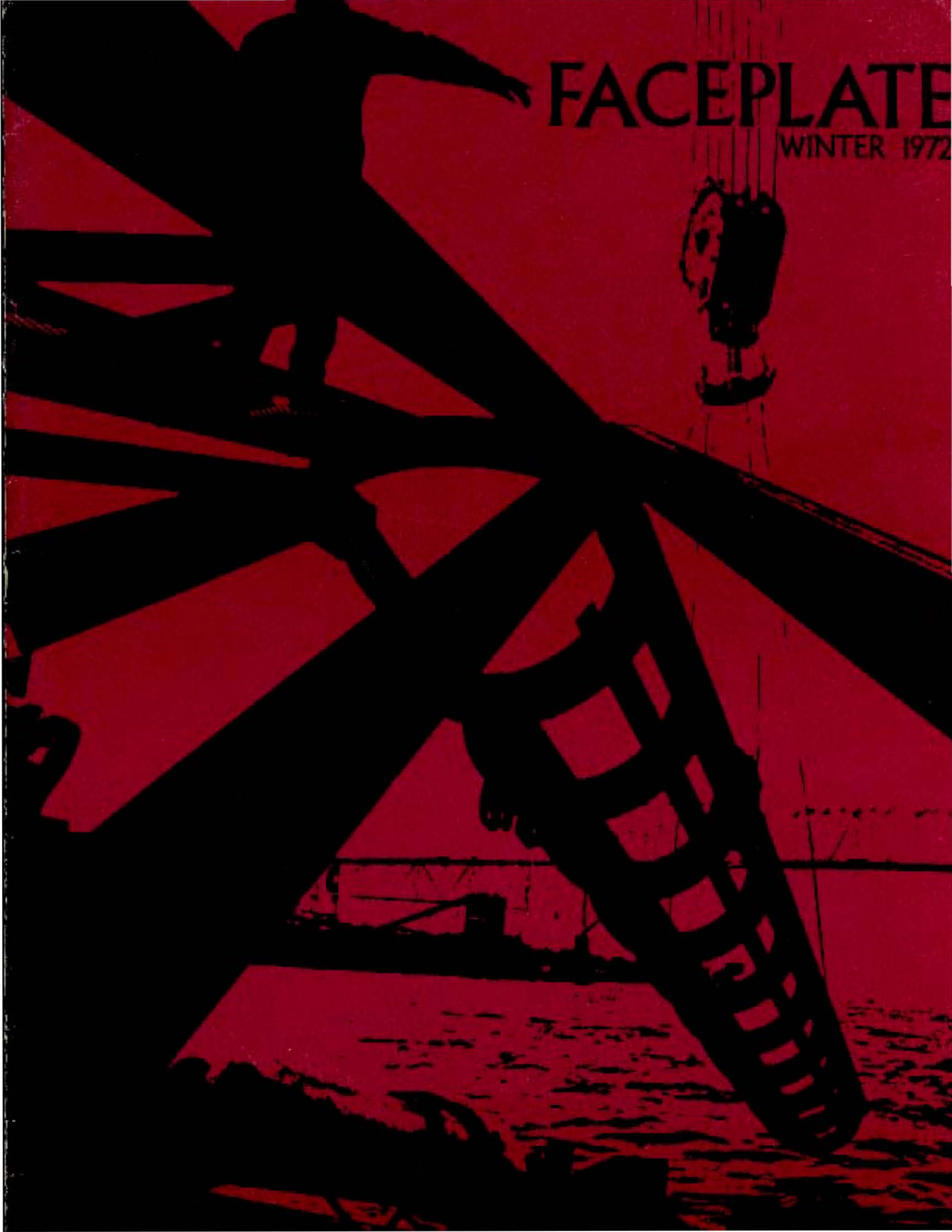
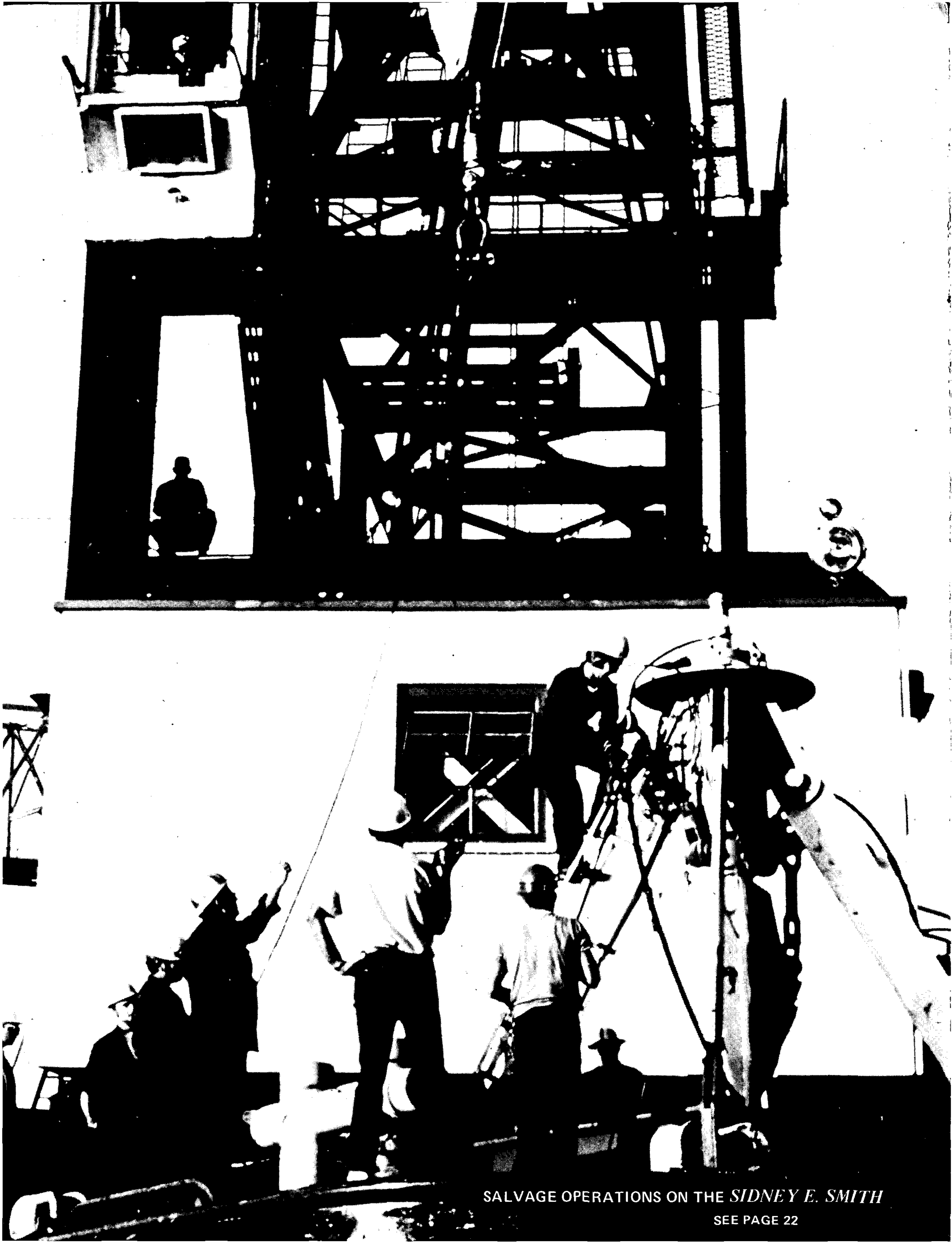
FACEPLATE

WINTER 1972





SALVAGE OPERATIONS ON THE *SIDNEY E. SMITH*

SEE PAGE 22

VOL. 3 NO.4

FACEPLATE

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

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.

Requests for distribution copies or for changes in distribution should be directed to *FACEPLATE*, Supervisor of Diving, Naval Ship Systems Command, Washington, D.C. 20360. Telephone (Area Code 202) OX2-1400 or AUTOVON 222-1400.

CONTENTS

Anyone with a good recipe for Lemon Soup, please send it to Ed Wardwell, Seaward, Inc., Suite 204, 6269 Leesburg Pike, Falls Church, Virginia 22044

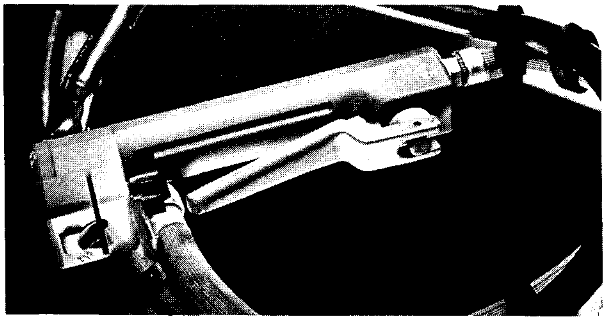
SOUNDINGS

Underwater Cutting Torch — "Sea Cutter"

A newly designed Navy Underwater Cutting Torch called "Sea Cutter" is presently being issued to selected activities. This new torch has many distinct operational and safety advantages over the present torch. A few of the improvements of the torch are as follows: (1) fabricated mostly of nylon which greatly increases its operational safety due to the nylon's inherent electrical insulation characteristics; (2) corrosion to parts and hence down times are minimized due to few metal parts; (3) minimum number of moving parts and thus fewer spares are required; (4) lightweight (4 pounds) and improved torch configuration due to the handle, oxygen lever, electrical cable wrist loop and electrode screw clamp mechanism; (5) wrist loop increases manuverability and provides for freeing the operator's hand for other work when not cutting; (6) a newly designed oxygen valve to minimize the leaking and sticking problems of the present torch.

It should be noted that the "Sea Cutter" is designed to accommodate the standard 5/16-inch-diameter cutting electrode and will not accept the 7/16-inch-diameter Navy ceramic cutting electrode nor is the torch designed for underwater welding.

The Federal Supply System has been requested to assign a FSN to the torch and to maintain a supply of the new torches. Activities will be notified when the torches are available in the supply system.



Publication Distribution

The Diving Operations Handbook and The Underwater Work Techniques Manual have been distributed to all diving activities. Activities which have not received these publications should advise the Supervisor of Diving.

ID Cards for Divers

While most diving schools and commands issue divers' identification cards, these are of various designs and not standardized. The Supervisor of Diving has designed and printed a standard Navy Diver's ID card. These cards will be distributed to the Fleet with a NAVSHIPS instruction specifying how they are to be used.

Your Opinion

This is the twelfth issue of FACEPLATE since it was revised in the Spring of 1970. FACEPLATE is designed to provide news on diving developments to Navy divers. We want to know what you don't like about FACEPLATE, and how we can improve it to make it more useful to you. Don't hesitate—we're looking for constructive criticism. Tell us what you don't like, what we have too much of, not enough of, etc. Send your comments to FACEPLATE Magazine, Supervisor of Diving, Naval Ship Systems Command, Washington, D.C. 20360

Five Navy Divers Reenlist Under Water

A unique reenlistment ceremony, administered to five Navy men stationed aboard the repair ship USS VULCAN (AR-5) at the Norfolk Naval Station was recently conducted on the bottom of the swimming pool at the Fleet Recreation Park on Hampton Boulevard in Norfolk. LCDR John Ringelberg, assigned to the staff of Commander Service Force, U.S. Atlantic Fleet gave the reenlistment oath to (left to right in photo) MM1 Donald L. Dunkley, EM2 Donald G. Deaton, EM2 Steven G. Demsky, EM3 Charles W. Cobb, and MM1 Steven A. DeBolt. The men elected to re-up in the underwater surroundings because they routinely perform underwater hull inspections, underwater repairs, and participate in salvage operations.

Certification of the Mk 2 Mod 0

In early September, 1972, the Mk 2 Mod 0 received certification. Housed on the IX-501, ELK RIVER, in San Diego, the Mk 2 is now fully approved and operational. Shown here at the certification signing are (left) LT Rick Parrish, and (right) Mr. Charles Darley of the Office of the Supervisor of Diving, and (seated) RADM Kenneth E. Wilson, Jr., Vice Commander of NAVSHIPS.

Current EDU Reports

Three new research reports have been recently issued by the Experimental Diving Unit, Washington, D.C. Non-DOD facilities desiring copies of these reports 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 obtain copies from the Defense Documentation Center (DDC), Attn: DDC-TSR-i, Cameron Station, Alexandria, Va., 22314.

Experimental Diving Unit Report 5–72. *Beckman Electrolung II, Mixed Gas, Closed Circuit, Underwater Breathing Apparatus.* LT Alfred B. Quist

Abstract: The Beckman Electrolung II mixed gas, closed circuit, underwater breathing apparatus was evaluated by the Navy Experimental Diving Unit during the period 15 November to 21 December 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 does not meet these requirements and that no further testing is warranted or recommended.

Experimental Diving Unit Report 6072. *General Electric MK 10 Mod 5 Mixed Gas, Closed Circuit, Underwater Breathing Apparatus.* LT Alfred B. Quist, EMCS (DV) Thomas C. King

Abstract: The General Electric MK 10 MOD 5 mixed gas, closed circuit, underwater breathing apparatus was evaluated by the Navy Experimental Diving Unit during the period 5–25 January 1972 and 14–25 February 1972. 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.

Experimental Diving Unit Report 13–72 *Effects of Increased Ambient Air Pressure on Standing Steadiness in Man.* J.A. Adolfson, L. Goldberg, T. Berghage

Abstract: The effects of increased ambient air pressures on standing steadiness at 2.2 ATA, 4 ATA, 7 ATA and 10 ATA, as compared with results obtained in two control situations at ambient air pressure (1 ATA), were studied in 10 experienced divers. Body sway was recorded quantitatively by statometry and in four different conditions: with open and closed eyes and in sagital and lateral directions. The device used–Statometer IV–allowed analog and digital recording and evaluation of variations in frequency and amplitude of the pattern of body sway, and an advanced statistical analysis was made by using a randomized block factorial analysis of variance design. The results indicated that (1) there is a strong quadratic relationship between balance and depth, (2) deterioration in balance increases at a much faster rate for the eyes closed condition than for the eyes open condition as depth is increased, (3) there are highly significant individual differences, (4) the performance at depth is related to the performance at the surface, (5) there seems to be no habituation or other adaptation to the test device and (6) there seem to be no essential after-effects to the exposure to increased ambient air pressure under the present conditions. It was concluded that the postural disturbances at increased ambient air pressure might be related to the effect of the breathing medium on the central nervous system as one symptom of nitrogen narcosis in man.

Replacement of Conshelf XI

With the Supervisor of Diving's approval of U.S. Divers' Conshelf XII Regulator, many west coast diving units have been advised to replace the current working regulator, Conshelf XI, with the approved model (Conshelf XII). It has been found, however, that all the parts in the XI and XII regulators are identical with the exception of the Box Bottom #1049–22 and exhaling tube #1049–20. (The yoke and yoke screw are also different, but with no effect on the operation of the regulator.) In the interest of economy and supply, it has been recommended that instead of replacing all Conshelf XI regulators, only the above mentioned parts be replaced. The estimated cost of this is about $15.00 per unit. Each diving unit can accomplish this at a considerable savings for their respective commands, in the amount of $40.00 per unit.

New CO at School of Diving and Salvage

LCDR Anthony C. Esau recently assumed command of the Naval School, Diving and Salvage, Washington, D.C. Replacing Walter E. O'Shell, LCDR Esau comes from duty as Commanding Officer, USS SUNBIRD (ASR-15). His career includes duty on USS BARRACUDA, USS GEORGE WASHINGTON CARVER, and such training as the Polaris Weapons Officers' course and Helium Oxygen Deep Sea Diving Officers' Course. *Faceplate* welcomes LCDR Esau to his new duty. Good Luck!

ONR/SUPDIV WORKSHOP PROMOTES PROGRESS

The capability to operate within the entire oceanic water column--including diving on the continental shelf, the deep ocean, under ice and in all weather--is one of the long range goals that brought civilian and Naval diving experts together on September 19, 20 and 21. Meeting near Washington, D.C., the ONR/SUPSALV sponsored workshop on advanced diving technology proved to be a very effective means of freely exchanging and compiling information necessary to fulfill this Navy objective.

Mr. D. C. Pauli, Office of Naval Research, Washington, D.C., and Mr. R. Pfeiffer, Naval Ship Systems Command, Washington, D. C., were the Workshop Co-Chairmen in charge of seven Study Groups--UBA, Diver Platforms, Surface Support Platforms, Gas Technology, Diver Non-UBA Life Support, Physiological Monitoring--Sensors--Communication, and Special Arctic Problems.

Defining the technology objective was the first step in individual group procedure. Participants then listed sub-tasks, established priorities, and identified available and required facilities, equipment and techniques. At the conclusion of the Workshop, each group's chairmen presented to the assembly a summary of their findings, later to be filed with ONR. Reports included such information as major problem areas, study efforts required, defined operational techniques and supporting experimental programs required.

Workshop participants not only worked in particular groups but also had the opportunity to hear presentations on a wide range of related subjects.

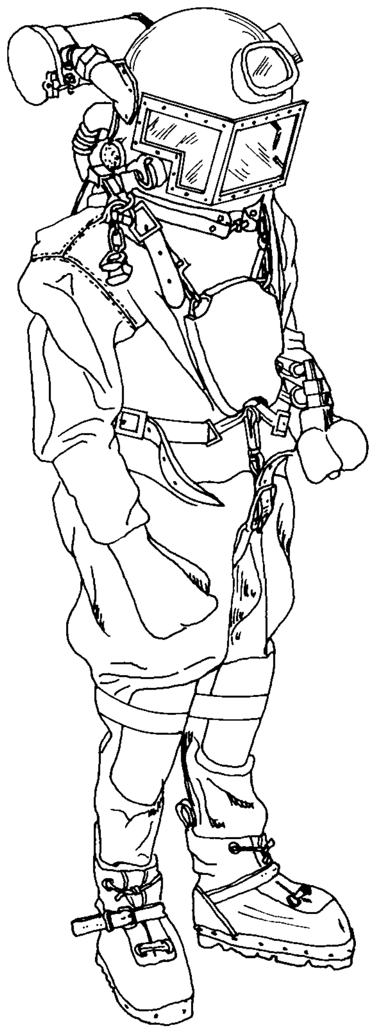
The agenda began with two general topics--"Navy Present Capability/Limitations Overview," by CAPT R. E. Jortberg, NAVSHIPS, and "Diving Medical Frontiers--Man's Requirements/Limits," by CAPT E. F. Coil, BUMED. Thereafter the program turned to more specific reports. Mr. T. D. Stanford, NAVSHIPS, spoke on "State of the Art and Innovations in UBA." Diving platforms were discussed by both LCDR Frank Eissing, Jr. in "State of the Art in Diving Systems," and Mr. F. Hettinger, Perry Oceanographics, Inc., in "Lock-out Submersibles." Continuing on this subject were CAPT G. M. Brewer, NAVSHIPS, and Mr. C. Dodge, NAVAL INTELLIGENCE SUPPORT CENTER, with their report on foreign diving platforms and concepts.

Moving on to other topics, Mr. G. H. Fahlman, Lockheed Petroleum Services, spoke on "Ocean Floor Diving Stations," and Mr. Seth Hawkins, NAVSHIPS Research and Development Center, described present support ship experiences and new concepts.

An overview on Arctic problems was presented in a report by Dr. J. B. MacInnis, Undersea Research, Ltd. The final topic--"Associated Problem Presentation Overview," including underwater communications and power, gas logistics, protective systems and physiological monitoring, was covered by Mr. R. E. Pfeiffer, NAVSHIPS. The remainder of the Workshop was left for additional work sessions before the group summary presentations were given. The Workshop closed with feelings of accomplishment and benefit for all who attended. It is hoped that a precedent has been established for greater progress in the future.

Letter to the Editor

Faceplate appreciates this letter from one whose contributions to Navy diving are significant and well known. The Buie diving outfit seems to have disappeared into Naval history. *Faceplate* would like to hear from anyone who has used, or had any experience with this outfit.



Dear Sir:

I have just finished reading an article in *Faceplate*, Fall 1972 issue, entitled, "New Hard Hat On The Way" by W.A. Danesi.

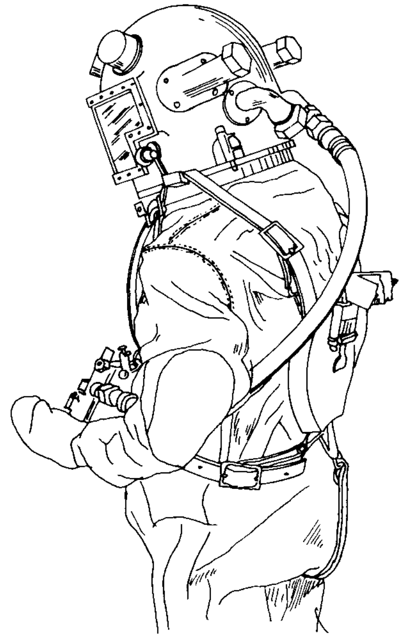
Not so, Gentlemen, not so. After looking at the enclosed patent sketches and information, I believe you will agree that the vast number of similarities between subject diving suit and one I developed for the Ordnance Disposal Units in 1943, render the originality of the former shaky.

There is no question of patent rights – the Navy has all rights. But as you can see, the hard hat has been changed.

In ordnance disposal work during W-W-II, we needed a diving outfit including air supply with some of the following requirements: the entire dress, including shoes, of lightweight, soft materials; helmet and breastplate as light as practical, and with as much visibility as possible, (plexiglass). We used breast weights to give the waist more flexibility. The helmet had to operate as needed on air, with or without recirculator, on oxygen, or mixed gas, with diver selection.

Breathing media was from compressor, pump, or standard 200 cuft., oxygen bottle. One such bottle, charged to 1800 lbs. of air, would suffice for three hours of diving time on recirculator. A test dive at 200 ft. showed no rise above normal in CO_2 content. We had muffler control in the helmet for noise. Our circulation in the helmet on recirculator was 6 to 7 cuft., on surface.

The Navy purchased these diving outfits and shipped them to O.D.U.'s almost all over the world. I never knew of any malfunction.



Very truly yours,

E.D. Buie
President
U.S. Laboratory
P.O. Box 317
Port Royal, S.C. 29935

Naval diving experience–
Qualified 2nd, class 1934
D.S.D.S. 1st. class 1936
Duty ASR's Falcon and Pigeon
Instructor D.S.D.S. 1939, Master Diver
Instructor Ord. Disposal School 1941
W-W-II Bureau Ord. and Ships rep. in Europe, Naval Tect. Mission, on underwater diving equipment and sabotage
Asst. O in C Deep Sea Diving School, Wash. D.C. 1945

HONORS AND AWARDS

CPO Gary Bruce Magnuson is Honored

The Navy and Marine Corps Medal was recently awarded to CPO Gary B. Magnuson for his courageous actions which avoided a potential diving accident.While serving aboard the USS DELIVER (ARS-23) at Iwakuni, Japan, CPO Magnuson and the ship's Diving Officer were conducting a preliminary survey dive on a sunken jet aircraft. Both men became completely entangled in the fishing nets surrounding the wreckage. CPO Magnuson managed to free himself and assisted his partner, despite the fact that the Diving Officer's reserve air supply had become inoperative. In the words of the citation, "Only through the self-sacrifice and courage of CPO Magnuson did both divers reach the surface safely."

Frank Eissing Decorated by Navy

On 20 July, 1972, CAPT Jack Faulk, USN, Commanding Officer of Callander Naval Air Station, New Orleans, Louisiana, awarded a Gold Star and citation in lieu of a second award of the Navy Commendation Medal to Mr. Frank Eissing.

CAPT Faulk presented the citation awarded for meritorious achievement while serving with friendly foreign forces engaged in armed conflict against North Vietnamese and Viet Cong aggressors in the Republic of Vietnam.

During the period of commendatory service, Frank Eissing, then a Master Chief Petty Officer (Master Diver), assumed charge of the salvage and recovery efforts of the SS ROBIN HOOD following her extensive flooding due to the explosion of a 200 pound high explosive sapper mine. CAPT Faulk in his closing remarks stated, "Master Chief Petty Officer Eissing's exemplary professionalism and devotion to duty reflected great credit upon himself and were in keeping with the highest traditions of the United States Naval Services."

Superior Civilian Service Award presented to Mr. Louis W. Ivins

Prior to his retirement on 30 June 1972, Mr. Ivins was Head, Special Units Branch, Logistics Division, Ocean Engineering Support Department, Navy Experimental Diving Unit.

The award was made in recognition of Mr. Ivins' long record of sustained superior service to the U.S. Navy in the field of logistics and maintenance for non-ship oriented fleet units and diving activities.

Among the diverse units of the Amphibious and Service Forces and the Marine Corps, Mr. Ivins has had the support responsibility for Navigational Aid Support Teams, Beach Jumper Units, Naval Beach Groups, Coastal River Squadrons, Sea-Air-Land Teams, various fleet facilities and advanced bases.

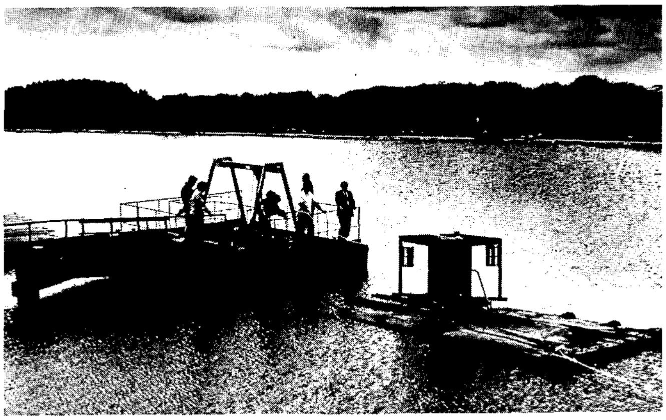
The recommendation for the award states "The Navy can do no less for an individual who has given 30 years of such dedicated and superbly capable service."

21 Years Under Water

(Photo courtesy of the San Diego Evening Tribune.)

Navy Petty Officer Irwin C. Rudin ends a 21-year diving career and marches off the USS FLORIKAN (ASR-9) between "rainbow" sideboys. Fellow divers honored him wearing SCUBA, Mark Five hard hats, shallow water masks and band masks. Rudin entered the Navy in 1951 and qualified as a second and first class diver, and a saturation diver. His work included service with the Navy Experimental Diving Unit.

USN/RN Enlisted Divers Exchange Information



by LT Don Chandler
NAVXDIVINGU

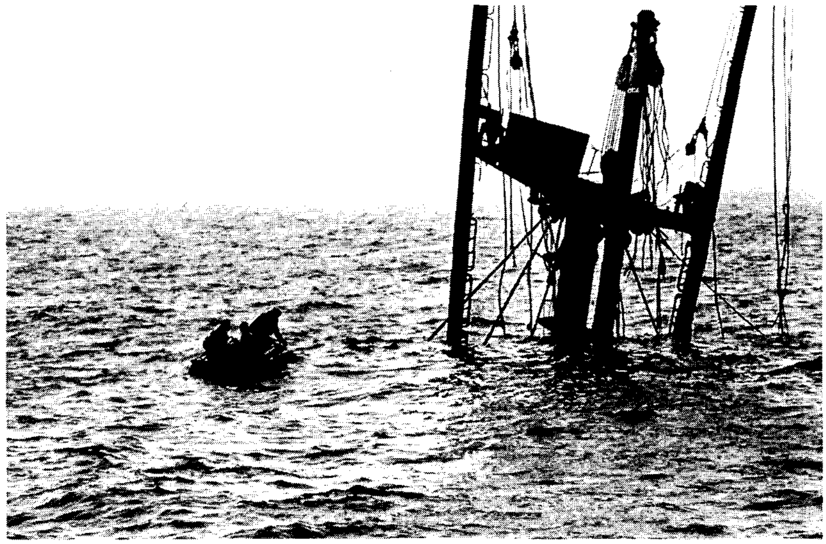
Two years ago CAPT E.B. Mitchell, Director of Ocean Engineering for NAVSHIPS, initiated a program designed to significantly expand the Information Exchange Project (IEP) for Diving and Salvage between the United States and the United Kingdom. The plan called for a team of experienced enlisted divers to visit diving activities throughout the United Kingdom. The first visit proved to be such a success that a policy was established to continue the visits on an annual basis.

Activities of the visiting US divers are coordinated through the office of the Royal Navy's Superintendent of Diving. The US Navy Exchange Officer, currently billeted at the Admiralty Experimental Diving Unit Portsmouth, England, handles the arrangements. LCDR John Naquin, USN, the current Exchange Officer, has, during the past two visits, provided the team of US divers an informative, educational, and extremely valuable itinerary.

The itinerary this year gained special significance through the fact that the visiting US divers were able to join the RN divers in their routine assignments. Two such RN/USN combined operations which took place are representative of the type of activity programmed for each visit. First, the RN and USN joined forces to test a new type of shaped charge (top photo) on a 36-inch steel pipe in Horsea Island near Portsmouth, England. Later during the visit they surveyed the sunken hull of the USNS RICHARD MONTGOMERY which was sunk during World War II in the Thames Estuary off Sheerness Island (bottom photo). The MONTGOMERY was carrying a cargo of bombs and ammunition, and consequently, periodic hull surveys are mandatory.

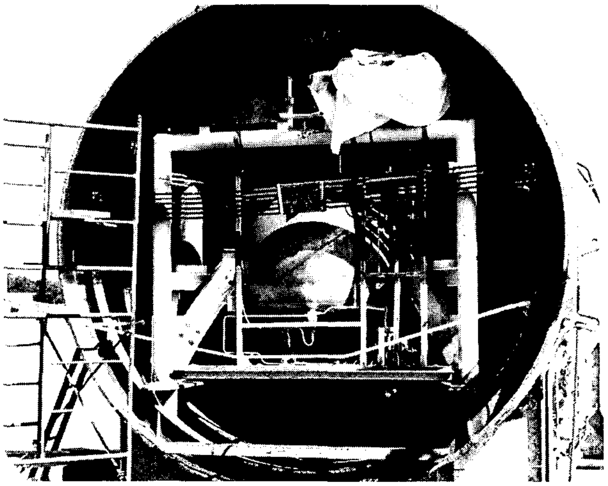
In order to economize, the visits thus far have been expansions of other official US/UK diving operations. This visit was no exception, since the visiting divers also participated in the USN/RN 1000 foot cold water saturation dive (see FP Fall '72).

Such a program that allows a free exchange of information on the enlisted level is considered a complete success. Both Navies will benefit from this type of exchange for many years to come.



NCEL SUPPORTS SUPSALV PROJECTS

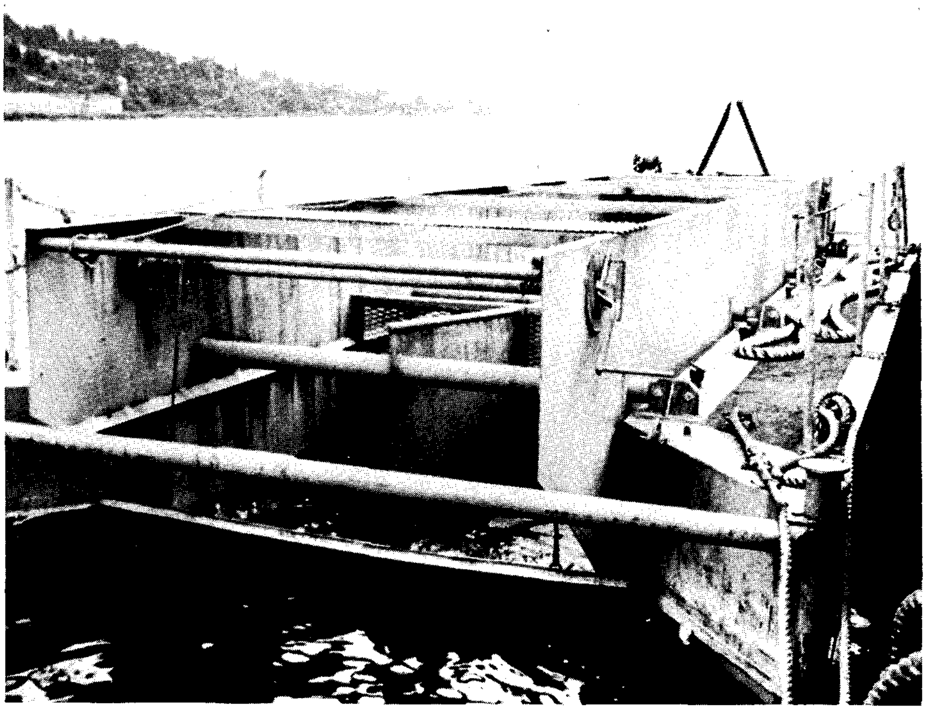
The Naval Civil Engineering Laboratory, Port Hueneme, California carries out many of the research and development activities of the Supervisor of Salvage. New underwater tools (see *Faceplate*, Fall 1972) represents only one of many areas of experimentation and construction. Approximately 18 projects are now underway at NCEL in support of the Supervisor of Salvage. Some of these are discussed below.



Uncapped rigid 100-ton lift capability pontoon, showing the NCEL–developed, hydrazine fueled buoyancy gas generating system installed.

One vital area in which the Naval Civil Engineering Laboratory is supporting SUPSALV is oil pollution control. Presently an engineering evaluation of available oil skimming systems is in progress. Candidate equipment will be selected and field tested at the site of a natural oil seep in the Santa Barbara Channel, known as "Coal Oil Point." An important phase of this program is the Laboratory's study of loading and offloading procedures on a C5A to resolve any transportation problems and develop a fast response capability. Field testing is expected to be underway by early 1973.

Beach cleanup is also being investigated at NCEL. A literature search, covering the most effective practices and procedures for removing spilled oil from various beach surfaces, is nearly completed. The objective of this project is to obtain sufficient information to publish a manual for personnel involved in these operations.



The Spiltrol "Husky Offshore Skimmer," an open sea skimmer successful in the oil spills in the Gulf of Mexico.

Two projects involving the physical behavior of oil are now beginning in the NCEL oil spill effort. The first is an investigation of chemical aids and other materials that might serve as emergency aids in preventing oil loss from damaged or leaking tankers and which will help in the salvage of oil cargo. These chemicals or materials will be used to quickly thin or thicken the oil, enabling it to be pumped to salvage vessels or reduced in flow.

The second project is a study of the effect of waves on the movement of dispersant-oil mixtures through the water column. This will be accomplished through a series of wave tank experiments simulating mixing/energy levels used in the field. Wave period, height and front-steepness are important variables, as well as external mixing procedures such as hosing with water.

Sorbents of various types have always been considered part of any complete oil spill cleanup system. At NCEL, a mechanized system for broadcasting, harvesting, squeezing and re-using sorbent material is being developed. The total system will consist of one or more boats, a broadcasting device, a wing boom for collecting the sorbent, a rotating belt for harvesting it and a squeezing device. As presently conceived, the sorbent will be polyurethane foam, which can be recycled. An alternative to this foam is straw, but it cannot be recycled. The Laboratory expects to have prototype hardware by early 1973, and to begin testing the system by summer, 1973.

It is a well known fact that the Navy is switching from the standard black fuel oil to a new, cleaner type of distillate for its ships as an environmental improvement measure. Somewhat less well known is how this new fuel will react if spilled in the sea. It will not be as unsightly as the black fuel and it will evaporate more rapidly, leaving less residue to contend with; but questions such as how fast it will evaporate and what the chemical properties of the residue are will be answered by an investigation currently going on at NCEL. In less than a year, NCEL hopes to have an accurate assessment of the fuel and any possible problems.

Twenty-five ton lift capability, vertically oriented collapsible salvage pontoon undergoing test and evaluation by NCEL off San Clemente Island, California.

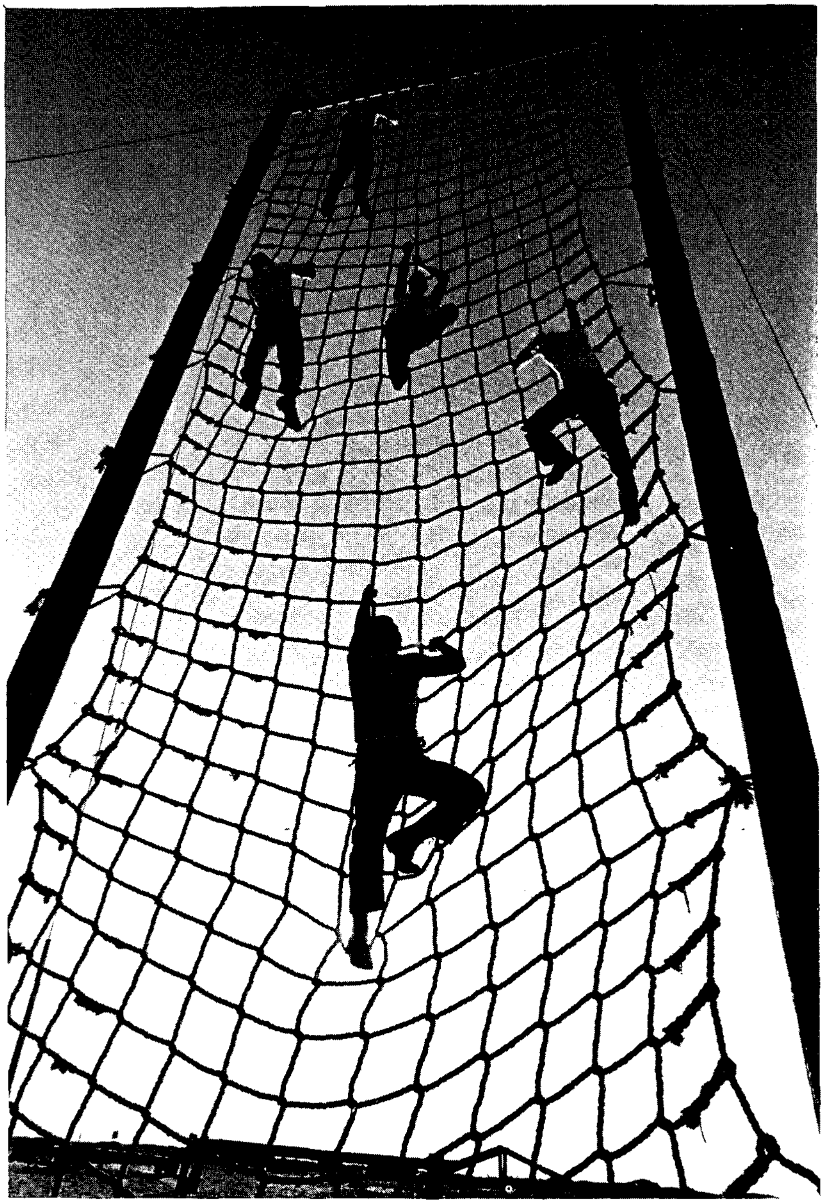
NCEL is also engaged in an activity of basic salvage work—the raising of sunken objects from the sea. The controversy concerning the merits of collapsible and rigid pontoons is the object of one study. The Laboratory has spent seven years investigating the collapsible pontoon—mainly in test and evaluation. Pontoon work began in 1965, with an in-depth study of pontoons of all types, including three different models of a 25-ton lift capacity inflatable pontoon and several 8.5 ton pontoons. The Laboratory has designed and assembled a hydrazine gas generator of its own, which is installed inside the pontoon. When the generator is activated, it deballasts the pontoon by pressurizing the central tank and forcing the ballast water out. Any degree of buoyancy can be achieved by controlling the valves from the surface support ship. The NCEL gas generator was recently tested successfully in a 100-ton rigid pontoon for the Large Object Salvage System project at Panama City, Florida.

In the field of diving operations, the Laboratory has made a nation wide survey of instruments for monitoring the purity of hard hat divers' air supplies and has made recommendations as to the best available instruments for this purpose. Also, an NCEL-evaluated diver heating system is currently being monitored in field use. This oil-fired, closed cycle system is capable of supplying heated seawater to as many as four divers.

The possibility of fire in hyperbaric chambers is a very real hazard because of the high oxygen content and the fact that the occupants are sealed inside. To combat this, NCEL is developing an automatic fire protection system which uses infra-red detectors to activate water sprays. The system has been installed and is being evaluated at the Navy Experimental Diving Unit in Washington. (See FACEPLATE, Spring, 1972) The Laboratory is also working on methods for detecting smoke.

These on-going projects cover a broad range of scientific and engineering support for SUPSALV. They are an integral part of this Port Hueneme, California, Laboratory's mission "to be the principal Navy RDT&E center for shore and sea-floor facilities and the support of Navy and Marine Corps construction forces."

For further information, contact John Quirk, SUPSALV Coordinator, Naval Civil Engineering Laboratory, Port Hueneme, California, 93043. Telephone 805–982-5062 or Autovon 360-5062.



A Force To Count On – Special Warfare Groups

This is the conclusion of a three-part series on Special Warfare Groups. Check your Summer and Fall issues of FP for the other installments.

ASSAULT CRAFT UNITS

The Assault Craft Units provide heavy assault craft to transport men and materials between the amphibious and assault beaches, and to provide operational and training services to the amphibious forces in support of amphibious operations. Assault craft units utilize LCUs, LCM-8s and LCM-6s. These craft are normally employed with amphibious ship types to accomplish the ship-to-shore movement of personnel and material during amphibious assault operations. They are usually embarked in Landing Ships Dock (LSD) and Landing Platform Dock (LPD) ship types.

One of the major innovations found on some LCUs is the Mark-10 Sewage Treatment Equipment. This equipment meets the requirements of military and civilian anti-pollution specification for sewage treatment. By effective maceration and chlorination, the Mark-10 equipment creates an affluent that can be discharged overboard with negligible pollution effect.

The equipment is automatic, occupies a minimum of space and consists of a control panel, macerator/detention tank, disinfectant mixing and storage tank assembly with injection pump, liquid level controls, flow switch controllers and inlet trap assembly.

NAVIGATION AIDS SUPPORT TEAM

The mission of the Navigation Aids Support Team is to provide reliable, portable, precise electronic navigation aids support to designated Navy-wide activities. NAVAIDSUPTEAM maintains a repository of standardized portable, precise electronic navigation equipment and is prepared for emergency world-wide deployment of necessary equipment and personnel. NAVAIDSUPTEAM also conducts necessary training to acquire and maintain proficiency in the operation and maintenance of this precise electronic positioning equipment.

SUPPORTING THE FORCE

Inventory Control Point responsibility in the support of the Naval Shore Based Units of Fleet Operating Forces (NSUFOF) was assigned to Ships Parts Control Center (SPCC), Mechanicsburg, Pennsylvania, in 1970 by Naval Supply Systems Command. Naval Ship Systems Command developed Tables of Allowance for each individual unit and utilized these tables as the basic document to establish support. Many items were common to all elements and are procured and supported collectively rather than individually. In order to determine budgetary inputs, and to evaluate assets against requirements, a Master List was required which would include all separate and consolidated allowance for the elements of the Force.

In response to Naval Ship Systems Command's need for a comprehensive document, SPCC utilized the basic approved Tables of Allowance and developed a computer program designed to produce an organic table of allowance. An initial list of approximately five thousand line items was prepared for input. Major elements of data contained in this record are: Line Item Serial Number, NSUFOF Unit, Nomenclature, Unit of Issue, Allowed Quantity, On-Hand Quantity and Unit Price.

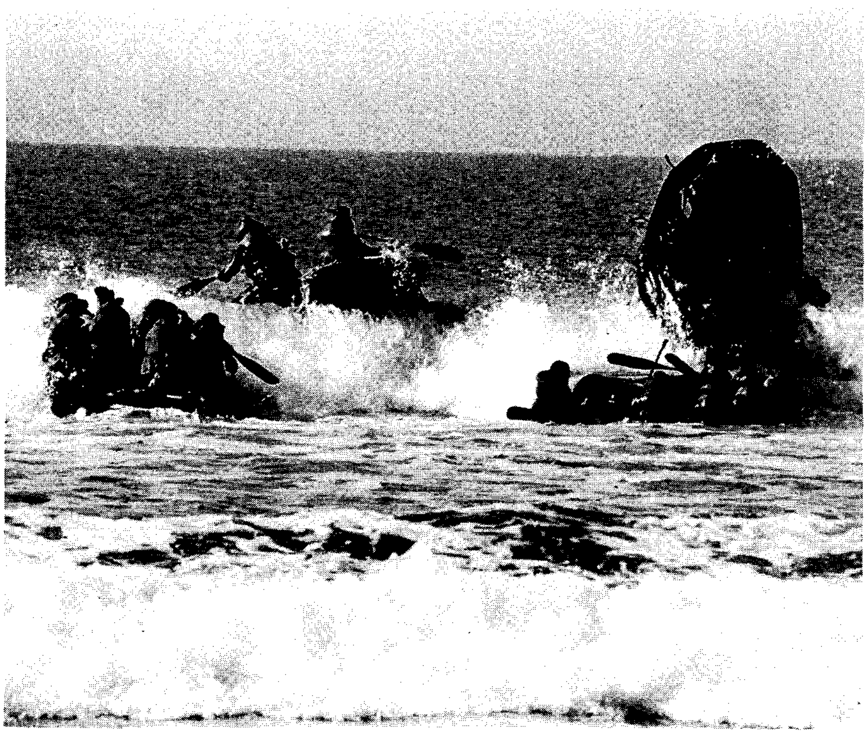
Provisions have been made in this program to include the Federal Stock Number, the manufacturer and his code, and flexible controls for changes to data elements. Output can be programmed for any sequence designed; computations are made to summarize and to total quantities and costs for on-hand, allowed, and deficient. The same computations are made for individual units or for the entire program.

These statistics can enable all Commands to evaluate total assets and deficiencies, and form the basis for budgetary and other management decisions.

To effectively serve the Force, SPCC has executed a Wholesale Interservice Supply Support Agreement (WISSA) with the U.S. Army Aviation Systems Command to Support requirements for certain parachutes, aerial pick-up and delivery, and cargo tie-down equipment. This agreement contains provisions for return for credit age-life items in accordance with a credit-scale age-life table. In addition to this service, teams composed of representatives from Naval Ship Systems Command, Ships Parts Control Center, Aviation Supply Office, Electronic Supply Office and Naval Ammunition Depot, Crane, Indiana, have visited NSUFOF Units based at Coronado, California and Little Creek, Virginia. Semi-annual return visits to each coast to conduct logistics effectiveness reviews will continue to resolve supply problems and assure timely and effective remedial action.

HARBOR CLEARANCE UNITS

Harbor Clearance Units (HCU) provide salvage, repair, diving and rescue services in rivers and restricted waters, and conduct harbor and river clearance operations. These units make temporary repairs, and deliver to a repair activity or safe waters, ships or craft which are battle-damaged, stranded, beached, or



abandoned in rivers or harbors. Additional duties include extinguishing fires on ships or craft in distress, conducting deep diving and recovery operations, non-assault clearance and salvage demolition of underwater obstructions, and augmentation of Fleet Salvage Units conducting major offshore salvage operations.

In addition to the training of divers, numerous small diving operations are performed every year by Harbor Clearance Units. These dives are made for such purposes as hull inspections, body searches, underwater recovery of small objects, and minor hull repairs on local service craft. Harbor Clearance Unit Two, a COMSERVLANT unit which has been stationed at Little Creek, Virginia, since August 1970, is a training facility for student divers; approximately 30 students in five classes each year. Recently, student divers completed the salvage operation of a former U.S. submarine, the HAKE, and raised the submarine from the depths of the Chesapeake Bay. To prepare the students for this difficult and hazardous duty, six First Class Divers and one Master Diver drilled the men extensively. Students participated in classroom instruction as well as in-the-water training. The classroom instruction covered diving hazards, safety precautions, and maintenance and repair of SCUBA equipment. Upon completion of their Little Creek training, the new divers are usually returned to parent commands and reassigned diving billets. If the diver came from a non-diving activity, he is usually transferred directly to a diving billet.

In his book, The New Navy, author Hanson W. Baldwin describes the organized complexity of the amphibious assault as the most inclusive and intricate of Naval missions in conventional or limited war. The Amphibious Forces represent the ultimate in sea Power – the capability of transporting a man, with a rifle in his hand, to an enemy coast; the capability of seizing a beach-head and holding and supplying it.

The U.S. Navy Shore Based Units of the Fleet Operating Forces are a powerful and vital part of the vast panoply of power concentrated in the amphibious assault; men proud to belong to an organization like no other, and with a special job to do. Their work is essential and dangerous, many times lonely and nerve-shattering. These are the men who pass through the gates of the U.S. Naval Amphibious Bases at Little Creek, Virginia, and Coronado, California; highly motivated and disciplined men. The history of these units has been one of accomplishment and pride, and the men who have made this history have lead exciting and interesting careers. They are all in the only kind of publicity that really counts – word-of-mouth among the troops that these are *men to count on.*

SWEDISH NAVY DIVES TO 300 METERS

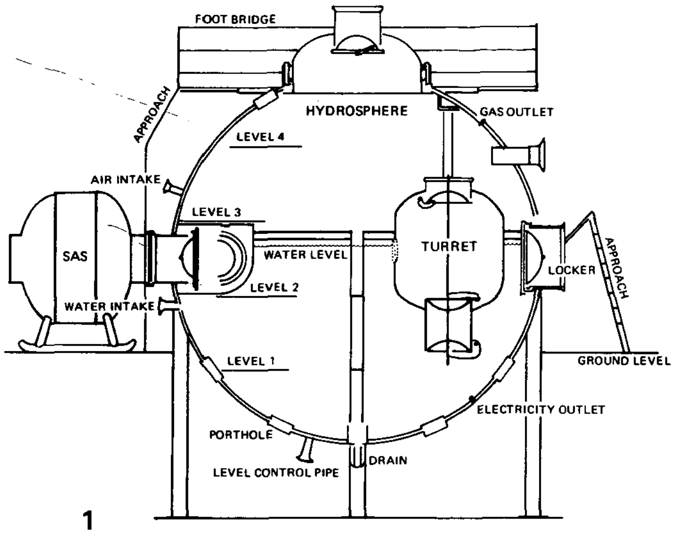
by Peter Wide

A chamber dive was undertaken by the Swedish Navy in cooperation with Compagnie Maritime d'Expertises (COMEX) and the Centre National pour Exploitation des Oceans (CNEXO) on April 13 through 22, 1972. The purpose of the dive was to test various kinds of diving equipment, and to take part in a current program of osmotic studies. The divers' susceptibility to high pressure nitrogen saturation was also tested.

The dive took place in the COMEX/CNEXO hydrosphere in Marseille, France, and a depth of 300 meters was reached. A cross-section of the French Chamber is shown in Figure 1, and the diving profile is given in Figure 2. The equipment tested included the Swedish AGA 324 open circuit SCUBA with full face mask, worn with the COMEX gas heater, and UNISUIT; the Swindell helium helmet with backpack and Japanese dry diving dress; and the COMEX open circuit breathing apparatus with COMEX gas-heater, and COMEX suit.

The water temperature remained at 43° F throughout the dives. Physical conditions of the divers, such as heart rate and body impedance were monitored, as well as an electroencephalogram being taken each evening.

Despite a few minor problems, the dive was completed successfully. Perhaps the greatest value of the dive, came from the fact that through the extensive cooperation of the U.S. Navy, this dive and the English-American dive to 1000 feet at Alverstoke in June (see FP, Fall 72) were coordinated, and the results will compliment each other. The value of international cooperation is once again demonstrated.



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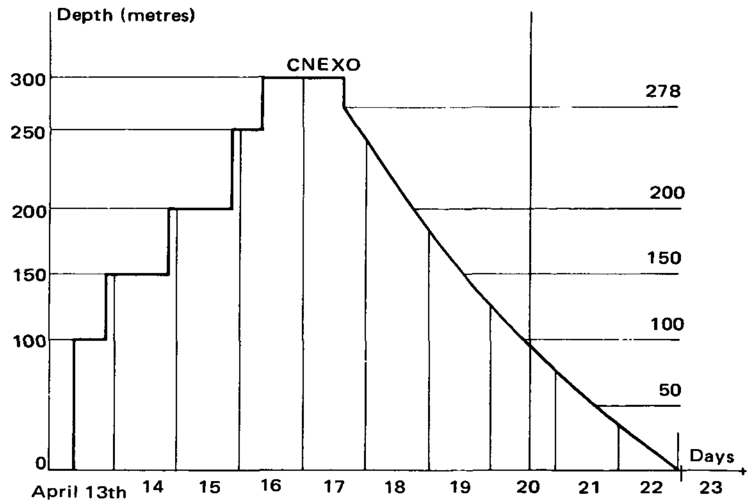
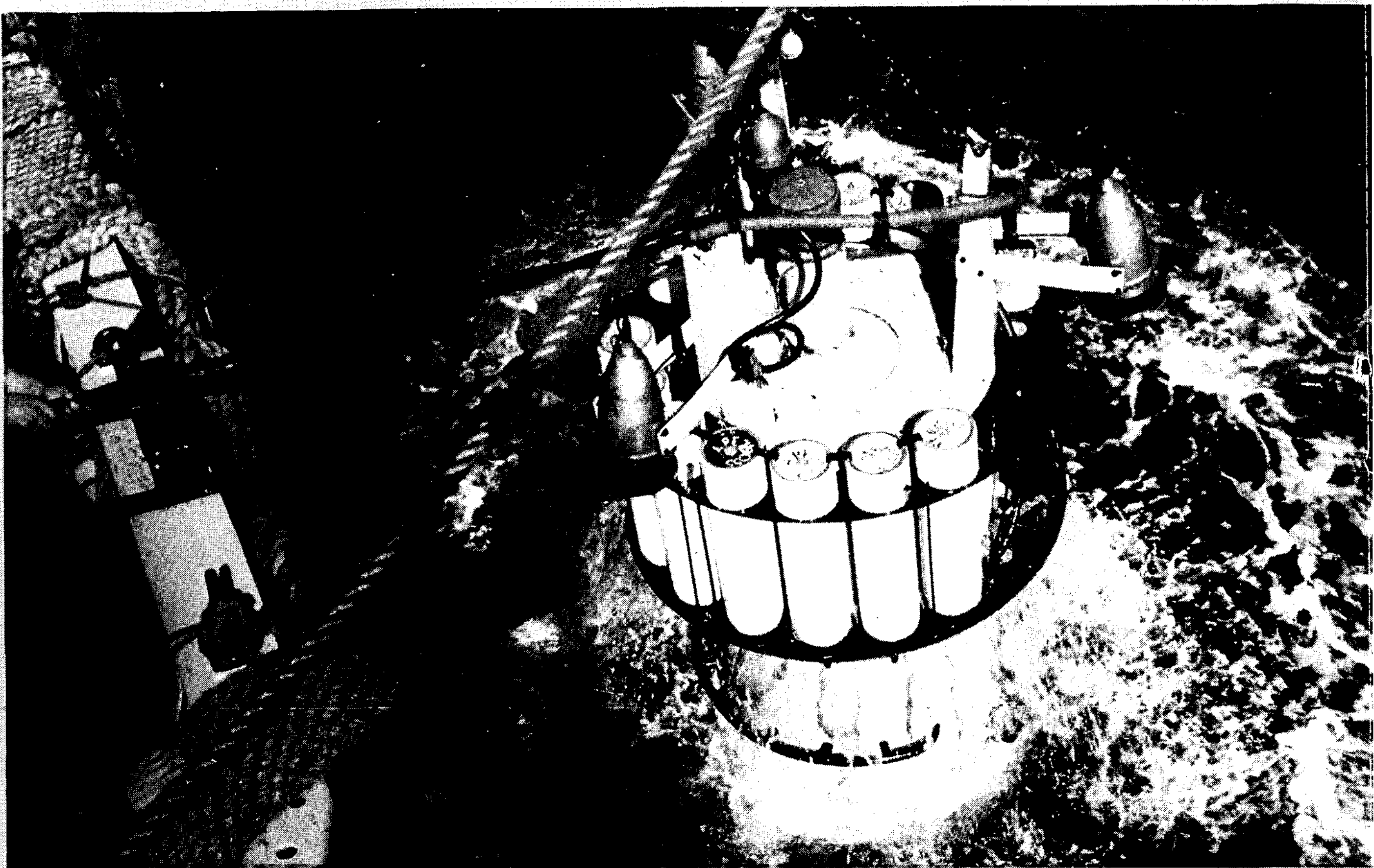


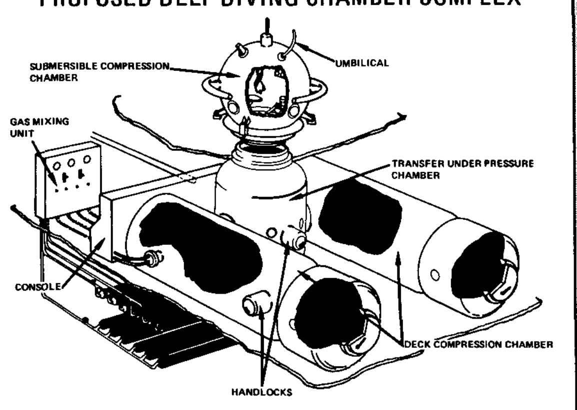
2

The participating divers are shown here (left to right) J.C. Guillen, Jacques Crozier, Stig Lundin, and Peter Wide.



(Above), the submerged compression chamber of the British Deep Dive System. (Opposite page), the H.M.S. RECLAIM underway.

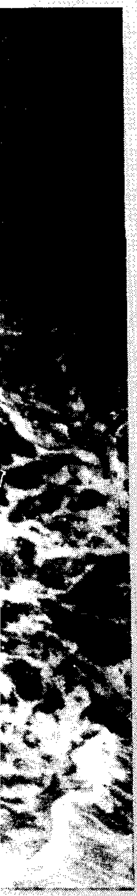
PROPOSED DEEP DIVING CHAMBER COMPLEX



Characteristics	R.N.S.D.S.	MK II D.D.S.	MK I D.D.S.	MK I (Mod I)
Working depth (bell)	850	850	1000	1500
Working depth (chambers)	1200	1000	1200	2000
Number of divers	12	8	4	3
Capacity of bell	3	(2) 4	3	3
Diver heating	elect. or hot water	hot water	hot water or elect.	hot water or elect.
Bell heating	elect.	hot water	elect.	elect.
Shipboard installation	fixed	fixed	semi-port.	portable
Diving apparatus	compressor-depressor, semi-closed, closed	open circ., semi-closed	open circ., semi-closed	compressor-depressor, open circ.
Handling equipment	stern or over side rails with u.w. capture	overhead moving gantry, through center well	articulating crane through center well	over side ships boom and tuggers
Operational date	1975	1968	1969	1975 (est.)

The British Deep Dive System has come a long way since its creation, when, prior to 1933, diving in the Royal Navy was limited to 200-foot depths. Equipment was hardhat standard dress supported by hand-operated air pumps, and actually very little diving went beyond 90 feet. Diving capabilities gradually increased to 360 feet for 20 minutes in 1948, after several years of oxygen-helium trials, to 410 feet in 1954 and, in 1965, to 600 feet for periods up to one hour. When this point was reached, the diver became limited by his equipment.

In 1968, plans commenced outlining the development of a saturation diving complex to replace the non-saturation system, installed on board H.M.S. RECLAIM. The increasing importance of getting divers to the Continental Shelf for extended periods of time resulted in the deepest and most ambitious saturation diving experiment to date—Sealab III. The U.S. Navy invited the Royal Navy and several other nations' navies to pool their re-



BRITONS TO CONQUER THE DEPTHS

by LCDR Larry Bussey

sources toward this experiment, and accomplished the greatest single advance in diving technology in two decades.

The British Navy first visualized the new diving system on board H.M.S. RECLAIM but, in 1971, the decision was made to house the complex in a new custom designed ship. A trip to Toulon, France, was made by two representatives to see the French Navy's new diving ship TRITON—after which it was decided that such a ship would be excellent for the Royal Navy.

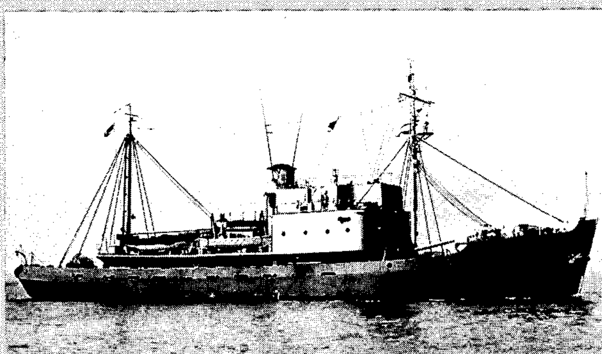
Heating, communications, instrumentation and especially handling procedures and equipment were problem areas discussed. The major problem was not with the hardware, but with actual saturation bell-diving operating procedures.

Structurally, two interconnected chambers will each house a maximum of six divers—allowing a total of 12 divers saturated at one time and enabling continuous round-the-clock diving operations for 30 consecutive days. The usual radio/TV entertainment systems will be installed, as will the Gill Helium speech unscramblers, providing the excellent distortion-free communication they did at the 1000-foot dive at Deep Trials Unit in early July, 1972. Also included is a complete workbench facility with an internal gas panel for charging and setting up closed and semi-closed circuit breathing rigs.

The submerged compression chamber, (SCC), will accommodate two divers and an operator. Controls in the bell will be at a minimum since most are operated from topside. Thallium-Iodide lighting and high-resolution TV cameras will allow observation of underwater activities. A valuable 6-inch port in the bottom hatch of the SCC will permit divers to visually survey the area directly beneath them. Essential gages, controls, and communications, necessary for bell operations, are grouped in the center of the control console topside. Controls for less essential functions are mounted on separate side consoles. A complete helium cryogenic reclaim system, coupled with a mixmaker for automatic gas control, will assure economy of operation.

The saturation diving research ship will utilize computer-controlled dynamic positioning, which will keep her plus or minus five feet over a selected diving site in 1000 feet of water up to Sea State 5. A diver lock-out submersible will be capable of being locked on to the Transfer Under Pressure Chamber, (TUP), allowing the SCC and the sub to effectively extend the ship's search and recovery capability over a vast area of the continental shelf.

Many months of classroom and chamber/open sea work-up dive training go into forming the team to man the ship, which includes one fleet Chief Petty Officer, Master Diver, two CDIs, two medical POs, a medical officer and 12 divers. It is being planned, through the sponsorship of the International Exchange Project, B-12, for the Saturation Team to participate in future U.S. Navy Deep Dives, including the use of the MK I Deep Dive System at HCU-2, Norfolk, Virginia.



The joint military objectives of the Royal Navy and the United States Navy are demanding and far-reaching. The equipment must be designed to operate as safely and reliably as inner-space age technology will permit.

USN MK I MASK TESTED

by CDR D. G. Disney
SUBDEVGRU–1

In September, 1972, Submarine Development Group One and USS FLORIKAN (ASR-9) divers successfully completed an operational evaluation of the Divers Mask USN MK I. The purpose of this OPEVAL was to determine if the Divers Mask USN MK I is suitable for service use in a surface-tended mode at intermediate depths of 130 to 300 feet. Air was used as the breathing medium from depths of 130 to 190 feet, and HeO_2 from 190 to 300 feet. All dives were open sea dives using an open diving bell and USS FLORIKAN (ASR-9) as the support ship.

The Divers Mask USN MK I is a hooded, umbilical supplied, open-circuit, demand-breathing apparatus with an emergency "come home" bottle mounted to a vest assembly. The emergency bottle is a standard single 71.2 cubic foot steel bottle charged to 2250 psi. Gas is supplied to the mask from the surface at 400 psi to a first-stage regulator mounted on the right side of the vest, reducing the pressure to 120-130 psi over bottom pressure for delivery to a second-stage adjustable regulator in the Divers Mask.

Diver-mounted communications equipment contains a microphone, earphones, and appropriate connections for mating with the umbilical. Topside communications include communication boxes with voice unscramblers for use when diving with mixed gas. The communication system provides for diver-to-diver communications as well.

A wetsuit with internal tubing through which hot water flows provides thermal protection. The diver has control of the hot water flow.

An open diving bell, similar to the type used in submarine escape training tanks, was structurally modified to house a Built-In Breathing System (BIBS) for mixed gas HeO_2 or O_2.

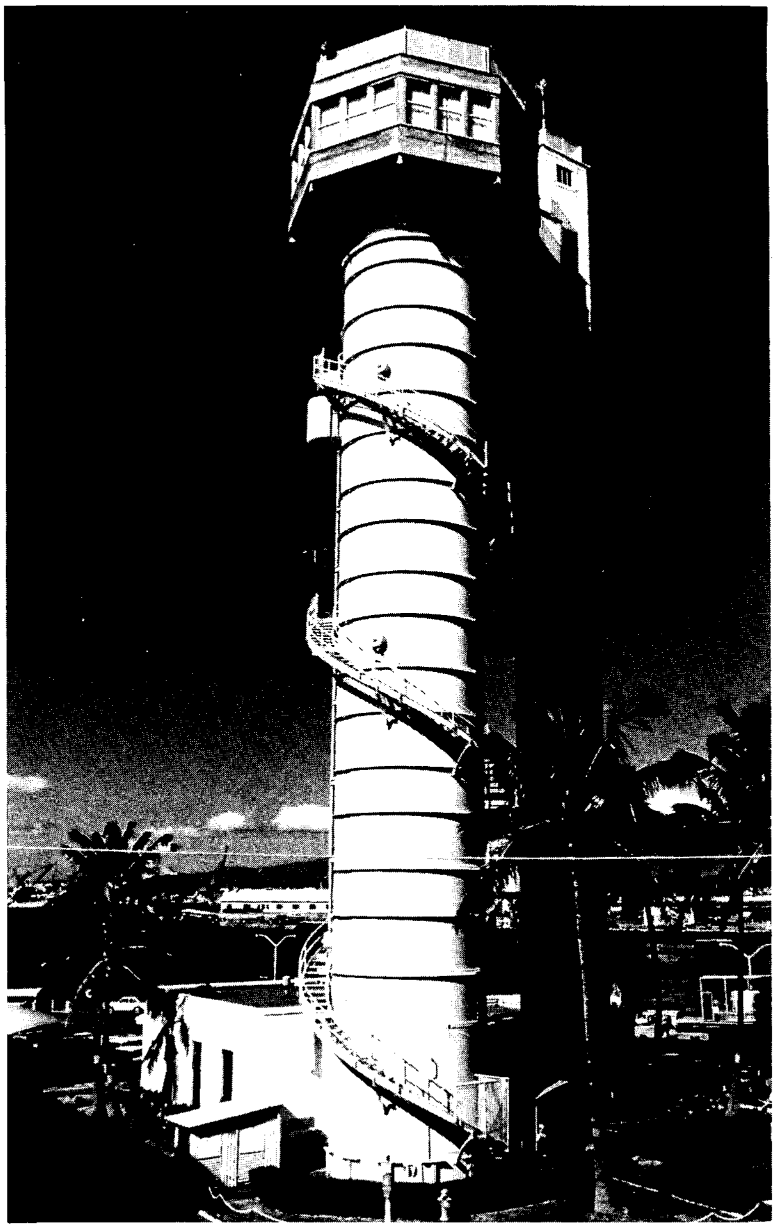
Separate umbilical systems are provided for the divers and diving bell. Each diver's umbilical provides primary breathing gas, communications, pneumogage, and hot water for thermal protection. The diving bell is supported by two umbilicals—one provides air and communications and the second, breathing gas, HeO_2 or O_2. Hot water, breathing gas, and communications are supplied to the diver by the umbilical from the surface. Breathing gas from the umbilical is supplied to the breathing system. During normal open-circuit operation, the breathing gas at 120—130 lbs. over bottom pressure enters the second stage regulator with a "dial-a-breath" and into the oral nasal cavity of the Divers Mask. Exhaled gas passes from the Divers Mask, through a one-way exhaust port into the sea. During emergency operations, the side valve has an emergency gas control valve mounted into it and places the emergency bottle in the breathing circuit.

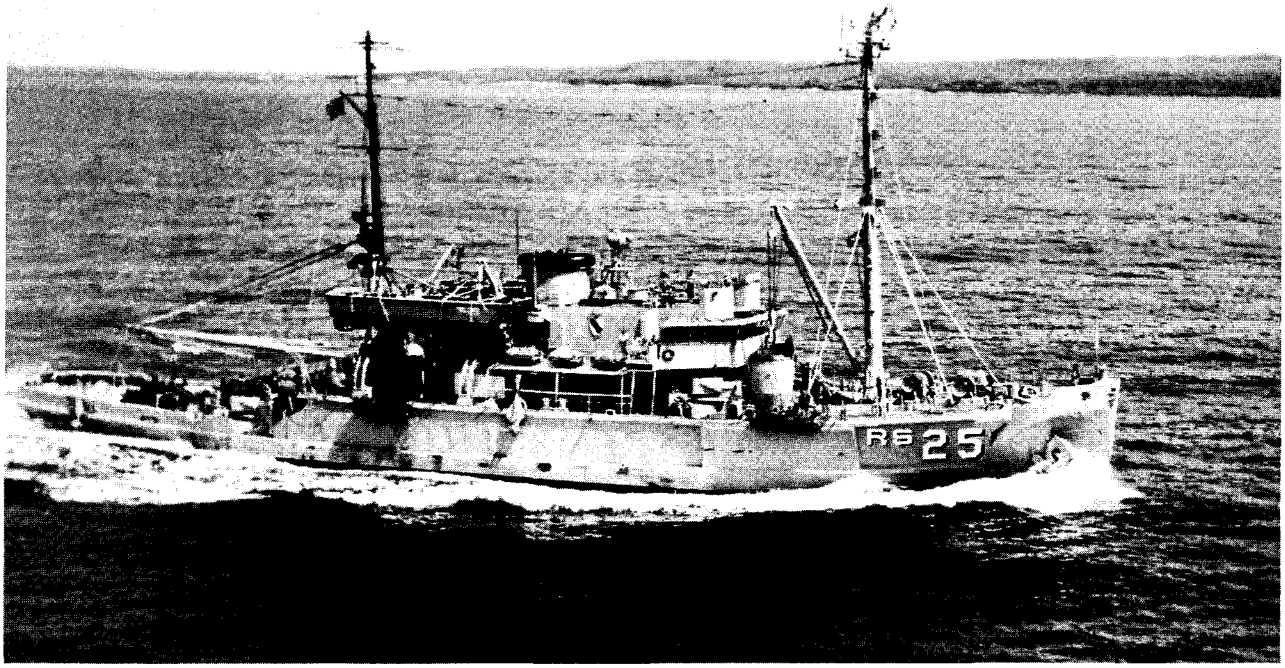
The diving bell, which is controlled from the surface, lowers the divers to the test depths and raises the divers, through decompression stops as specified in the decompression tables, to the surface. The diving bell also acts as a refuge for divers while in the water and provides emergency breathing gas from the BIBS.

DIVER TRAINING IN THE PACIFIC

The ability to function and, in some cases, survive in various underwater situations is the aim of every person involved in the field of diving. It is also one of the primary concerns at the Naval Submarine Training Center Pacific, (NAVSUBTRACENPAC), Pearl Harbor, where training programs in diving, submarine escape, and underwater repair are available for both military and civilian divers.

Most of the activity at the Training Center involves the use of the Escape Training Tank, designed for the purpose of training personnel in the methods of escape from sunken submarines. The tank is 134 feet high with a diameter of 18 feet and a holding capacity of approximately 280,000 gallons. The chemically treated fresh water is maintained at 92°F and at a depth of 119 feet. There are three air locks – at 18 feet, 50 feet and 100 feet – which can be entered from outside or inside the tank. Two blisters, which serve as air spaces for the instructors during training, are located at 30 feet and 85 feet. A roving bell is used primarily to bring a trainee to the surface when his ascent has been terminated. An intercommunications system connects all locks and operating positions with the surface and a hydrophone is used to talk to instructors in the water. At the base of the Escape Training Tank are located offices, classrooms, equipment rooms, air compressors, and a hyperbaric chamber used for pressure, oxygen tolerance tests, and treatment of divers' diseases and accidents.





The training center also maintains a second class and SCUBA diver school, training approximately 110 divers each year. Requalification training programs for all classes of divers are another part of the offered programs.

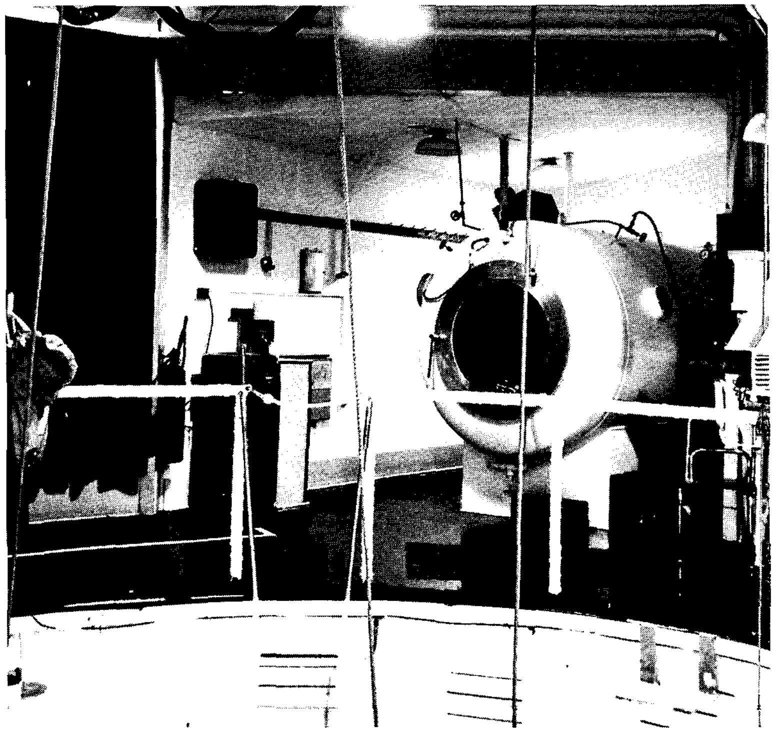
A diving locker and diving/underwater repair services are maintained for all Pearl Harbor-based submarines and submarines in transit. As part of this capability NAVSUBTRACENPAC provides a submarine rescue fly-away kit, i.e., a system of equipment and personnel that can be flown anywhere in the world on immediate notice in the event a rescue vessel is not close to the disaster area.

The treatment of divers' diseases and accidents is also a primary function of the Training Center. Upon notification of an incoming injury, a treatment team composed of the Diving Officer, Master Diver, Diving Corpsman, Medical Officer, and a stand-by duty section is called. The average treatment time for cases handled during 1971–72 was 4 ½ hours, probably because of the treatment tables which utilize pure oxygen as the breathing medium for the patient.

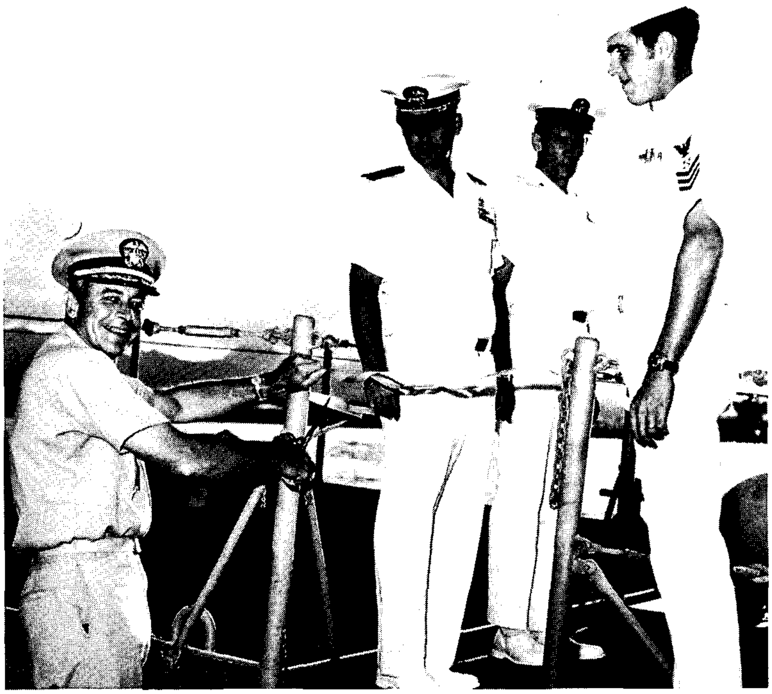
To combat diving accidents, the Diving and Escape Training Department of the Training Center is involved in such activities as participating in various diving safety programs, and promoting a public awareness of diving hazards and accidents. Diving clubs are given the opportunity to visit the department's facilities. Every month hundreds of sport divers are guided through the Escape Training Tank, shown movies on Mechanical and Medical Aspects of diving, made aware of some of the venomous sea animals, and given lectures on safety. Some success can be measured by the fact that only once in 3 years has the department treated a person that had previously attended an Escape Tank Lecture and Walk-Through.

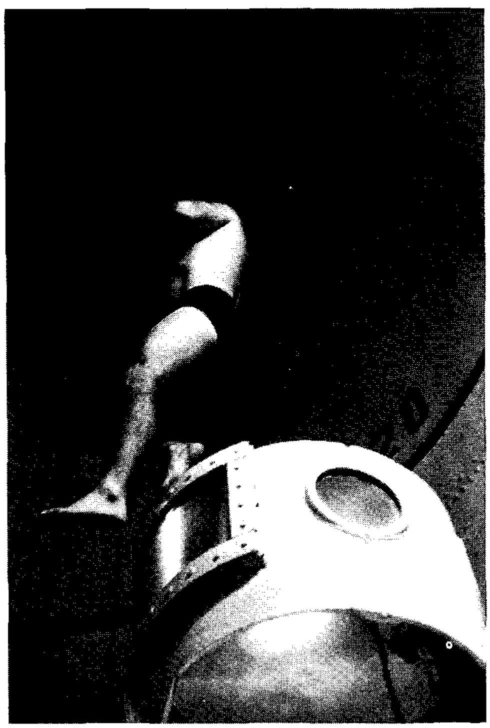
Although not the primary mission of the Diving and Escape Department, water safety is taught to the civilian diving community. The Department trains its own Navy Divers, while promoting safe and successful diving throughout its Pacific area.

Besides the various functions listed here, the Training Center rounds out its duties in other areas – screening applicants for UDT training in the Central Pacific area; providing a permanent member to represent the US Navy on the city Water Safety council; providing facilities and equipment to conduct training in hull painting, rigging, etc.; providing personnel to conduct salvage inspections for local submarines.



(Opposite page) USS SAFEGUARD (ARS–25) underway in April, 1972, with the Submarine Fly-away Kit. (Above, left) Trainee performing Free Ascent from 50' level in Escape Training Tank. Other personnel are instructors covering the trainee for safety. (Above, right) Interior view of the top of the Escape Training Tank, showing recompression chamber and entryway. (Below, left) C.O. of Naval Submarine Training Center, Pacific, cutting the ribbon on the new LCM–8 diving platform upon delivery to the diving school. Left to right: CAPT C.A.K. McDonald, LT P.F. Fawcett, Director of Diving and Escape Department, ENC (MDV) Loudermilk, Master Diver for School & Repair section, and BM1 (DV) Van Dine, PO–in–C of the LCM–8. (Below, right) Tank Instructors going to "stations" for Free Ascent training in the Escape Training Tank.





SALVAGE OPERATIONS

SIDNEY E. SMITH

The St. Clair river, an extremely important waterway connecting Lake Huron and Lake St. Clair, was the scene of a formidable ship salvage job in the summer and fall of 1972. The river is relatively narrow to handle the volume of traffic it does, but its most crucial characteristic is its current, never less than 8 mph and often as high as 12 mph. The possibility of an accident has existed for years, and when one finally occurred, it proved to be all that was anticipated.

The S.S. PARKER EVANS and the SIDNEY E. SMITH collided on June 5, 1972, in the St. Clair River at Port Huron, Michigan. While the EVANS managed to limp to shore, the SMITH sank within 30 minutes of the collision and caused the down-bound channel to be closed. To make the situation worse, the SMITH, a 500-foot 4200-ton freighter, later broke in two, leaving the bow section completely submerged and the stern section partly visible but sinking rapidly.

The Supervisor of Salvage was notified, and immediately dispatched a four-man team: CDR Robert Moss, Earl "Curly" Lawrence, Salvage Master; Jerry Totten, Salvage Engineer; and LT Craig Mullen. The job was considered by many to be impossible. The consistently pounding current made underwater work almost out of the question, eroding the river bottom beneath the two sections at a rate of 1 foot every 24 hours. A method also had to be devised to lighten the sections enough to be pulled to shore. The pulling machinery, therefore, had to be able to overcome the force of the current and the negative buoyancy of the hull. This required 700 tons of pulling capability.

When salvage operations began in July, 1972, a plan was adopted both ingenious and unprecedented. The stern section was dealt with first, since it was near the center of the river. The skin of the ship was 4 feet out of water when work began. Cofferdams designed with windows for the divers' entry into the submerged ship were placed through the hull, port side to starboard side. Once inside the hull, the divers moved through the windows into the ship's compartments. The open hatches had to be closed off with a 40-foot by 12½-foot steel hatch cover. Various rigging and patch work was also done. Polyurethane

Key personnel in the SMITH operation: (left to right) Mr. Robert McKenzie of Murphy Pacific Marine Salvage Co.; CDR Robert Moss and LT Craig Mullen of SUPSALV; Jerry Totten, Salvage Engineer, and Earl "Curly" Lawrence, Salvage Master, also of the SUPSALV Office.

foam, a two-part chemical which displaces water and when heated and combined expands to 30 times its original volume, was then pumped into the sealed compartments. The hull was then ready to be pulled to shore.

The bow section was next and posed more problems, since it was totally submerged to a depth of 26 feet beneath the surface. Working off an anchored barge, 100-foot cofferdams, constructed with windows at various levels, were lowered on the downstream side of the ship. The divers descended through the cofferdams and, once in position, secured each window to the hull with eighteen 1-inch bolts, outlining a 24-inch by 30-inch area. An underwater torch was then used to create an opening within the window, through which the divers entered the ship. Once inside, the divers again sealed and foamed the compartments.

The pulling to shore of each section, the stern in August and the bow in September, introduced more problems. Six 2¼-inch steel chains were placed by divers around

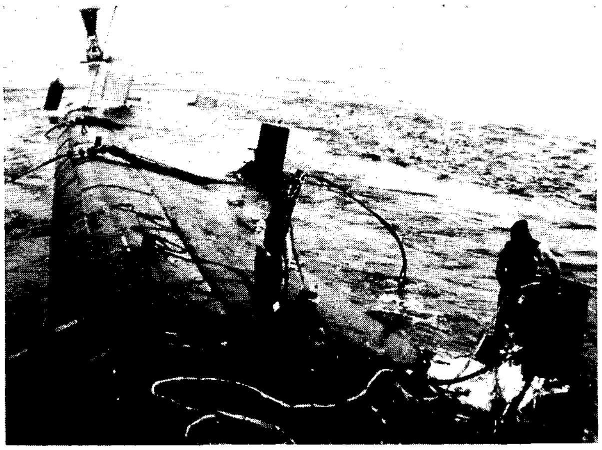
SHOW NEW SKILLS................

around the keel of the submerged sections. The chains were then secured to 2-inch cables leading to shore. Six hydraulic pullers, plus two large winches, were used to create 700 tons of pulling force.

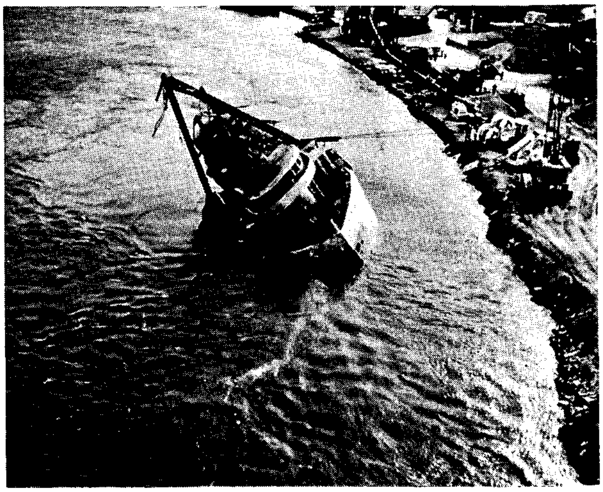
The stern section was parbuckled into an upright position against a sandbar in the middle of the river and pulled to shore in this position. The bow section was pulled to shore on its side. The pulling contact point was then relocated onto the ship's deck and when power was applied, the bow was parbuckled into an upright position against the sloping bank, next to shore. When both bow and stern were in an upright position against the shore, additional foam was added to make each section stable and towable.

This task was of such importance that the staff of about 100 worked on a 24-hour basis for the first three months. With the able help of the divers of Harter Underwater Co. of Edgewater, Maryland, and Murphy Pacific Marine Salvage Co., the channel was eventually made passable. When the SMITH sank, traffic had come to a complete halt, at one point backing up 84 ships. Normal two-way traffic resumed when the bow section was pulled out of the channel.

To complete the salvage operation, both bow and stern sections were transformed into towable objects with a maximum draft of 24 feet. When they were turned over to the Army Corps of Engineers in mid-October, 1972, perhaps the most difficult ship salvage operation ever encountered was completed. The perseverance of the men involved proved successful when most "said it couldn't be done."



(Right) The partially exposed 250-foot stern section is shown in the foreground, with a diver being tended through a cofferdam. The wreck buoy in the background marks the location of the submerged 250-foot bow section. (Below, left) The stern section is parbuckled against the sandbar. (Below, right) The bow section is parbuckled against the shore.



ORIENTAL WARRIOR

A monumental salvage job was recently completed with the raising and subsequent disposal at sea of the MV ORIENTAL WARRIOR. On 27 May, 1972, the WARRIOR experienced a fire at sea which disabled the ship. After initial reports of the casualty, a commercial tug rendevoused with the still smouldering vessel and towed it to Jacksonville, Florida.

The ship was berthed at the Blount Island pier facilities with fires still burning in the engine room, several holds, and the stern portion, and listing approximately 15° to starboard. The Jacksonville Fire Department extinguished the fire in the holds, but resultant flooding caused the ship to sink alongside the pier.

Of immediate concern to local authorities, particularly the U.S. Coast Guard, was the oil pollution threat which the damaged ship presented. The Coast Guard requested assistance from the Supervisor of Salvage and an oil pollution containment team was dispatched to the scene.

On their arrival at Jacksonville, the team, consisting of Jim Friel and Jim Walker of SUPSALV, and Gene Simpson and Robert Belsher of Murphy Pacific Marine Salvage Company, assumed responsibility for the containment of the oil, which was escaping from the ship at a rate of approximately 10 to 15,000 gallons per day.

A boom barrier made up of sections of TT, MP, and Slick-bar boom was deployed around the ship. Two skimmers secured locally were deployed within the boom to remove the captured oil. Also five high capacity hydraulic pumps were placed in forward hulls to maintain the vessel's remaining stability. With the boom barrier and skimmers proving themselves capable of combating the escapement of the oil into the surrounding waters, further plans were implemented to remove the estimated 300,000 gallons of oil which either remained in the ship's bunkers or had escaped into the holds.

Two vacuum trucks with a combined capacity of 1800 gallons and rigged with special vacuum pumps were utilized to remove oil from the water surface in No. 3 and No. 4 holds. This method was later employed to remove oil which had surfaced in the flooded engine room and the passageways surrounding the engine room and No. 3 and 4 holds. The oil which had remained in the ship's bunkers was purged from these areas and allowed to escape into the ship's holds, either by forcing water into the bunkers through the vents and allowing the oil to escape through the bunker sounding tubes, or through utilization of hot-taps placed on tank tops. Approximately half of the entrapped oil was removed from the vessel by the vacuum trucks. The remaining oil was removed from within the perimeters of the boom by the skimmers.

Oil removal operations were completed 15 July, 1973, and the divers sealed off all underwater openings with plywood patches. The boom and skimmers remained on the scene to collect the small amounts of oil which continued to seep from the wreckage. With the major objectives of oil pollution containment achieved, this initial phase of the disposal of "ORIENTAL WARRIOR" was successfully terminated.

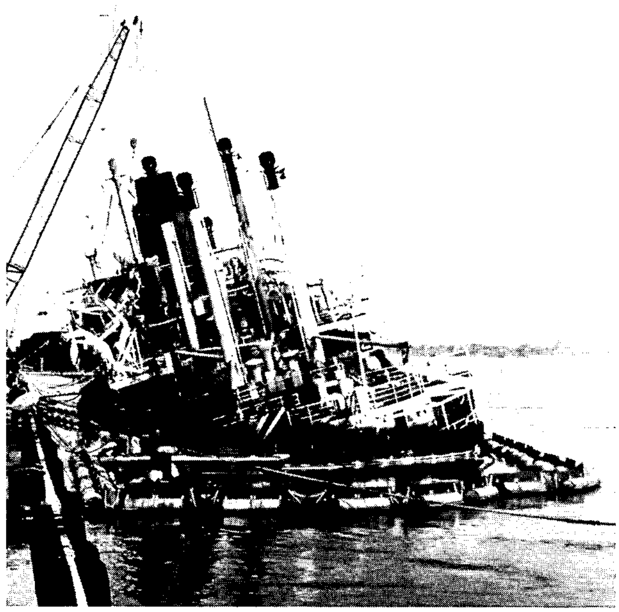
After several weeks of negotiations regarding disposition of the ORIENTAL WARRIOR, the U.S. Army Corps of Engineers, Jacksonville District, assumed responsibility for removal of the ship and solicited the assistance of CAPT E.B. Mitchell, Director of Ocean Engineering, to: (1) refloat the ship; (2) prepare it for deep ocean tow; and (3) tow the ship to a suitable sea location and sink it.

LCDR James Bladh was appointed the on-scene commander for the operation. Robert Belsher of Murphy Pacific Marine Salvage Company was again called upon to assist SUPSALV—this time as Salvage Master in the preparation and implementation of a removal plan.

Based on information compiled from an underwater survey, available ship's plans and curves of form, cargo loading plans, and other information regarding the vessel, a salvage plan was devised. Briefly, this plan called for the following: elimination of free surface effect, particularly in all holds and the engine room; shoring up engine room bulkheads to insure structural adequacy for full expected hydrostatic head; removal of all topside weight, i.e. booms, deck machinery, etc.; and the rigging of parbuckling/pulling units under the ship to "dead men" implanted on the pier. Also included in the removal operation was the placement of solid ballast low in the No. 2 hold to insure proper stability, the controlled pumping in engine room and Nos. 3, 4 and 5 holds, the placement of concrete ballast in shaft alleys, and finally the removal of the ballast from No. 2 hold.

Necessary preparatory work was completed, and on 10 September, the loading of lead ballast into No. 2 hold commended. The salvage crews continued round the clock operations, and dewatering operations were initiated on 22 September, with the actual refloating of the ship occurring on 24 September. The lead ballast was then removed from the holds and the parbuckling wires were disconnected, in preparation for the towing of the vessel on 30 September.

The vessel was towed to the pre-designated position. Explosive charges were rigged throughout the ship under the direction of LCDR Bladh and the Explosive Ordnance Disposal personnel. The charges were detonated on 1 October, and the ORIENTAL WARRIOR sank 125 miles off the coast of Florida, ending a memorable salvage operation.



DIVING—AN INTERNATIONAL CONCERN

german...

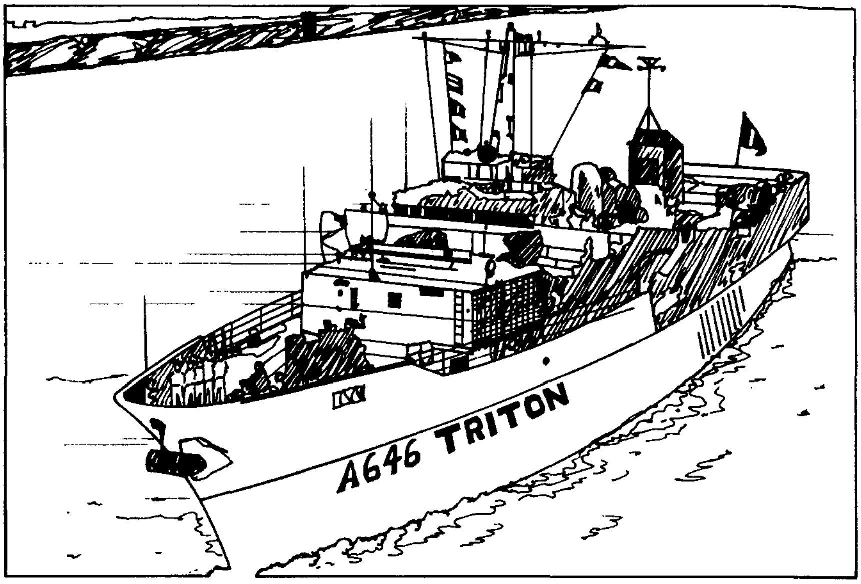
Every country bordering an ocean has an interest in the underwater world. After initiating a very successful exchange program on diving techniques with Great Britain, the Director of Ocean Engineering, NAVSHIPS, has established a similar exchange with the Federal Republic of Germany.

In October, 1971, a U.S. Navy delegation was hosted by the German Navy in Bonn, Germany, – touring various training, research, and mine warfare facilities. The success of this initial meeting led to the scheduling of another, held in the United States in August, 1972. The purpose of this second working conference on diving techniques was to provide a comprehensive tour of the various Navy diving facilities and in-house labs involved with diving operations and equipment.

The delegation was greeted by CAPT E. B. Mitchell, Director of Ocean Engineering, and briefed on current USN diving projects. Before leaving for Norfolk, Virginia, to see Harbor Clearance Unit-2 and the Mark I Deep Dive System, complete tours were conducted to the Naval School of Diving and Salvage, the Experimental Diving Unit, and the Explosive Ordnance Demolition Facility at Indian Head, Maryland.

A visit was also made to Submarine Development Group One in San Diego to view submersibles and the new saturation diving school. The final day of the conference was spent at the Naval Civil Engineering Lab at Port Hueneme, California.

The result of these two conferences has been to gain a more useful knowledge of diving equipment and procedures between the United States and the Federal Republic of Germany. A future meeting has been scheduled to take place in Germany in 1973.



french...

The French experimental ship TRITON's arrival on 30 August 1972 at the Washington Navy Yard was another step in the information exchange program sponsored by the Director of Ocean Engineering, NAVSHIPS.

The French delegation traveled to Harbor Clearance Unit-2 to see the MK I Deep Dive System, then to Taylor Diving and Salvage Co., and finally to the Ocean Simulation Facility at NCSL, Panama City, Florida. The remainder of the visit consisted of exchange conferences between EDU, TRITON and GERS (French Underwater Study and Research Group) personnel.

TRITON, an under sea recovery and trials ship, is operating with GERS in Toulon, Var, France. Her main activities deal with the experimentation of such deep diving equipment as a two-man crew pocket submarine GRIFFON, a 13-ton diving bell used for diving teams, diving saucers and underwater sleighs (*troika, telenaute*). Special equipment for individual divers allows a 10-day diving mission for 17 divers.

TRITON carries a deep dive system similar to the USN's Mark I DDS. The system is top-mating, rated for 820 feet (250 meters) of sea water and is located amidships. The chambers and all support equipment are below decks; the 13-ton PTC and its handling system are topside.

TRITON is also distinguished by her propulsion system, consisting of 2 cycloidal propellers—one forward and one one aft. Cycloidal propellers are a relatively new development, more complicated than the conventional screw-type propellers. Advantages of this type of propulsion include permitting full thrust in any direction, eliminating the need for a rudder, and making close-quarter maneuvering a simple operation. With this system, the TRITON is able to achieve a speed of 13 knots. More important, she is capable of dynamic positioning. Using only her propellers and onboard precision navigation equipment, TRITON is expected to be able to accurately maintain a position over a dive site in any sea state permitting bell operations.

The TRITON's visit was highly informative and beneficial to all. It is hoped that this will be a beginning of future information exchange programs between the U.S. and French Navies.

Buoyant Ascent Training Tank Underway at Key West

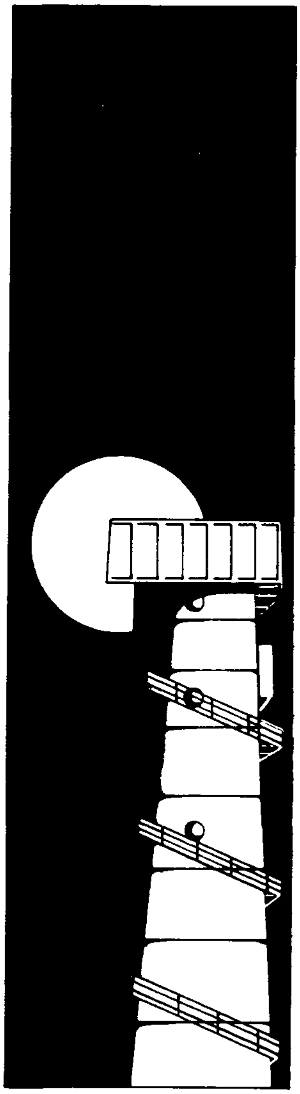
LTJG Wayne L. Bates
UWSS

A new buoyant ascent training tank is currently being constructed by Frank Keenan and Son, Inc. of Miami, Florida, for use at the Naval School, Underwater Swimmers, Key West, Florida. The training tank is rapidly taking shape and will soon be able to accommodate the school's aspiring divers.

This structure is designed to replace the Underwater Swimmers School's 12-foot concrete training tank, located in the main school building, and the 18-foot and 36-foot diving bells. These bells are lowered from the modified LCM-8, a diving support boat. Locating the buoyant ascent training tank adjacent to the main school building will greatly reduce the time previously lost in transit to the waterfront area.

As the only one to be used south of New London, Connecticut, on the east coast, the training tank will significantly enhance the training capabilities of UWSS. Previously, submarine escape training could be carried out only in conjunction with submarines based at Key West. Now, training will be centered at the school, placing primary responsibility with UWSS.

The tank is 50 feet in height, excluding the circular concrete foundation, and 20 feet in diameter. Constructed of 3/8-inch thick steel plate, and holding 116,239 gallons of water, it will be used in the instruction of the school's student divers in such courses as basic SCUBA, Deep Sea, EOD, SOT, and various special courses given upon request. The single lock, a simulated submarine lock-out/escape chamber previously employed as a training aid at the school, is welded to the main tank and will make 45-foot ascents possible. Filtration of the tank is accomplished by taking the filtered water from the bottom of the tank and pumping it upward. Compressed air is supplied to the single lock, the two blisters or bells and the recompression chamber situated on the top of the tank. In addition to lighting at the top, the tank is equipped with seven exterior dead lights or round viewing windows enabling instructors to observe student activity. A single circular ladder constructed of 3/8-inch steel deck tread leads to the topside area of the tank.



Visiting UDT/Seal Platoons, Marine RECON, Submarines and Special Forces units will utilize the escape chamber to practice buoyant and free ascents and simulated submarine exits using SCUBA equipment.

In performing a 45-foot ascent the swimmers and trunk operator enter the elevated lock/escape chamber from the bottom and increase the pressure inside to equal that in the training tank. After notifying topside that they are "on bottom" the swimmers lifejackets are inflated individually and they exit the chamber one at a time. On signal from two assisting divers wearing SCUBA equipment, the swimmer exhales to prevent the possibility of an air embolism and begins his ascent. After the last swimmer exits the lock the trunk operator closes the side door and opens the drain valve and vent. The lock is drained through a sewer line to sea and is replenished by opening the filling valve.

A corpsman is assigned to the topside area to check the condition of the trainee after he breaks the surface. The Training Officer, also stationed on topside, coordinates the movements of the instructors and the students by means of a viewing glass.

the Old Master says . . .

From The Supervisor of Diving:

Don't try to hide from it–diving is dangerous work. As long as divers are getting in the water there are going to be accidents. It is best that we admit this, and take a long look at accidents that have happened to prevent making the same mistakes again. Our resident expert on everything, the Old Master, has comments on some of the accidents that happened during the first 6 months of 1972. Read what he has to say and take heed; you *are the one that will benefit.*

Diver made a moderate to heavy working dive to 256 feet for 47 minutes in a deep sea HeO_2 rig breathing an 84 percent helium 16 percent oxygen mixture. He was brought out on a 260/60 SUR D O_2 table. Ten minutes after leaving the chamber, the diver complained of severe pain in both legs and calves. He was recompressed and obtained relief at 38 feet. The diver was treated on a treatment table 5 with complete relief of all symptoms.

No real fault here–the dive was deep and hard but the procedures were right. When exceptional exposures are made and an exceptional exposure table used, a greater risk is taken than with standard HeO_2 tables.

An open circuit SCUBA diver was working on a training project in 30 feet of water with near zero visibility. He was tended from the surface with a lifeline. He had been sent down an air hose to attach to the project to dewater it. Upon completion of the task, the diver walked up the underwater embankment toward shore, walking into the slacked tending line. He then gave signals to the tender to pull in the slack and to surface. On the way up he sent another signal to stop, then 15 seconds later to take up the slack again. At this time the diving supervisor had the stand-by diver prepared for water entry. The tender then received 4-4-4 to be hauled up immediately and pulled on the tending line and felt excessive strain and weight and feared serious entanglement. The stand-by diver entered the water. The mouthpiece of the trainee diver came out of his mouth just as the stand-by diver reached him, and he refused to take it back when the stand-by diver tried to give it back to him. He then lapsed into unconsciousness and was hauled to the surface in this condition. Mouth-to-mouth resuscitation was begun immediately. The diver had regained consciousness upon arrival at the chamber 5 minutes later. He was treated on a table 6 with complete recovery. The standby diver reported that he had been tangled up in both the lifeline and the air hose. At no time did the diver give any signal to indicate that he was fouled.

A hard lesson for an inexperienced diver. Diving operations with inexperienced divers always involve a high degree of risk and must be most carefully supervised. Another situation in which inexperience contributes to accidents is the submarine escape training. Careful supervision of inexperienced divers, particularly in training, cannot be emphasized too much. Watch those divers!

Diver was making a training dive to 20 feet for 20 minutes in a semi-closed circuit scuba rig. While on the bottom, he started to feel dizzy and tried to operate his bypass rod and found that it was missing. He then attempted to operate it by hand and noticed that his breathing bags were deflated. He elected to make a free ascent to the surface where he was treated with pure oxygen for 45 minutes and all symptoms were relieved.

This is a case of pure carelessness on the part of the diver and his topside crew. Diving is serious business; diving in semi-closed circuit SCUBA adds another degree of seriousness because of the extra complication of the equipment and the danger of CO_2 passing. If you permit sloppy maintenance and/or improper checkout in diving equipment, you are going to have an accident. If this man had been deep when he found his bypass missing, we could well have had a dead diver. Get the message?

Instructor in an escape training tank made a free ascent from the 50 foot lock after a 42 minute bottom time working at that depth. Prior to diving he had noticed nausea and fatigue. Five to ten minutes after reaching the surface he developed sudden pain in both upper arms with tingling and weakness in the hands, and an increase in the nausea. He was immediately placed in the recompression chamber. Pain was relieved at 60 feet, and he was started up on a table 6. After 38 minutes at the 30 foot stop, the diver had a recurrance of the upper arm pain. He was taken back to 60 feet and the table 6 was restarted. Pain in the arms and nausea persisted until he arrived on the surface. No further symptoms were noted.

This is a case of 'CAN DO' NOT DOING. The CAN DO spirit among divers is great but basic rule number 1 is "Don't dive when you're not physically up to it!" You're not doing anybody any good and you may find yourself riding out a treatment that could have been prevented.

Diver was one of a group involved in a 650 foot saturation dive with a 4-day bottom time. Decompression was carried out with the standard saturation schedule with 0.3 atmospheres oxygen at the standard rate. During decompression this diver had intermittent discomfort in the left knee, which would spontaneously resolve and was never worse than a moderate ache. In the final evening of decompression from 30 feet to 12 feet, the diver noted progressive discomfort in the left knee. Soon after arriving at the overnight stop, it was elected to recompress at 5 feet per minute to 60 feet on high O_2. As pressure was increased, the pain in the knee became greater and started to radiate up the thigh and into the hip. Recompression was halted at 54 feet when the pain moderately increased. After a pause, recompression was resumed slowly and the diver arrived at 60 feet 20 minutes after leaving 12 feet. Two 20 minute periods breathing high O_2 were accomplished with almost complete relief. On the fourth high O_2 breathing period, it was elected to return to 12 feet at a rate of 1 foot per minute. As decompression started, there was an increase in pain. At 45 feet it was more severe than it had been originally at 12 feet. The diver was again recompressed to 60 feet after a 4-hour rest. Symptoms had then disappeared and normal decompression was initiated again from 60 feet with four breathing periods of O_2 given the diver during the last 40 feet of decompression. He arrived on the surface symptom free except for mild aching in the left leg. No further treatment was necessary.

Saturation diving is a great technique, but it is still relatively new. We're going to have some bends like these from unknown causes until we get a lot more operational experience with saturation diving and saturation decompression. That only one of a group usually gets hit, just points up that not all divers are alike, and what may be a clean dive for one may not be for another.

Diver had been working at 162 feet for 21 minutes in a deep sea air rig, and was being decompressed on a 170/25 SUR D Air table. On leaving the last water stop at 20 feet, the diver's hat became fouled in the descending line and 5 minutes was required to clear him. The SUR D Air table was aborted and the diver was brought to the surface and immediately placed in the recompression chamber on a table 1 for missed decompression. At no time did the diver exhibit any signs of decompression sickness.

> [illegible] diving gang any day.

Diver was on a working dive to 127 feet for 24 minutes in a deep sea air rig. The work was moderate to heavy with water temperature 32°F and air 36°F. The diver was brought up on a 130/25 SUR D Air table. Approximately 1 hour after reaching the surface, the diver complained of pain in the back of the right knee with increasing severity. There was tenderness and more pain with flexation of the knee. He was taken to 60 feet on oxygen in the recompression chamber, and relief began almost immediately upon reaching 60 feet although it was not complete for 12 minutes. A table 5 was used and the diver remained free of symptoms.

> As I pointed out before—right from the Good Book—when the work is heavy and the water is cold, go on to the next deeper and longer table. Liberal interpretation by the Diving Officer and Diving Supervisor of cold and arduous dives will save a lot of grief.

Two divers served as tender and Medical Officer on the treatment case of an air embolism and cardiac arrest case during which vigorous efforts at external cardiac resuscitation were carried out for 55 minutes at 165 feet. They were brought out on a 170/60 standard air table. At the ten-foot stop, the tender developed pain and stiffness in the left shoulder which subsided after several minutes at 10 feet. At the surface he developed severe pain in the left shoulder-arm joint, and reddening of the skin over the left back and side of the chest cavity. The tender was taken back to 60 feet and brought out on a treatment table 5. Symptoms resolved at 20 feet on descent. Following treatment, pain was alleviated and there were small ecchymotic (escape of blood under the skin) areas on the posterior shoulder area.

Meanwhile, the medical officer upon arrival at the surface noted a small amount of stiffness in the right wrist, but no pain. Approximately 5 hours later, acute onset of pain in the right wrist and forearm with accompanying swelling was noted. The medical officer was treated on a treatment table 5 with complete relief of all symptoms except for the residual stiffness, which cleared in 5 days.

Eight hours after treatment on table 5, the tender suffered a recurrence with swelling of the left shoulder and was treated on a treatment table 6. Following treatment on table 6 residual symptoms of swelling and ecchymoses were still present. Further treatment was deferred and the patient was observed closely. No further increase in severity of symptoms was noted.

> This one's easy—it is apparently a case of bends due to heavy physical exertion. The Diving Manual states: "Decompress according to schedule unless the dive was particularly cold or arduous. In this case go to the schedule for the next deeper and longer dive." Use of the 180/60 Exceptional Exposure Table may have prevented these accounts altogether. The extra time required to use an exceptional exposure table is a small price to pay for the *increase* in safety and the *decrease* of wear and tear on all. Also, there was a serious mistake made in this treatment. When the tender experienced initial symptoms, he should have been treated for a serious symptom. Pain under pressure *is* a serious symptom and should always be treated as such.

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