to be experienced in UDT techniques. Further training includes hand-to-hand combat, free-fall parachuting, foreign weapons, foreign language training, escape and evasion, communications, rappelling and other Army Ranger tactics. The Navy UDT and SEAL Teams continually need qualified volunteers. Those selected undergo a grueling training course to condition themselves to the high professional, mental, and physical requirements.

Four weeks of toughening runs and calisthenics sharpens their physical stamina and begins the rigorous training program. Following weeks are filled with classroom





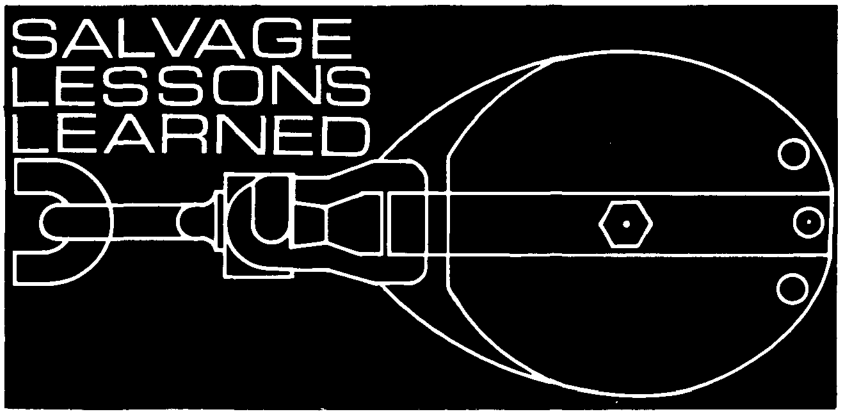
work, open-sea swims, study and practice in demolition and reconnaissance techniques and a steady diet of exercise. They are trained in survival, escape, evasion, and land navigation. Later in the course they learn to use explosives, make live demolitions, perform raids against offshore islands and complete an ocean swim of about seven miles. After three weeks of airborne training, they attend underwater swimmers school to learn the use of various underwater breathing apparatus. Additional specialized instruction for UDT men includes helicopter jumps and explosive ordnance handling. A Navy SEAL officer is paid extra for his work: $220 per month above regular pay — $110 for parachuting and $110 for demolition work. Enlisted SEAL's receive $110 per month extra — $55 for parachuting and $55 for demolition work.

Men from the Special Warfare Group Pacific established a parachute group called the "U.S. Navy Leap Frogs." These veteran Naval parachutists, each a volunteer, use colorful nylon canopies instead of the secretive black models used operationally. The club demonstrates the highly refined tactic of airborne insertion by HALO (High Altitude — Low Opening) which gives a small team the capability to penetrate enemy defenses under the cover of darkness on the whisper of an open parachute. With the emphasis on landing accuracy, these demonstrations give visual proof of man's ability to control his plunging descent. Using the torso, arms and legs, the free-falling parachutists can accelerate to a head-down 200 plus MPH. With a change in body configuration, loops, rolls, and formation flying are accomplished with relative ease (for the Leap Frogs, that is!).

When the Apollo 15 mission splashed down in the Pacific (see FP Summer '71), the primary recovery ship was the Amphibious Assault Ship USS OKINAWA (LPH3). The OKINAWA, a 500-man ship, was also the primary recovery ship in 1968 for Apollo 6, last of the unmanned moon probes. For Apollo 15, Underwater Demolition Team Eleven was airborne near the splashdown site, and proceeded to attach an anchor and a flotation collar to the capsule, providing assistance as required.

Apollo 15's return to earth climaxed hour upon hour of study, preparation, and practice for the 'Gator Units. On 22 June 1971, a mock space capsule was towed out of San Diego Harbor to a predetermined location off Point Loma in Southern California Pacific waters. There, on a chilly, overcast day, UDT-11 swimmers and members of Helicopter Squadron One, Naval Air Station, Imperial Beach, California, ran through the final dress rehearsal for the return of Apollo 15.

Next issue features "Beach Jumper Units," "Coastal River Squadrons," and "Naval Beach Groups."



EDITORS NOTE: This new column for salvors is beginning this issue in an effort to spread the knowledge and experience garnered by salvage efforts from all over the world. Hopefully these notes will help fellow salvors avoid the same pitfalls. We invite your contributions and comments.

Accuracy in Laying Moors. After the anchors were dropped for a four point moor, it was discovered two anchors were out of position. The lengthy operation of resetting the two legs of the moor might have been avoided if the following procedure had been used initially.

a. Place a buoy in the center of the moor with a plumbed line to the holding weight of the wreck.

b. Position a workboat at the plumbed buoy with radar reflector and stadimeter.

c. By use of the stadimeter, accurate ranges can be passed by radio to the ship laying the moor. With very accurate ranges from the workboat and bearing to the workboat taken visually or by radar, a very accurate dropping point can be achieved.

Causeway Towing Tips. Towing a section of causeway presents a problem since the section has no rudder. On one recent tow a sea anchor was rigged consisting of one 7/8 inch chain suspended over the causeway's stern, allowing approximately twenty feet of the chain to hang free. The causeway section then trailed dead astern of the ATF towing vessel.

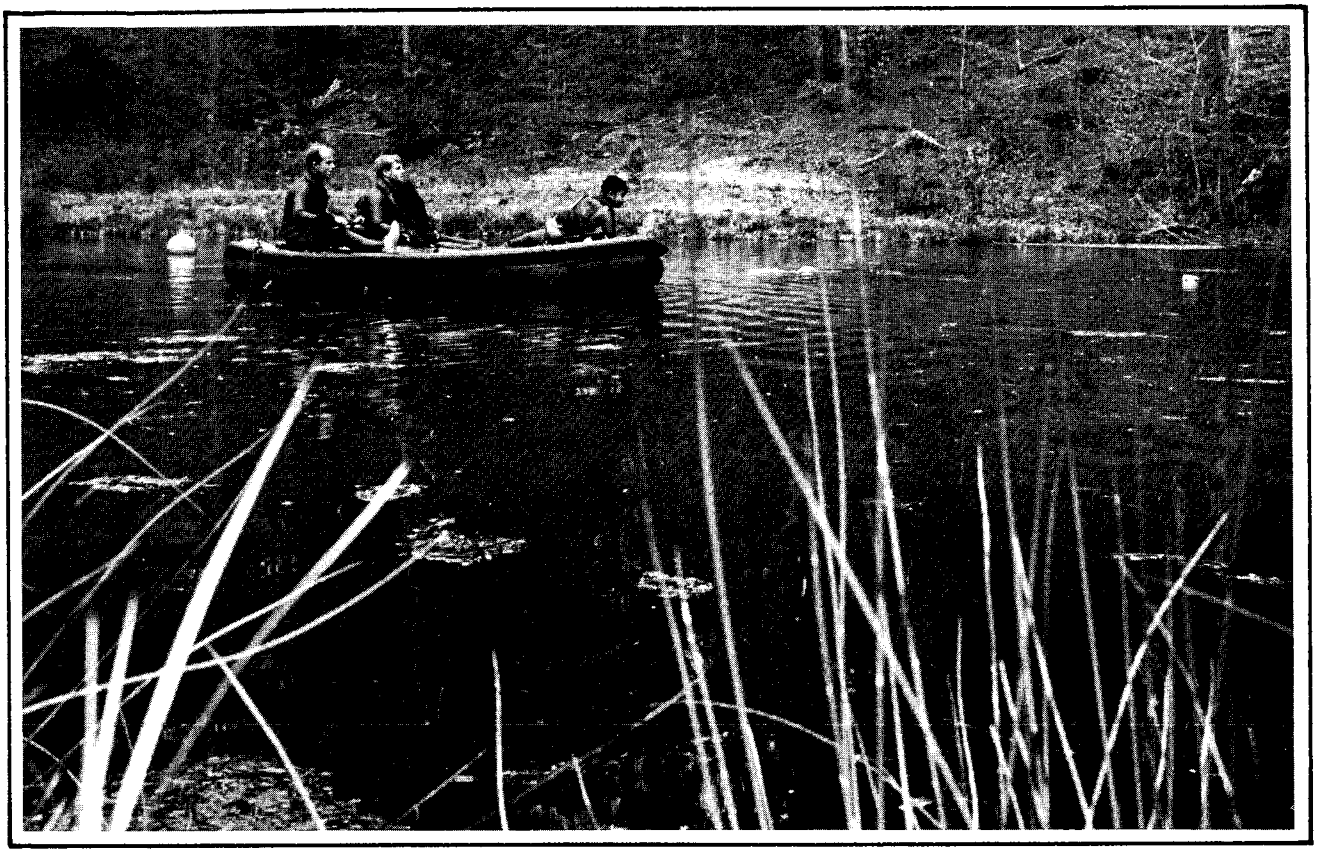
Towing Rig Tips. During a recent tow of two MSO vessels utilizing a Christmas tree rig using chain bridles and chain pendants, it proved to be extremely difficult and dangerous for recovery of the underrider. In order to recover the underrider, two 45-foot lengths of chain connected with a flounder plate had to be hauled aboard and disconnected before the underrider could be taken to power. In accordance with COMSERVLANT Towing Manual, the 45-foot chain pendant between the bull rope and flounder plate and underrider is optional for this rig. When the underrider must be recovered at sea, the chain pendants should be omitted.

Do Your Own Thing. HCU-2 was recently involved in the salvage of a 200-ton ship that had been initially surveyed by another command and reported to have no mudding. The experience of the salvage officer, however, provided him with insight to resurvey, during which an estimated 50 tons of mud was discovered. A good rule is to do your own surveys before starting salvage operations.

Keep the Mattresses. During a recent salvage of a sunken YTB, a temporary T-bolt patch using a foam rubber mattress for gasket material was placed over a 14 x 18 inch hole in the side of the vessel. The patch reduced leakage sufficiently to pump out the space after the YTB was mechanically lifted to the surface. Since a drydock was not immediately available, a box patch was placed over the original patch, again utilizing foam rubber padding, however, a slow leak continued to exist. The problem was finally corrected by replacing the foam rubber gasket material with sections from a cotton felt mattress. All salvage activities should keep some of the cotton felt mattresses for small patches.

Hose Kink. Plastic air hose procured commercially was used extensively in SUBSALVEX–71. The hose was subject to kinking which eventually fatigued the hose. One cause was from initially coiling the hose circular fashion causing a three-inch coil to tighten into a kink when the hose was pulled off the coil. The problem was lessened by piling the hose into a figure eight coil. The problem can be eliminated by leaving the hose on a reel. The hose then comes off the reel uncoiled and there is less chance for kinks to be introduced.

SPAR Vessel. Past attempts at towing the SPAR Vessel utilizing nylon towing lines on long point-to-point tow proved unsuccessful. Since the padeye on the SPAR vessel is either at or near the waterline, constant submersion of the tow line results, permitting it to stretch and subsequently part due to cutting by the thimbles when vortex shredding occurs. To alleviate this problem the two-inch wire pendant was specified for long point-to-point towing of SPAR. This wire pendant must be removed during local operations since it becomes an offsetting weight affecting the stability of SPAR when SPAR is placed in a vertical position. Therefore, SPAR vessels require a seven-inch nylon line during local towing operations. To reduce the dangers and difficulties encountered while rigging and unrigging, these evolutions should be accomplished in port utilizing crane services.



Teaching Navy Divers to Handle All Kinds of Situations

Civil War cannon balls on Navy property, mines, torpedoes, or bombs, are all the responsibility of the Explosive Ordnance Disposal people when they happen to end up somewhere they're not supposed to be. The U.S. Navy School, Explosive Ordnance Disposal (NAVSCOLEOD) teaches Navy divers how to handle these possible trouble-makers in all kinds of situations.

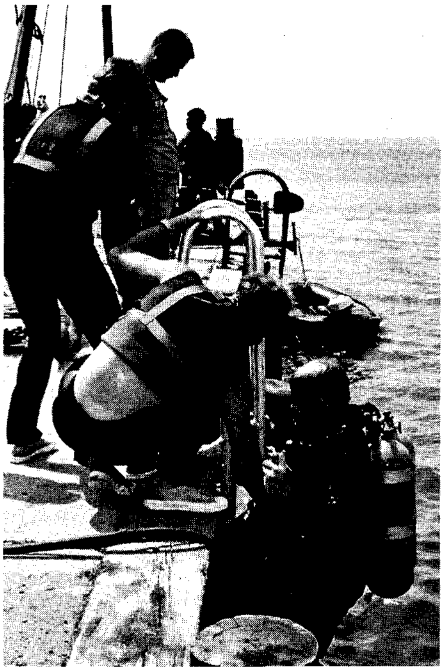
Located on the Naval Ordnance Station, Indian Head, Maryland, the center is the headquarters for training EOD technicians from all branches of the military. CDR D. H. Moody, USN, is the Commanding Officer of the school which trains an average of 500 students per year.

The school's diving locker contains a hyperbaric chamber, wet pressure pot, open tank, and a large underwater training facility which measures 80 by 40 feet, 24 feet deep, and has a capacity of 560,000 gallons. The water is heated to 75 degrees and is filtered at a rate of 616 gallons per minute.

The open tank offers students another controlled environment where various underwater tasks are completed using SCUBA or lightweight equipment. While the student works at a 10-foot depth at 75 degree temperatures, fellow classmates observe through one of four viewing ports.

The school's wet pressure tank serves to qualify and/or requalify divers in open circuit or MK VI semi-closed circuit rigs. The pressure pot provides a working depth to 200 feet for an average of 2500 dives per year. External lighting into the tank with two viewing ports ensures close observations of divers.

The hyperbaric chamber has, in addition to such features as external lighting, a double lock, an oxygen monitoring system, and a two-way communication system. Rich in history, the chamber was aboard the USS FALCON in 1939 during the salvage of the USS



SQUALUS. Recent improvements include a new exhaust system of 2-½ inch piping to exchange a greater volume of air during vents at lesser depths. In addition, all external gages are of the type designated by the Supervisor of Diving.

A pond, which is 18 feet deep and about 150 feet in diameter, is used to acquaint and familiarize students with the AN/PQS–1 hand-held sonar and the MK-10 ordnance locator. This spring-fed underwater area uses a bubbler system with a low pressure air compressor and 300 feet of hose to prevent icing over during winter months.

Diving facilities on the Potomac River include a classroom and locker room as well as LP and HP air compressors. Here students complete practical problems in water with no visibility. In addition, there is an inert minefield consisting of 20 items of underwater ordnance which students are required to identify and render safe. A knowledge of underwater ordnance is of the utmost importance as it is the Navy's responsibility to cope with all the ordnance found seaward of the high water mark.

Upon successful completion of the school, the new EOD personnel are assigned to one of the various EOD units throughout the world. Once there they may be called upon to perform tasks of varied descriptions ranging from small diving jobs to the rendering safe of a nuclear weapon.

Upper photo opposite page, a student prepares to enter the pond training area used to train basic EOD divers. This page, the open tank is used for preliminary training prior to the river training. A Navy basic EOD student exits the water after completing a practical problem in zero visibility. Upper right, a closed circuit television system is used to monitor and record student activities in the underwater training facility. Photo, above, a staff member checks out the AN-PQS-1 Hand Held Sonar as the student prepares to enter the water.

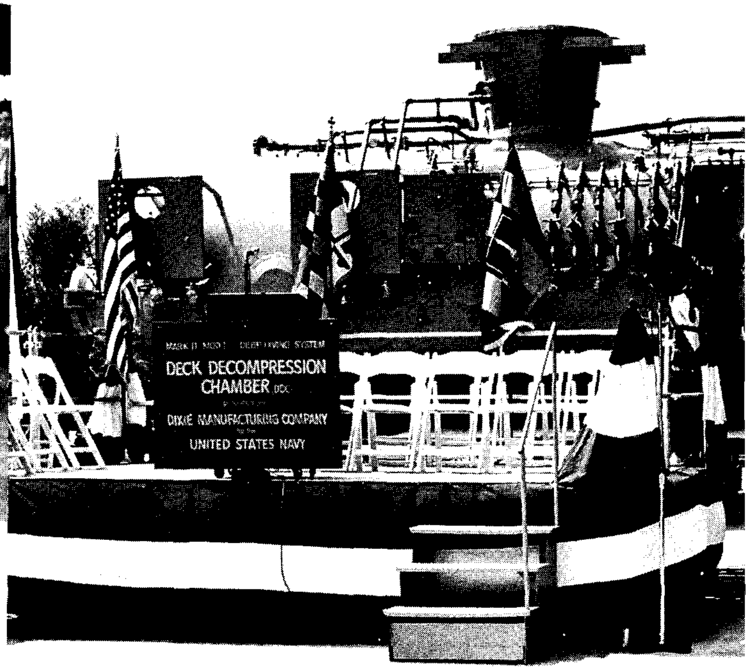
The delivery of the Mark II Mod I Deck Decompression Chamber was celebrated in early May, 1972. The "launching" by Mrs. E.B. Mitchell, wife of CAPT E.B. Mitchell, Director of Ocean Engineering, took place in Baltimore, Maryland, at the Dixie Manufacturing Company, Inc. where the DDC was built. The Mark II Mod I DDS comes as a followon to the Mark II Mod 0 unit already operating on the ELK RIVER (IX-501), primarily a research and training vessel. The two Mark II Mod I systems will be installed on the not yet commissioned USS PIDGEON (ASR-21) and the USS ORTOLAN (ASR-22), both ocean-going vessels. Operation of the systems in the fleet is expected by 1973.

While the capabilities of the MK 2 MOD 0 and the MK 2 MOD 1 are fundamentally the same, some components are a later generation state-of-the-art, and other minor improvements have been included as a result of lessons learned from the MK 2 MOD 0. The arrangement of the system on the ASR-21, a catamaran-hulled ship, will vary from the IX-501 in that one DDC and one winch will be installed on each hull, rather than the side-by-side arrangement on the IX-501.

The elements of the MK 2 MOD I diving system consist of two deck decompression chambers (DDC), two personnel transfer capsules (PTC), two main control consoles (MCC), two strength, power and communication cables (SPC cables), two deck winches, two downhaul winches, and a helium recovery system.

The Deck Decompression Chamber shown here is a shipboard-mounted unit similar to other double-lock recompression chambers. It can be used for saturation diving and decompression, as well as non-saturation diving. It is capable of being mated with the personnel transfer capsule.

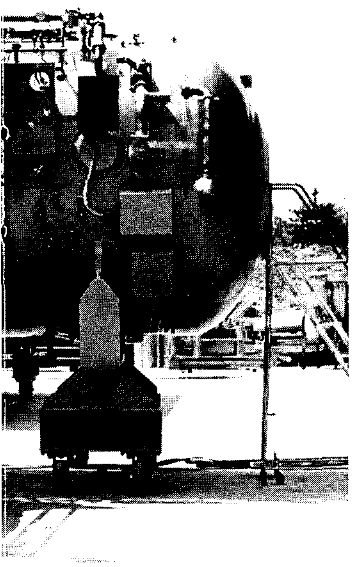
MK II MOD I

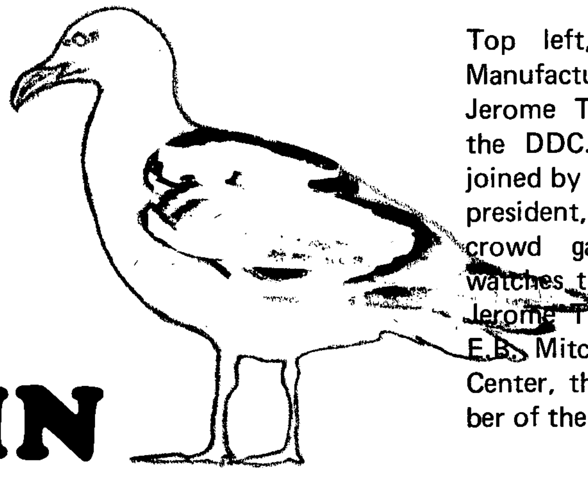


"LAUNCHED"

The DDC is designed to house four men under pressures equivalent to continental shelf depths to 850 feet of sea water for a period of time up to 14 days under saturated diving conditions, plus the necessary decompression time. The chamber is equipped with an inner and outer lock separating the sleeping quarters from the eating, recreation, and work area. The sanitary facility spaces are located in the entrance lock. A medical lock is provided for passing small equipment, food, and other small items either into or out of the DDC. An access hatch is provided in the top of the DDC to permit mating with the PTC or with a deep submergence rescue vehicle (DSRV).

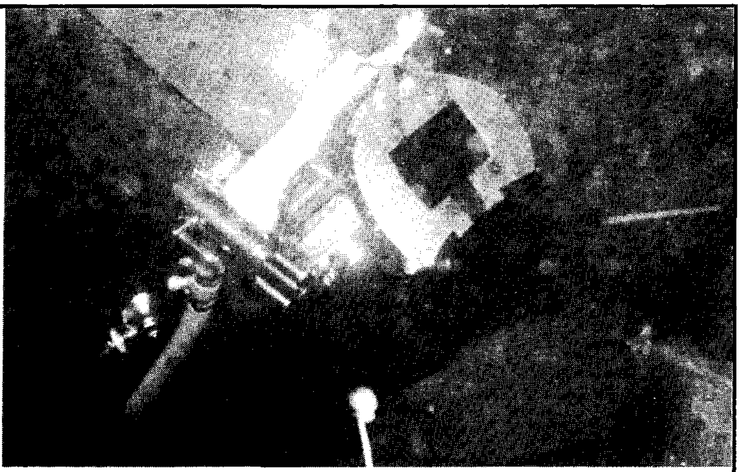
Top left, Mrs. Mitchell with Dixie Manufacturing Company's president, Mr. Jerome Toohey, is about to "launch" the DDC. Top right, Mrs. Mitchell is joined by Mr. Frank Toohey, Dixie's vice president, and his wife. Center, the crowd gathered for the celebration watches the festivities. Bottom left, Mr. Jerome Toohey escorts CAPT and Mrs. E.B. Mitchell through the Dixie plant. Center, the Deck Decompression Chamber of the Mark II Mod I DDS.





IN BALTIMORE

Uni-Suit & Underwater Welding



Traditionally any underwater welding performed by Navy divers is done while using the standard deep sea diving dress Mark V. In order to weld zincs on a ship's hull a rather elaborate stage is required. The divers of the U.S.S. GRAND CANYON were tasked with replacing 160 zincs on the U.S.S. MILWAUKEE (AOR-2). Use of the Mark V was considered initially but was abandoned due to the time frame imposed by the MILWAUKEE. A total time of 15 days was allowed for the task, but due to sonar activity only nine of the 15 could be used for working dives.

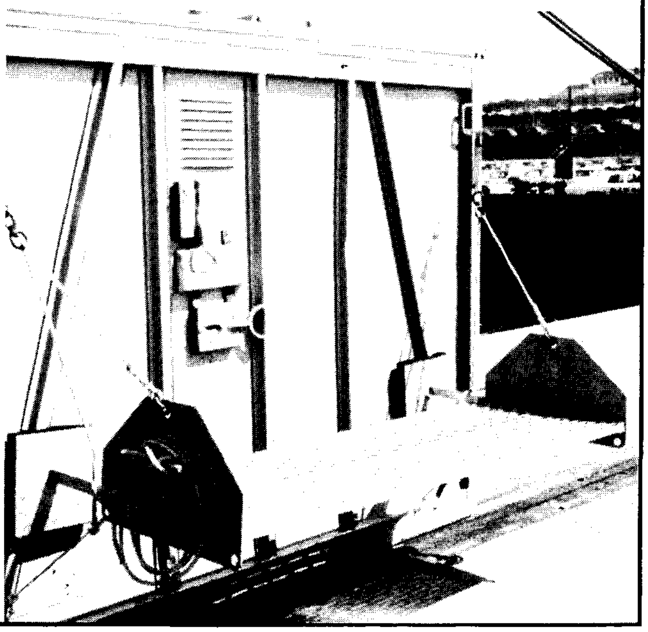
At the request of the Repair Officer of the GRAND CANYON, the Supervisor of Diving provided technical and operational assistance. SUPDIVE provided Uni-suits, KMB-8 and an engineer to accomplish the job in the time specified. A one-day training course in the use and maintenance was given to the GRAND CANYON divers on April 4. On April 5, work began on the MILWAUKEE.

A small aluminum stage was constructed, utilizing the existing zinc straps as the points of attachment to the hull. A magnetic zinc holder was fabricated to hold the zincs in place during welding. The welding rods were dipped in varnish prior to use.

During the 15 days the water temperature was a constant 38 degrees F. Bottom times of up to two hours 45 minutes were achieved with no ill effects. With minor exceptions, all the divers came to the surface warm and absolutely dry. While working, the buoyancy control provided by the Uni-suit was invaluable for handling zincs by a lightweight diver. The mobility offered by the Uni-suit enabled an average of 18 zincs to be installed per day. In addition, use of demand breathing apparatus saved time and money by breathing less than one-half of the air than the Mark V would require.

A few minor difficulties with the Uni-suit were encountered but were easily solved by SUPDIVE's on-site engineer, Tom Cetta. The hot slag dripping from the welds landed on the suit, burning some small holes. The holes were repaired and canvas chafing coveralls were fabricated to prevent further suit damage. The Uni-suit gloves chafed severely. They required frequent repair. Eventually, new gloves were fabricated on-site and with four additional pairs of gloves, the chafing was slowed and no further problems were encountered with gloves.

For the first time the Uni-suit was used on a Navy operational dive and the overall performance was excellent.



"...a powerful and versatile addition to our forces afloat"

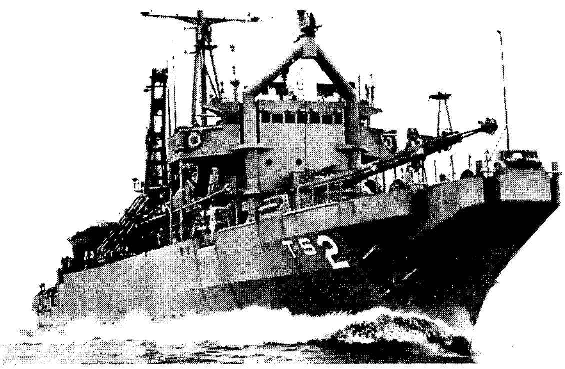
ADM E. R. ZUMWALT, JR.

The most valuable vessels for Navy diving, towing, salvage, and rescue operations since World War II have been ASR's, ARS's, ATF's and a variety of barges, heavy lift craft and an occasional YRST. That all changed, however, when the USS EDENTON (ATS-1) joined the Atlantic fleet last year (see FP Sum 71). Now her sister ship, the USS BEAUFORT (ATS-2), has been commissioned and, following fitting out at the Norfolk Naval Shipyard, will soon see duty in the Pacific under the command of Service Squadron Five.

USS BEAUFORT, named after two cities in North and South Carolina, is designed to provide the fleet with the most advanced and comprehensive capabilities for ship salvage, diving, emergency repairs, and long distance towing.

Most of the BEAUFORT's propulsion, auxiliary, and deck machinery is British-made. It is larger, more powerful, and more sophisticated than any presently found on commissioned U.S. Navy salvage vessels other than the EDENTON. She has twin screws, twin rudders, and four Paxman diesel electrics, each of 1500 BHP. Her bow thruster unit is designed for greater maneuverability at the low speeds required by most salvage operations. Additionally, her propellers are of controllable pitch design, enabling her to adjust her speed or power as required by a particular situation.

BEAUFORT has a self-tensioning towing winch capable of 70 tons static pull, and two large hydraulic deck cranes with 10 and 20 tons lifting capacity, respectively, to handle salvage and beach gear stowed in the large storerooms. Her towing stern rollers can be hydraulically raised and lowered, which enables them to be stowed out of the way when not in use. Bow rollers allow BEAUFORT to provide the heavy lift capabilities required in many salvage operations. Her auxiliary bow rollers provide 60 tons of dynamic lift, while her main bow rollers can lift 150 tons dynamically, or 300 tons by using the tide. She has the latest and most advanced facilities for communications and navigation and also has underwater search capabilities.

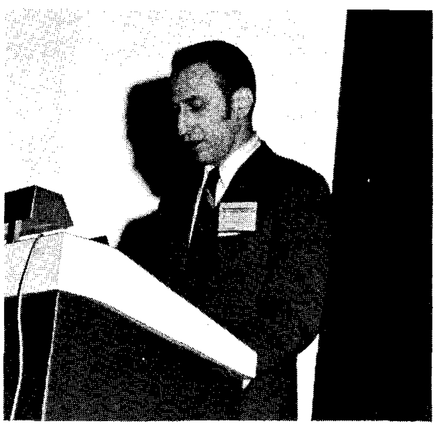


LCDR A. R. Erwin is the CO of the eight officers and 87 enlisted men aboard the new ship. LT B. L. Banks is the Executive Officer and diving officer in charge of the allotted 22 enlisted divers and four diving officers. BMC Jerome Dearie is the Master Diver. While the BEAUFORT is not yet up to her allowance for divers, the first dive is already planned. Three demonstration dives will take place while the ship is anchored at Beaufort, S.C., where welcoming festivities will take place on the way to her home port in Pearl Harbor.

The ship is well equipped with all the necessary diving gear for any task. A double lock chamber capable of 200 psi will hold six divers. KMB 8 band masks, Mark 5 deep sea gear, and deep sea helium/oxygen gear will cover the BEAUFORT's diving requirements. They carry 190,000 cubic feet of free air, two 5,000 psi 100 CFM air compressors, two MP air compressors, and their recompression chamber is equipped with the Scott overboard discharge system which vents O_2 overboard.

ADM E. R. Zumwalt, Chief of Naval Operations, in his letter to LCDR Erwin welcoming BEAUFORT to the fleet, made clear the mission of the BEAUFORT when he said, "BEAUFORT will be a powerful and versatile addition to our forces afloat. . . by bringing her to the highest level of competence and readiness for any eventuality, you will all have a worthy share in maintaining America's peacekeeping power at sea."

Builder	Brook Marine LTD, Lowestoft, England
Keel laid	19 February 1968
Launched	20 December 1968
Length	282 feet 8 inches
Displacement	3200 tons (approx.)
Beam	50 feet
Draft	16 feet
Maximum speed	16 knots plus



Battelle 1972 the working diver

Battelle Memorial Institute, Columbus, Ohio, was again the scene for a gathering of military and commercial diving experts from around the world to discuss the working diver.

The 1972 edition of the symposium, organized and co-sponsored by Battelle, the Marine Technology Society and the Office of the Supervisor of Diving, followed a format similar to the 1970 conference (see FP Sum 70). Following a call to order by CAPT E. B. Mitchell, Director of Ocean Engineering, which started off the conference, RADM M. H. Rindskopf, Deep Submergence Systems Coordinator, delivered one of three opening statements given at the gathering.

He informed attendees about the Navy's program for diving in competition with other high priority projects. He gave pertinent information concerning the burgeoning power of the Soviet Navy versus the tightening of funds available for research in the U.S. Navy. He emphasized diving achievements accomplished since the 1970 conference and pointed out what remains to be done. He placed particular emphasis on the expanding field of bio-medical problems and stated that "if a diver cannot cope with the underwater environment, all the sophisticated hardware being developed will be to no avail," therefore work should continue in that area.

Further opening statements came from Roger Merrill, Director of Battelle-Columbus and Dr. Joseph MacInnis who represented the Marine Technology Society. With preliminaries over, the symposium began two days of informative talks to be digested by the over 400 attendees. Experts in their respective fields delivered hard core facts and figures concerning diving in oilfields, under polar ice, gas logistics, and engineering problems. The promise of new hard hat gear due out soon was explained. The YFNB-43 was verbally disected to explain how it was modified to work with the Mark I DDS. Hydraulic tools, hot water suits, insulated suits and foreign diving techniques were topics of papers presented. Note page 21 for specific topics and speakers who participated in the symposium.

The social highlight of the symposium was the banquet held at Battelle for all participants. Henri G. Delauze, president of the French diving organization COMEX, was the featured speaker. He presented a variety of diver-related topics and summed up with the hope that a worldwide gathering of minds might be established to standardize safety regulations to ensure an underwater world safe for divers from all countries.

Top photo, Henri G. Delauze, president of the French diving firm COMEX, spoke of international cooperation in diving during his keynote address at the banquet held the first day of the Symposium at Battelle-Columbus. Second photo, Jerry Henkener, engineer at Battelle-Columbus, answers questions from the floor following the delivery of his paper prepared jointly with David Adkins, also from Battelle-Columbus, during Session 1. Lower photo, LCDR W. I. Milwee, Assistant Supervisor of Diving, USN, brings the Symposium audience up to date on the Navy Diving Program.

Photos, opposite page, over 400 people from commercial firms, the military, and civilian institutions around the world attended the Symposium for the Working Diver, 1972. Those attending had a chance to exchange information during the several breaks from the papers delivered. Top photo, RADM M. H. Rindskopf, Deep Submergence Systems Coordinator, was on hand to deliver greetings from the U.S. Navy to Symposium attendees and to discuss U.S. diving programs during intermissions. Center, LT Douglas Smith, attached to the Mark 2 Mod 0 Deep Dive System, Submarine Development Group One, looks over diagrams of the Royal Navy's deep dive system now under construction, with LCDR John Naquin (right), U.S. exchange officer to the Royal Navy, and Walt Bergman, Officer of the Supervisor of Diving, at left. Bottom, Robert Gilardi started off Session 1 with a discussion of saturation diving gas.

PROGRAM

TUESDAY MORNING – 22 FEBRUARY

SESSION I – DIVING SYSTEMS DESIGN

Saturation Diving Gas Logistics

Systems Approach to the Design of Shipboard Gas Systems

Modification of the YFNB-43 Barge to Support the MK 1 DDS

Automatic Shut-Off Protection for Pressure Chambers and Diving Systems in Case of Abnormal Fluid Flow or Line Rupture

Engineering Problems in Handling Diving Gases

TUESDAY AFTERNOON – 22 FEBRUARY

SESSION II – OPERATIONS AND EXTREME ENVIRONMENT DIVING

U. S. Navy Diving Program

Technical and Economic View of Oilfield Diving

Deep Diving in Cold Water – Some Practical Results

Diving Under Polar Ice

Arctic Diving and the Problem of Performance

WEDNESDAY MORNING – 23 FEBRUARY

SESSION III – EQUIPMENT DEVELOPMENT

Development of Advanced Deep Sea Diving Equipment for the Navy Hard Hat Diver

Passively Insulated Diving Suit

Electrical/Electronic Equipment in High Pressure He-O$_2$ Environments

Power Sources for Underwater Hydraulic Tools

Hot Water Diving – State of the Art

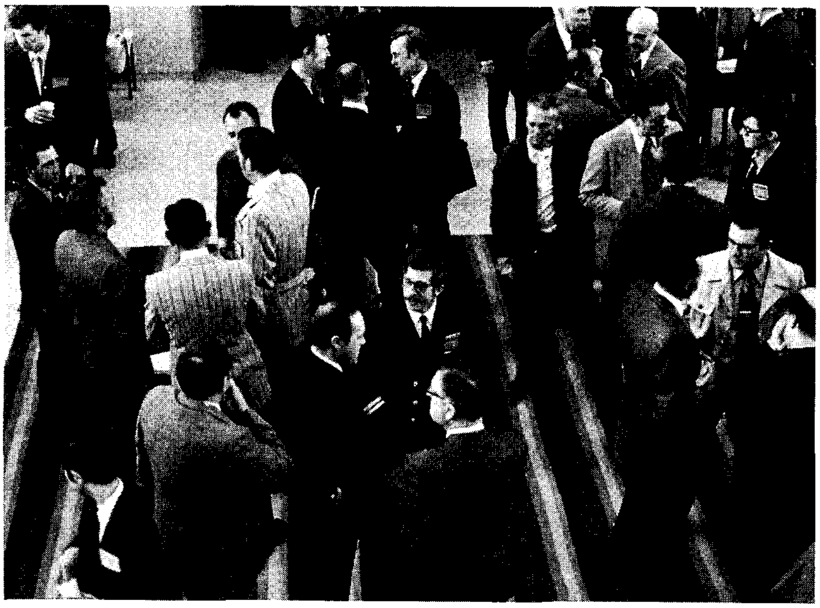
WEDNESDAY AFTERNOON – 23 FEBRUARY

SESSION IV – BREATHING GAS TECHNOLOGY

N_2O_2 Diving in the Swedish Navy

Manned Experiments to Investigate the Role of Hydrogen as a Breathing Medium for Deep Diving Operations

A Study of Alternatives for Supplying a Diver with Warm Breathing Gas



RESCUE OF THE RESCUED

By
HTSC Chas. Flynn

Specializing in submarine rescue, ASR's frequently practice their skill to keep up performance. One such drill, the S–51 exercise, involves a simulated sinking and rescue using a diving bell as the rescue vehicle. The particular S–51 exercise I have in mind is one I will never forget, nor will the divers and crew of the ASR and submarine involved.

The ASR got underway for the training exercise. Shortly after the special sea and anchor detail was secured, the four-point mooring detail was set "rigging phase." Deck force and engineers were working hand in hand. A nine-inch manila line was broken out and faked out on the port and starboard sides of the main deck. Chain for each leg was hooked up to four anchors, two on the port and two on the starboard side of the fantail. One end was run forward and hooked up to the spuds. Within one hour the ASR was rigged for dropping a four-point moor. The bell was made ready and 500 feet each of exhaust and supply hose were connected. The back-haul wire was ready for hookup. A 1500-foot cable, used as the telephone line, was made up on a separate reel.

The submarine released its forward buoy; the ASR located this and sent one work boat out as a reference point. The weather was perfect for the exercise.

The ship dropped all four anchors and spuds, and then began to run out the forward and after legs of the moor. Four anchors were used to allow the rescue vessel to center over the submarine escape hatch. One diver was sent down to check the seat in 13 feet of water. The seat was found clear and when the diver was back aboard, the bell was hoisted up and over the side.

The bell had one operator and one co-operator. Four passengers were to transfer from the bell into the submarine, and four passengers from the submarine would ride the bell back to the surface.

All passengers boarded, the upper hatch was locked, the air motor started inside, and they began their descent. When they reached the seat, the main ballast tank was flooded and the bell was jacked down tightly to facilitate making the lower compartment watertight. The water was blown out and a seal was made. The lower compartment hatch was opened and the holddown rods were put in place to hold the bell upright on top of the submarine escape hatch.

When the proper signals had been exchanged, the hatch was opened and passengers from the bell boarded the submarine, while the passengers from the submarine entered the bell. The submarine escape hatch was closed, and the procedures for surfacing started. The co-operator began by removing two of the holddown rods on the same side of the bell. Suddenly the bell tilted to one side and the seal was broken. Water rushed in, forcing the co-operator to scramble up through the lower compartment hatch and close it.

Meanwhile topside, the weather had come up suddenly and high winds were causing the forward anchors to drag. The port anchor was dragging and had parted the starboard anchor's manila line. The ASR had shifted aft between the two after buoys, the ship could not turn over the screws because the nine-inch manila line was slack underneath the stern of the ship.

There were 500 feet of exhaust hose,

500 feet of supply hose, and approximately 700 feet of back haul wire attached to the bell. Also, there was 1500 feet of telephone cable on a separate reel. When the ship shifted in the moor, it moved more than 500 feet, and to keep the bell hose from peeling over all at once, 30 men were holding it back.

When the ship shifted, the back haul wire had created a strain on the bell, tilting it, and thereby breaking the seal, letting water into the lower compartment. The bell operator told topside that the bell was tilting, so the back haul wire was chopped in two. This left the bell with the two hoses and the telephone cable still connected.

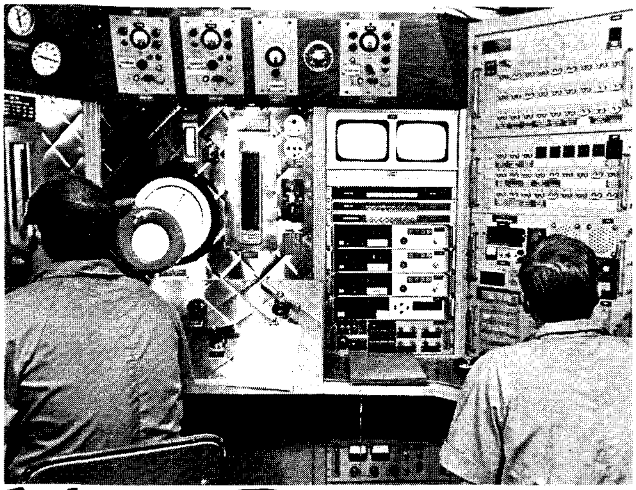
Among the 30 men on the bell hose were one big first class gunner's mate and myself. The hose was peeling over the side faster than we could hold it back. Finally, the last 50 feet of hose came up and severe strain was created. All of the men let go of the hose except the gunner's mate and me. He yelled to me, "Turn it loose, Flynn!" I did. The hose stretched and then finally parted about 20 feet from the valves. No one thought of securing the valves that supplied the air, and when the hose parted, it began whipping across the deck on the port side. I realized what was happening and jumped out of the way just as the hose whipped down the deck where I had been standing. If I had not moved when I did, I would have been cut in half.

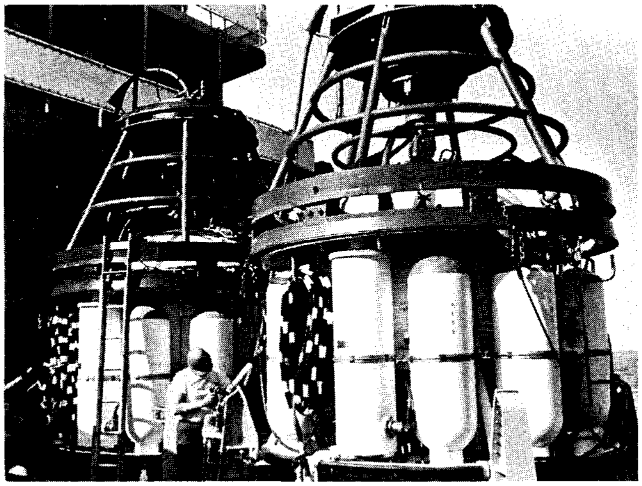
The main concern, however, was the bell, still attached to the escape hatch on the bow of the submarine. Two holddown rods were in place, the only things keeping the bell from tipping off the submarine. The telephone cable was still attached to the bell and communications were good. The passengers in the bell were surprisingly cool, but perhaps only the operator and co-operator fully realized the seriousness of their situation.

An immediate decision had to be made. All legs of the moor were dropped and the ship moved away from the submarine beneath. (A bubble and flare were released from the submarine to designate the location of the submarine.) The Executive Officer then radioed down to the submarine telling them that the bell was on their bow, and therefore to surface as evenly as possible. The bell would stay attached as long as the submarine surface horizontally, but if there were any list at all, everything would be lost for the nine men in the bell.

The submarine radioed back that they understood and would attempt a level surface. We waited, and when the submarine suddenly appeared with the bell standing tall on the bow, there was a cry of relief from the crew of the ASR. The telephone cable was still attached, and the ASR told the bell operator that they were on the surface and to disembark immediately. The main concern then became the submarine's rolling on the surface, with the possibility of the bell tipping over. But the other two holddown rods were put in place to secure the bell on the escape hatch and it rode proudly to the harbor atop the submarine.

This was the first, and we hope the last, rescue of a rescue chamber in our history!





New Requirements New Programs and

The new ATS's, EDENTON and BEAUFORT, and the new catamaran hull ASR's, PIGEON and ORTALAN, will be equipped for saturation diving operations. The Naval School, Deep Diving Systems is the school which will train the divers who will man these ships and others with similar capabilities. It is a newly formed organization which recently graduated its first two special classes of saturation trained divers. It was established to meet a projected need for saturation divers, diving officers, diving medical officers and deep sea diving medical technicians within the Navy.

NAVY DEEP DIVING SYSTEM

The Navy Deep Diving System (DDS) consists of a family of pressure and non-pressure structures, subsystems, associated equipments, and interfaces designed to support saturation and non-saturation diving operations by teams of Master and Saturation Divers who have been trained in the operations and maintenance of these systems.

The Navy Deep Dive System Mark 2 Mod 0, built by Hunters Point Naval Shipyard, has been designated the new school's main training vehicle. This system is on board the ELK RIVER (IX-501), presently homeported in San Diego.

Major components of the DDS Mark 2 Mod 0 are deck decompression chambers (DDC); personnel transfer capsules (PTC); main control consoles (MCC); special winches; life support systems (LSS); and the strength, power and communication cables (SPCC). Each DDS has a gas system, a communication network, a power system and an instrumentation system for the monitoring and control of these various components.

Normal operation of the diving system includes pressuring down both the DDC and the PTC to the same pressure as that of the work site. After the divers have reached a gas saturation equilibrium with the ambient pressure of the work site they leave the DDC through the mating hatch and enter the PTC. When all preparations are complete the PTC is isolated, unmated from the DDC and hoisted into the center well by the Gantry crane. The PTC is then lowered into the water, checked over thoroughly by the surface support divers (SCUBA) and if all systems check satisfactorily, is disengaged from the hoisting basket and lowered to the work site on the SPCC cable. Upon completion of the dive project or at the end of each work period the dive team is returned to the comfort of the DDC which serves as their habitat between dives and during decompression after the dive project is completed.

THE SCHOOL

The Naval School, Deep Diving Systems, was established by Commander Submarine Development Group One, San Diego, under the auspices of Chief, Naval Technical Training, and is 14 weeks in duration. The curriculum is designed to train exceptionally well qualified HeO_2 diving officers, submarine diving medical officers, divers first class, and deep sea diving medical technicians in saturation diving and operation and maintenance of a deep diving system. It will consist of detailed instruction for officers and enlisted personnel in the operation and operational procedures for the DDS's. This training will include normal and emergency operation procedures for the Mark 2

Mod 0, theory of operation diagnostic routines, test and adjustment procedures, troubleshooting techniques and minor parts replacement. Specific training on other than the Mark 2 Mod 0 will be conducted by the Fleet as on-the-job training.

Team training, which encompasses operation and maintenance, will be conducted on board the ELK RIVER at the Naval Undersea Research and Development Center, San Diego. At sea training will be conducted while the ELK RIVER is moored to permanent moorings near San Clemente Island in a water depth of from 200 to 250 feet.

TO QUALIFY

To qualify for the program, an officer must be designated HeO_2 qualified (NOBC 9313) and be recommended by his commanding officer. He can expect to devote his 14 weeks of training to diving physics, diving medicine, saturation diving theory and KMB Underwater Breathing Apparatus. He will learn the operation of the DDS Mark 2 Mod 0 and will qualify in a saturation dive to 180 feet in the open sea. Quota control for diving officers is through the Chief of Naval Personnel (Pers B-2033), Washington, D.C. 20390.

The general course structure is the same for enlisted divers. An enlisted man must be designated diver first class (5342), be in pay grade E-4 or above, and be recommended by his commanding officer. Quota control is under the Chief of Naval Personnel (Pers B-2170), Washington, D.C. 20370.

A five-week course for Master Divers will provide refresher training in all aspects of saturation diving and DDS operations. Following extensive refresher training in all subjects pertinent to diving, he will be evaluated as a Saturation Master Diver during saturation diving operations at sea. Qualification for the Master saturation program include being a designated Master Diver (5341), having been a designated saturation diver (5311) for at least 12 months and averaged at least the upper 50% in each of the personal traits with no individual marks less than 50% in performance of duty and leadership. Quotas for Master Divers are under the control of the Chief of Naval Personnel (Pers C), Washington, D.C. 20390.

The saturation course for Submarine Diving Medical Officers (NOBC 0091) and Deep Sea Diving Medical Technicians (NEC 8493) is also 14 weeks. Doctors and corpsmen will receive the same extensive training as the diving officers and enlisted personnel with additional emphasis on the physiological aspects of saturation diving and atmospheric monitoring equipment. Quota control for doctors and technicians is through the Chief, Bureau of Medicine and Surgery, Washington, D.C. 20390.

The first regular classes for all courses will begin January 1973.

THE PROGRAM

The training program is divided into trimesters beginning with Aquanaut Equipment Training (AET) for the first four-week period. This period will include medical examination and establishment of individual diver physiological baselines and long bone studies. Advanced mixed-gas theory and equipment familiarization will be among the subjects studied during the first four weeks.

The second period will be five weeks of Saturation Training, Classroom (ST DRY) which concentrates on saturation diving theory, DDS operating procedures and safety precautions. The final five weeks (ST WET) is devoted to five manned saturation dives to 180 feet. Three trainees and one instructor will participate in each dive. Those trainees not actually diving during any dive will receive on-the-job complex training.

a New School

Photos opposite page, port main control console (left) is carefully watched during a dive. Equipped with TV, communications, and instantaneous information on all aspects of the dive, the main control console demands constant attention throughout a dive. Personnel Transfer Capsules No. 1 and No. 2 are mated to their respective chambers aboard the ELK RIVER. At right, a training dive utilizing the Kirby-Morgan Bandmask, hot water suit and MK 2 umbilical. Personnel from the MK 2 MOD 0 are (from left) QMC De La Oliva, AX2 Delucchi, and LCDR Frank Eissing, diving officer.

AIR COMPRESSORS

While air compressors are the most common source of divers' breathing gas, the control over selection and maintenance of this vital equipment is usually relegated to the ship's engineering department or shore based public works activities. With the more definitive purity demands and increasing knowledge of diving systems' requisites regarding pressure and flow rate, it is becoming imperative that the diving community impose its own requirements for the selection of the compressor and proper maintenance of the equipment. Some fundamental considerations follow.

All air diving apparatus must be supplied from a compressed air system which usually contains an air compressor. These systems can generally be categorized into three types:

Ventilated – MK V "Hardhat"
Lightweight
Kirby-Morgan Band Mask
Recompression/
Decompression Chambers

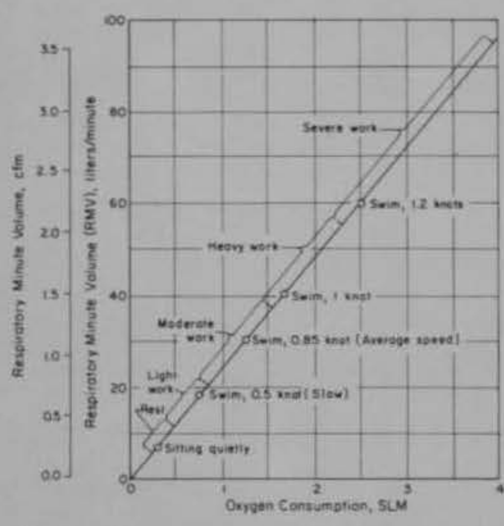


FIGURE 1

Demand – Air SCUBA
Kirby-Morgan Band Mask
Semiclosed – Single Man Decompression Chamber
(currently undergoing test)

The ventilated system requires the flow of sufficient low contamination air to dissipate the carbon dioxide resulting from metabolizing oxygen. The oxygen consumed is then related to the activity level of the diver. An average breathing rate per minute can be related to the average oxygen consumption. A graph indicating the respiratory minute volume vs. O_2 consumption is the fundamental criteria for the design of any diver's life support system. One such correlation for various activity levels is shown in figure 1. In general, the oxygen consumed by the diver is converted to CO_2, and even though the rate of conversion may range from 0.8 to 1.2 of the oxygen consumed, it appears reasonable to design systems based on a 1 to 1 conversion. With this relationship, the required average flow rates for both ventilated and demand systems may be obtained. Knowing the required flow rate permits the determination of the pressure necessary to supply this rate if the depth of the mission is known. Analyses to provide usable data have been performed and experimentally verified to provide the nomograph shown in figure 2.

This is for a ventilated type system and upon the establishment of the diving mission will permit determination of flow rate and the required pressure in the manifold immediately upstream of the diver's hose connection. For example, if a mission requiring hardhat divers to do heavy work at 150 feet exists, provision must also be available to support at least one standby diver so he may assist in any emergency action. Using the heavy work condition for three divers on the abscissa, and going to 150 feet on the ordinate, indicates the flow rate is 80 SCFM. Then, by entering the diving manifold pressure for 150 feet, it is established

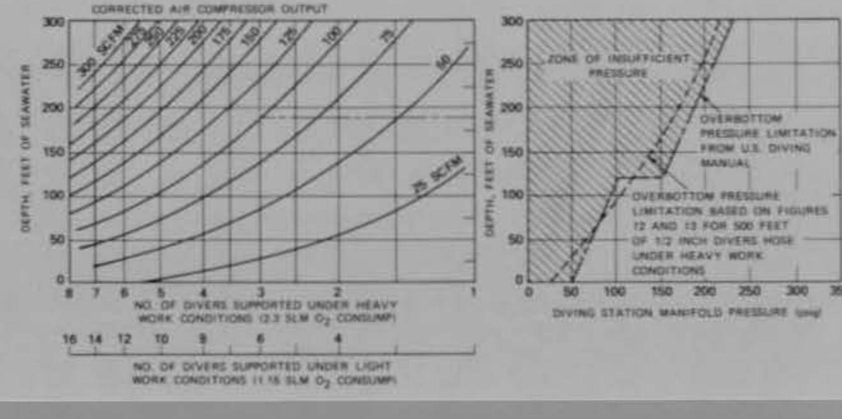


FIGURE 2

that the pressure must be in excess of 150 psi if the current rules are applied, or just under 150 psi if this flow is routed through 500 feet of 1/2-inch diver's hose.

Recognizing that this pressure must be maintained at the diver's air manifold, it is immediately evident that the rated pressure of the compressor must exceed this pressure due to losses in the compressed air piping system. Also, normally the compressor does not operate continuously at its rated pressure, but is controlled to unload or stop when it reaches this pressure. Therefore, a reasonable compressor for the described mission is one rated at 200 psig, with a flow rate of at least 80 SCFM and the start or load control lower limit set in excess of 160 psig.

Additional consideration must be given to the facilities for treatment in the event of a diving accident. Recently, a complete analysis of the compressed air requirements to support all of the published treatment tables in the USN Diving Manual was performed, establishing the flow rate at each treatment stop in conformance with the rules contained therein. The results for each treatment table including oxygen treatment are contained in table 1. It indicates the total SCF required at each stop, the flow rate at each stop, and the total SCF to perform the treatment. The highest flow rate is 140.7 SCFM at the 60-foot oxygen stop, and the highest chamber pressure is equivalent to 165 feet of sea water or approximately 75 psig. This indicates the compressor to support the diving mission has more than adequate pressure, but does not have a sufficient flow rate. Therefore, the need for a compressor in the system with a rated pressure of 200 psig and a minimum flow rate of 150 SCFM is required.

To properly select such a compressor, it is essential that some fundamentals of gas compression must be known. Two general types of air compressors are available, dynamic type (centrifugal), and positive displacement type.

The centrifugal compressor has to date been limited to use on some aircraft carriers where large quantities of air are required to support aircraft maintenance and aircraft starting. The equipment applied is compact, with high rpm, and would appear to be difficult to maintain if any significant repairs are required while at sea.

The positive displacement compressor can be further categorized into two general categories: rotary and reciprocating.

The rotary compressor is usually a sliding vane type and will provide a compact, simple unit for a required capacity. Its limitation is that it is not normally staged so its rated pressure is limited to 100 psi. Another consideration is that cooling is effected by the compressor lubricant. As compression approaches isothermal conditions, the lubricant is pumped into the compression chamber and trapped in a downstream accumulator to be recirculated. This type of compressor is very adaptable to portable systems, and with proper filtration can be used to support shallow diving.

Another similar type compressor, defined as a liquid ring compressor, effects compression by creating the compression volume through rotation of water in a geometrically defined chamber. The water serves two purposes, one to effect compression and secondly, act as a coolant. This type of compressor is frequently used in shipboard control air systems but is even more limited in rated pressure than the conventional rotary type compressor and will therefore be very limited in diving system application.

The reciprocating compressor and other things will be discussed in the next installment of this three-part series on life support systems. Keep reading FP for the conclusion.

TABLE 1
VENTILATION AIR REQUIREMENTS FOR TREATMENT TABLES 1–6A (REF. 1)
(TWO PATIENTS AND ONE TENDER IN CHAMBER)

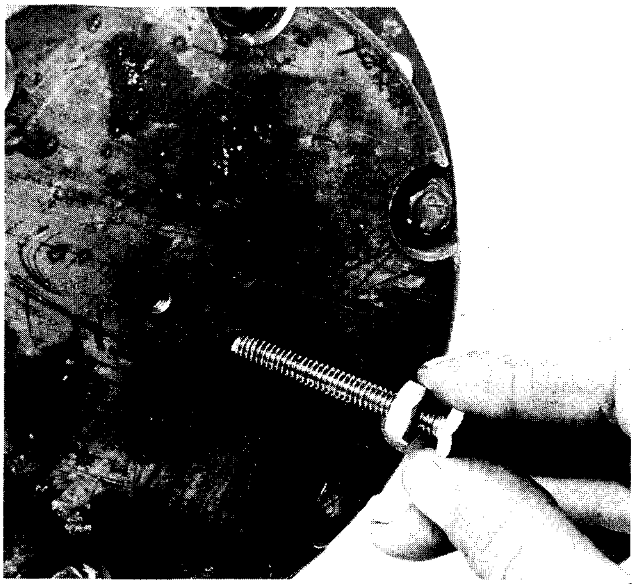
TREATMENT TABLES 1–4

DEPTH OF STOP (FSW)	VENT RATE (SCFM) AIR STOP	VENT RATE (SCFM) O_2 STOP	VENTILATION AIR REQUIRED AT STOP (SCF) TREATMENT TABLE 1	1A	2	2A	3(O_2)	3(AIR)	4(O_2)	4(AIR)
165	47.9				1437	1437	1437	1437	5749	5749
140	41.9				503	503	503	503	1256	1256
120	37.				444	444	444	444	1111	1111
100	32.2		966	966	386	386	386	386	965	965
80	27.3		328	328	329	328	328	328	821	821
60	22.5	140.7	4221	675	4221	676	4221	676	8104	8104
50	20.1	125.6	3767	603	3768	603	3768	603	7234	7234
40	17.7	110.5	3319	530	3314	530	3314	530	6363	6363
30	15.3	95.4		918	5721	1831	10984	10984	15790	10985
20	12.8	80.2	401	770	263	1540	1541	1541	5585	1540
10	10.4	65.		1250		2501	1250	1250	4532	1250
PRESSURIZATION	570		756	756	1247	1247	1247	1247	1247	1247
TOTAL FOR TREATMENT			13754	6794	21732	12026	29423	19929	58757	46625

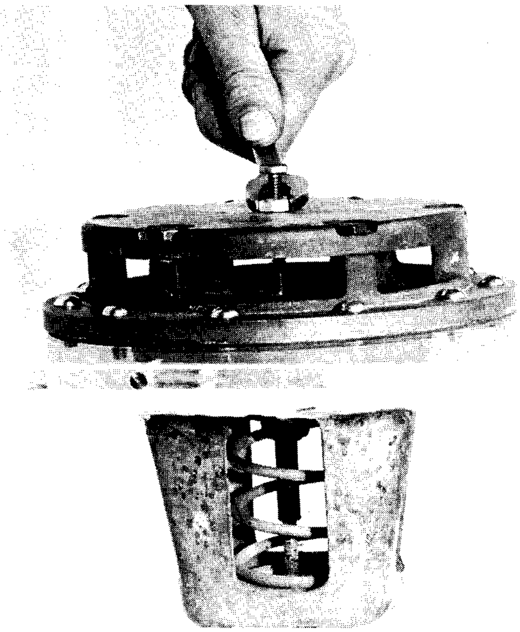
TREATMENT TABLES 5–6A

DEPTH OF STOP (FSW)	VENT RATE (SCFM) AIR STOP	VENT RATE (SCFM) O_2 STOP	VENT AIR USED AT STOP TREATMENT TABLE 5	5A	6	6A
165	47.9	–		719		1437
				138		139
60	22.5	140.7	5741	5741	8780	8780
			3540	3540	3541	3540
30	15.3	95.4	2060	2060	11900	11900
			2180	2180	2180	2180
0						
PRESSURIZATION	570		453	1247	453	1247
TOTAL FOR TREATMENT			13974	15625	28854	29223

By
Richard Hansen
Office of the Supervisor of Salvage



1



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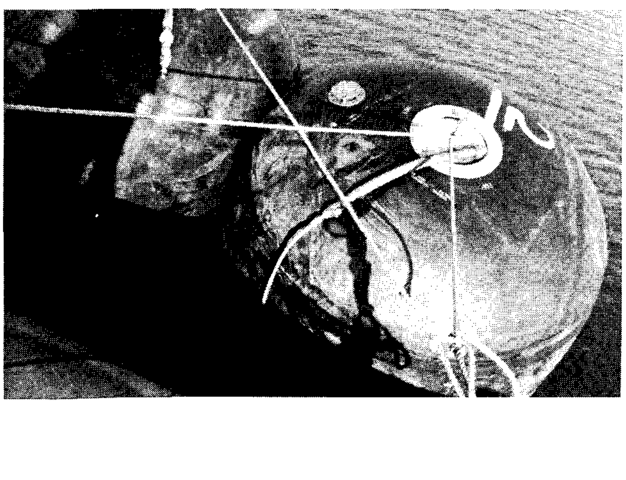


3

LONG DISTANCE TOWING OF THE 8.4 TON PONTOON

When it is necessary to keep the 8.4-ton collapsible salvage pontoon inflated for long periods of time such as during long distance towing, the spring force is not sufficient to keep the relief valve sealed and slow leakage results. Under such conditions these valves, both upper and lower, should be "gagged" or blocked closed to prevent leakage.

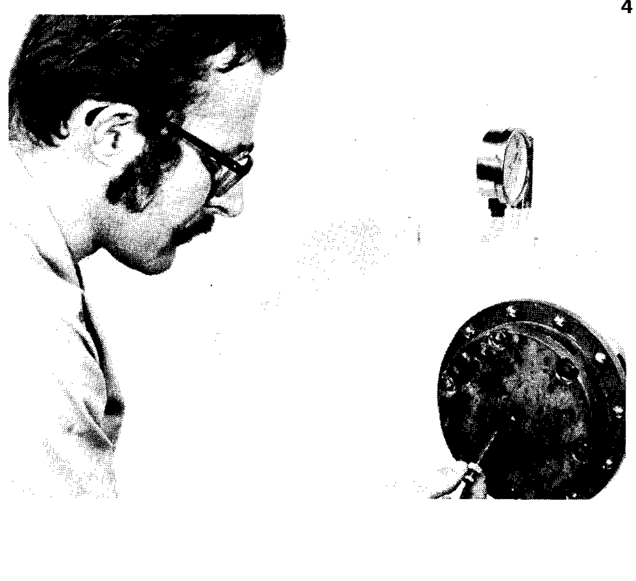
Figure 1 shows the operator preparing to insert a 1/4-20 x 2-inch bolt with a lock nut into the valve cover. (It is recommended that the bolt and nut be made of stainless steel or brass.)

The bolt should be threaded through the valve cover of the upper and lower relief valves until it bottoms snugly against the valve poppet, thus holding the poppet closed. Do not use excessive force or the valve may be damaged. After the bolt is snug against the poppet, the lock nut should be tightened securely against the valve cover as shown in Figure 2.

It is also recommended that the operator tighten all cap screws holding the upper and lower relief valves in place on the pontoon skin. Figure 3 shows a gagged pontoon ready for tow.

Figure 4 shows the operator removing the securing bolt from the relief valve at job site. This securing bolt *must* be removed before submerging the pontoon or the relief valve will not function.

4

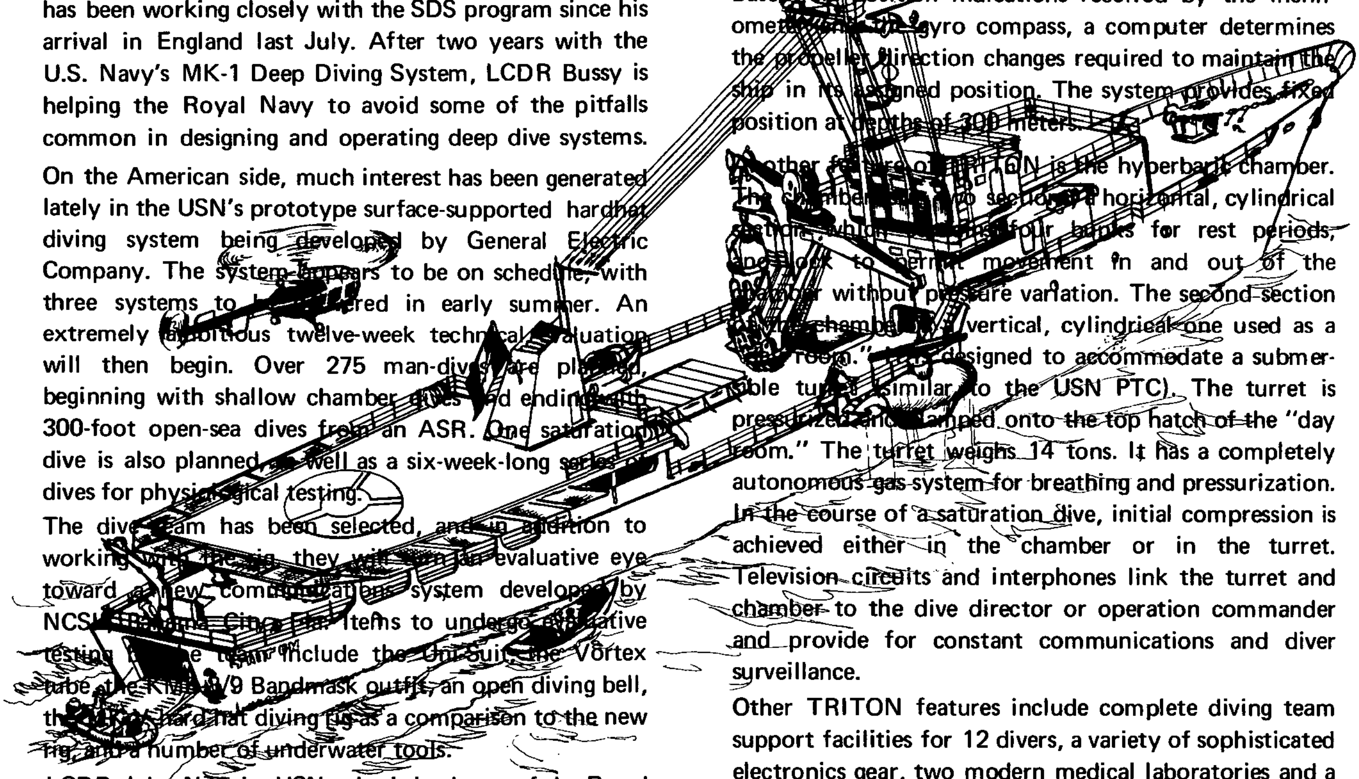


BRITISH, AMERICANS CONTINUE CLOSE COOPERATION

The spring issue of FACEPLATE initiated this column with a report on the minutes of the last annual IEB-12 meeting. In that report it was promised that in future articles additional information of mutual concern would be forthcoming as well as a continuous update of the ongoing projects on both the British and American fronts. This second article will deal with special projects of both countries.

The Saturation Diving System being fabricated for the Royal Navy is scheduled for completion in 1975. The SDS will be installed in a new ship specifically designed for the purpose of deep saturation diving. Eventually a submersible will be added, giving the RN a combined diving capability. They will be able to cope with any rescue or salvage mission near the British Isles.

LCDR Larry Bussy, one of the two USN exchange officers assigned to the Superintendent of Diving (RN), has been working closely with the SDS program since his arrival in England last July. After two years with the U.S. Navy's MK-1 Deep Diving System, LCDR Bussy is helping the Royal Navy to avoid some of the pitfalls common in designing and operating deep dive systems.



On the American side, much interest has been generated lately in the USN's prototype surface-supported hardhat diving system being developed by General Electric Company. The system appears to be on schedule, with three systems to be delivered in early summer. An extremely ambitious twelve-week technical evaluation will then begin. Over 275 man-dives are planned, beginning with shallow chamber dives and ending with 300-foot open-sea dives from an ASR. One saturation dive is also planned, as well as a six-week-long series of dives for physiological testing.

The dive team has been selected, and in addition to working with the rig, they will turn an evaluative eye toward a new communications system developed by NCSL, Panama City, Fla. Items to undergo evaluative testing by the team include the Uni-Suit, the Vortex tube, the KMB-8/9 Bandmask outfit, an open diving bell, the MK V hard hat diving rig as a comparison to the new rig, and a number of underwater tools.

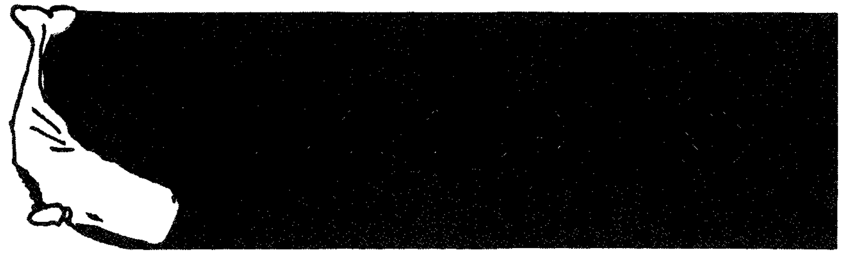
LCDR John Naquin, USN, who is in charge of the Royal Navy's Experimental Diving Team, reports that they are hard at work conducting a series of saturation dives at the Deep Trials Unit, Alverstoke, England. They are developing new decompression tables for use in their Saturation Diving System. Dives to 180 meters have been completed, with a goal of 250 meters just around the corner. When not engaged in experimental diving, the team conducts equipment trials in the open sea. They are presently evaluating the SABA II (Swimmers Air Breathing Apparatus) for the fleet.

In January of this year, LCDR Larry Bussy, USN, visited the French ship TRITON while he was in Toulon. He reports that the French Navy's new research vessel has incorporated many advanced developments in oceanographic equipment. The TRITON is equipped with a dynamic anchor system which enables her to automatically maintain a steady position in relationship to a defined point on the ocean floor. Two Voith Schneider cycloidal propellers are mounted in tandem, one forward, one aft, on vertical axes. The ship's position is determined by a gyro compass and biaxial inclinometer. Based on position indications received by the inclinometer and the gyro compass, a computer determines the propeller direction changes required to maintain the ship in its assigned position. The system provides fixed position at depths of 300 meters.

Another feature of TRITON is the hyperbaric chamber. The chamber has two sections, a horizontal, cylindrical section which contains four bunks for rest periods, and a lock to permit movement in and out of the chamber without pressure variation. The second section of the chamber is a vertical, cylindrical one used as a "day room." It is designed to accommodate a submersible turret (similar to the USN PTC). The turret is pressurized and clamped onto the top hatch of the "day room." The turret weighs 14 tons. It has a completely autonomous gas system for breathing and pressurization. In the course of a saturation dive, initial compression is achieved either in the chamber or in the turret. Television circuits and interphones link the turret and chamber to the dive director or operation commander and provide for constant communications and diver surveillance.

Other TRITON features include complete diving team support facilities for 12 divers, a variety of sophisticated electronics gear, two modern medical laboratories and a photo lab for on-the-spot film development.

In this column for the fall issue of FACEPLATE we hope to expand the scope somewhat by including reports from Sweden and Japan as well as France, England and the United States. Anyone wishing to contribute material please send your comments to LT D. R. Chandler, USN, Navy Experimental Diving Unit, Building 214, Washington Navy Yard, Washington, D.C. 20390 or to LCDR L. Bussy, Admiralty Experimental Diving Unit, c/o HMS VERNON, Portsmouth, England.



Gentlemen,

In your article on the "OOC" Boom (Winter, 1971) there is one misstatement I feel should be corrected. The statement "the OOC boom represents the most effective state-of-the-art containment system available," is not true. On the "OOC" boom, the horizontal length of the floats is approximately 18 inches, which measures the roll stability and, in effect, the effectiveness of the boom. On the boom which has been developed by the Johns-Manville Corporation for the USCG, this length is approximately 36 inches. Since the Johns-Manville boom also has an external tension line, which the "OOC" boom does not, it represents a more effective state-of-the-art containment system than does the "OOC" boom.

Sincerely yours,
Jerome H. Milgram
Associate Professor
Massachusetts Institute
of Technology
Department of Ocean Engineering
Cambridge, Mass.

Editor: Your technical evaluation of the Johns-Manville vs. the "OOC" boom is quite correct. However, according to the Supervisor of Salvage, the Johns-Manville/USCG boom is not a state-of-the-art containment system. It is still in the prototype stage.

The Johns-Manville does have decided advantages; however, it does not now have operational requirements. If a major oil spill should occur, 4000 feet of "OOC" boom could be on-scene in a matter of hours. The Johns-Manville boom could not meet this need to possibly spare a large portion of coastline from pollution. This is our definition of state-of-the-art as used in the article.

Gentlemen:

I thought you might be interested in preserving the exterior of steel SCUBA bottles with a method we tried at this command.

We had several sets of plastic coated steel SCUBA bottles that were rusting in spots where the coating had peeled off. To correct this we scraped the remaining plastic off and sandblasted the tanks down to bare metal. We then applied a heavy coat of DEMETCOAT No. 6 to the outside. We allowed about half an hour between coats and applied three coats with a paint brush. This has held up very well, and since we applied it six months ago there has been no rusting.

Perhaps other diving facilities might be interested in preserving their steel bottles in this manner.

Respectfully,
MMC/DV Paul Walker
Naval Inactive Ship
Maintenance Facility,
Puget Sound Naval Shipyard
Bremerton, Wash.

Gentlemen,

Why is the inside tender for the pressure/02 tolerance test not decompressed for a 120 foot for 40 minutes dive in accordance with Table 1-10? This table requires five minutes at 20 feet and 25 minutes at 10 feet.

Various answers have been offered by Master, First Class, and Corpsman divers; however, no one has a clear and concise reason for this apparent deviation from the normal practice of using maximum depth for total bottom time.

Can you clear this up?

Sincerely,
QMC(SS/DV) E. K. Maughmer
Harbor Clearance Unit-One

Editor: According to CDR W. H. Spaur, Senior Medical Officer, NEDU, "If desired, the inside tender can be replaced at 60 feet by another tender and decompressed as if from a 120-foot dive. As commonly practiced, though, the tender remains through both phases of the test. Also, the requirement to enter the Standard Air Table at the exact or next greater depth than the maximum attained during the dive is an operational necessity only. A new decompression schedule could be created for any combination of depths in a dive known well in advance. Such is the case in the pressure/oxygen tolerance test. The procedure is standardized; the method of performance known to be successful. Finally, an analysis of the theoretical tissue inert gas tensions using Dr. Workman's 'M' value model indicates that the inert gas tensions remain well within the safe limits without using decompression stops. Years of experience, of course, also indicate that the procedure is safe."

the Old Master says . . .

They *still* don't make 'em like they used to. Some activities have had difficulty with these new gages because they look alike. But there are differences. Look closely, can you see what they are? No? Well the cassion gage has the fittings on the back and a red dot on the center of the dial. The "do not remove" cap sign on the back of the cassion gage applies only to the top center (CRES) pressure element port.

These gages were mentioned in the Winter 1971 issue of FACEPLATE on page 8. If your activity has not received them yet, notify the Supervisor of Diving or the Navy Experimental Diving Unit.