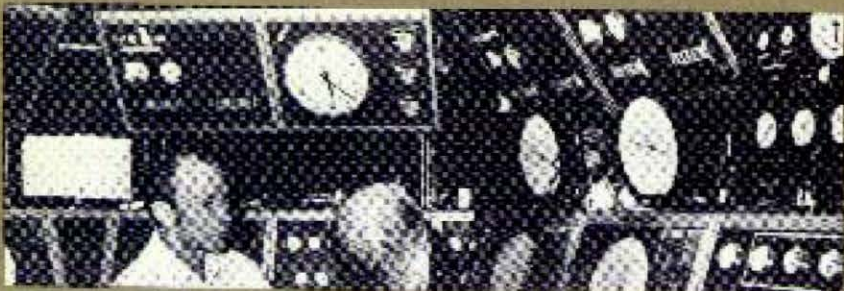

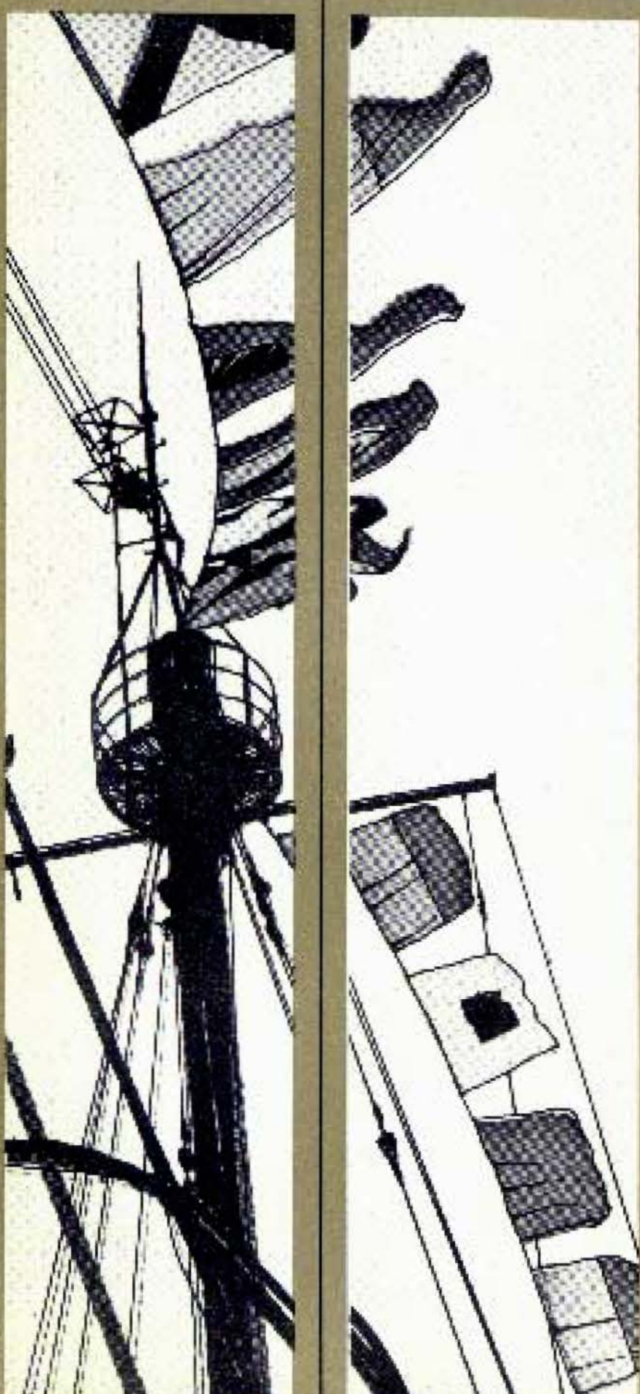

SUMMER 1973

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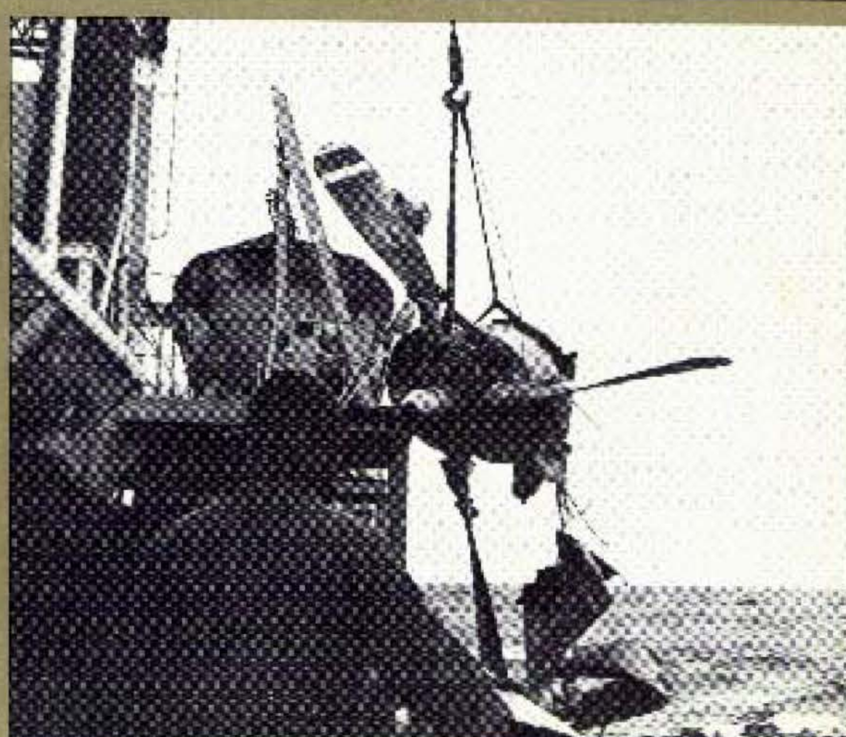

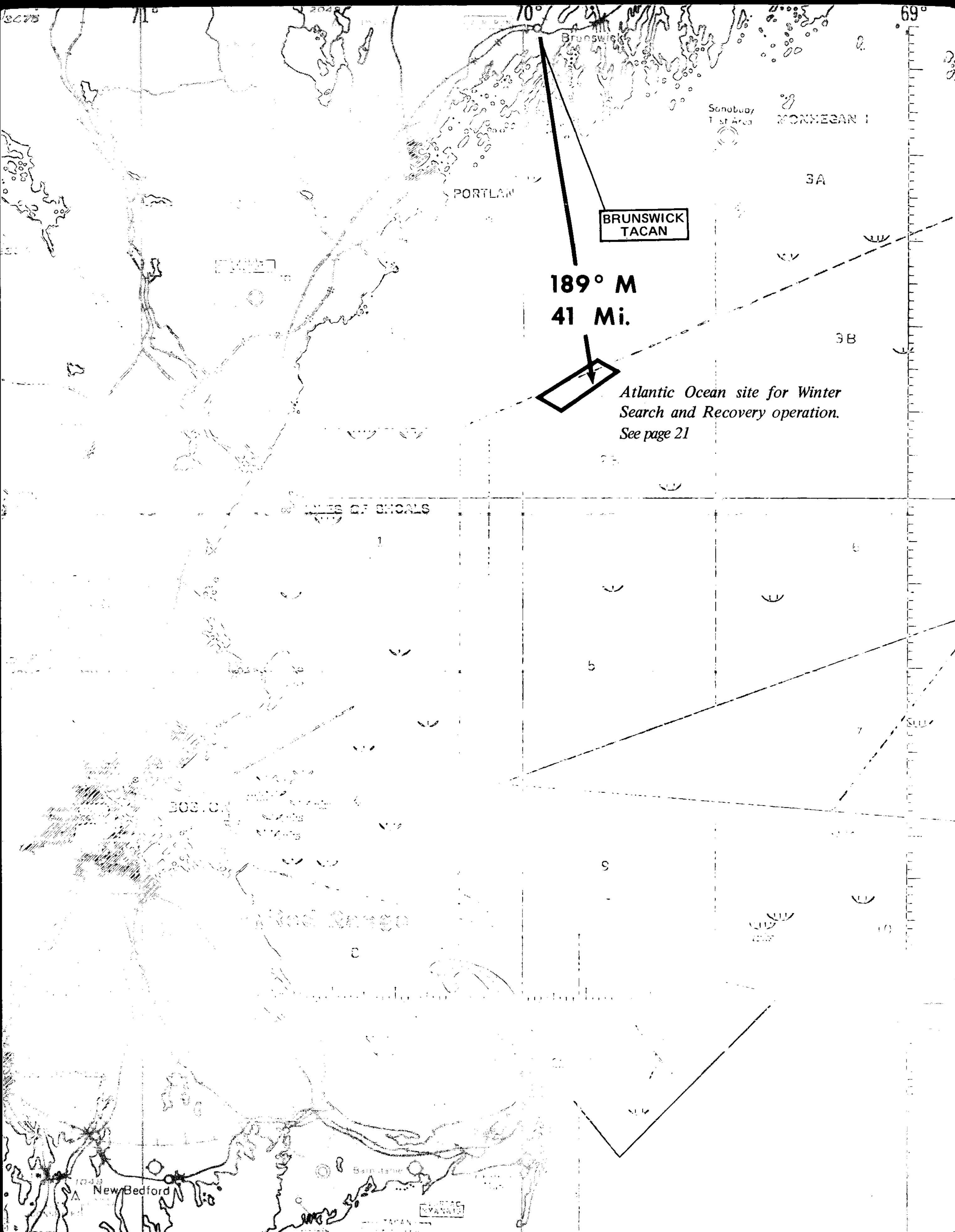

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Atlantic Ocean site for Winter Search and Recovery operation. See page 21
ISLES OF SHOALS
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VOL. 4 NO. 2

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.

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C O N T E N T S

SOUNDINGS

NEW DIVING GAS MANUAL

The U.S. Navy Diving Gas Manual, 2nd Edition, has been published and distributed to diving activities. The primary purpose of this manual is to disseminate criteria for use in the design and application of mixed gas diving systems. The second edition was expanded to provide additional criteria for the more common compressed air diving systems and mission planning techniques. Directions on how to use the manual and its data are included.

During the design of the support systems for the DDS MK I and MK II, various approaches were used to correct the deviation of pure gases and mixtures thereof from the ideal gas laws so commonly applied. To accommodate widely diversified results some uniform criteria must be made available, without having to solve the complex equation of state each time the system is modified or altered. The best known technique for doing so used gas tables compatible with known and anticipated requirements so that uniform systems design would result. Expanding the second edition to include compressed air diving systems was done to increase awareness of the limitations of many existing systems to support permissable diving operations. Example calculations are included to provide guidelines for application.

The manual is designed to require only simple arithmetic in performing the calculations. When the user applies the data in the manual, his results already include the solution of the equation of state and the application of gas mixing parameters. Using the gas state points and the subsequent density effect of temperature, the variation in gas properties can be allowed for.

Using the tabulated data in the manual demonstrates how diving gases deviate from the ideal, as shown in the analysis of the capacity of a defined gas cylinder configuration to store gas. Where:

Capacity in SCF for
various gases–
2400 Psig filling
pressure
70° F Temperature

Then:

Air 1195 SCF
Oxygen 1250 SCF
Helium 1125 SCF
97% He/3% O_2 111 SCF

This example is a limited application of the data, but is representative of the results that can be obtained.

Obtain a copy and see how it can be used to analyze your diving gas systems, using no more than the arithmetic you learned in grammar school.

NEW CO AT EOD SCHOOL

CDR David L. Schaible relieved CDR Dewitt H. Moody as Commanding Officer of the U.S. Naval Explosive Ordnance Disposal School, Indian Head, Maryland, at a Change of Command ceremony on April 6, 1973. CDR Schaible's career service includes duty as Commanding Officer, USS CADDO PARISH (LST-515); Commanding Officer, Seal Team-One; Director, UDT/SEAL Training at the Naval Amphibious School, Coronado, California. *Faceplate* welcomes CDR Schaible to his new post. Good Luck!

FIRE RESISTANT TEXTILE ITEMS FOR RECOMPRESSION CHAMBERS

The flammability of textile materials associated with diving and recompression chambers, including such things as mattress covers, sheets, pillows, trousers, and underwear, receives great attention because of high oxygen atmosphere in which they are used. Certain commands have also expressed concern over the fact that items of this type exhibit a tendency to become charged with static electricity when handled, and therefore could also become a hazard in recompression chamber use in this way.

From September 1970 to January 1971, the Supervisor of Diving, in conjunction with Ocean Systems, Inc., tested representative samples of such items to evaluate combustibility. During their development and testing, they were also considered for the potential combustion effects due to an induced static electric charge. Static electric energy levels created by the handling or rubbing of these materials are of an extremely low magnitude and cannot cause combustion under the conditions intended for use. Full-scale tests were performed on the material under the following recompression chamber conditions:

(1) Compressed air at 165 FSW

(2) 25% O_2 & 75% N_2 at 60 FSW

Under the test conditions, considerable heat energy with a temperature in excess of 2000°F was applied to the material before combustion could start locally. The fire would then self-extinguish with the removal of the heat source.

Heat energy levels caused by the discharge of a static charge created through handling of these materials are minute and instantaneous by comparison and therefore could not initiate combustion. Furthermore, it was found that any commercially available fabric softeners used in the washing of these textile materials satisfactorily eliminated the static electricity.

NEW UNDERWATER COMMUNICATIONS TESTED

At the recent open-sea series of tests conducted at USNS, Roosevelt Roads, Puerto Rico, a submersible communications *(SUBCOM)* prototype was subjectively evaluated. The evaluation was conducted in the UDT/SEAL Operations Area, which at the time was acoustically unclean because of the great amount of background noise from snapping shrimp, etc. However, diver-to-diver communications were clearly audible at distances to approximately 2000 yards. Diver-to-surface range, established at Panama City, is approximately 3 miles. Two diver units and one surface unit were previously evaluated at EODFAC, Indian Head, Maryland.

Batteries and transducers are carried on the divers' waists and headsets are worn.

Participants in this evaluation were LT James E. Harper, EMC Cecil B. Morton, LT Thomas L. Hawkins, and EMCS Thomas King.

Further results from these underwater communications tests will be discussed in greater detail in future issues of *Faceplate*.

BECKMAN MODEL NUMBER 715 OXYGEN ANALYZER

The Beckman model "C" oxygen analyzer has been in service for many years and is adequate for use by all HeO_2 diving activities; however, a newer, improved, and lower in cost oxygen analyzer is now available in Beckman model number 715. (0-25 percent scale)

Diving activities may procure the new model through GSA, using GS003-8048 PT under H scheduling. The price and catalog number for the sensing head and flow chamber assembly are as follows:

a. Model number 715 analyzer with sensing head; catalog number 190400; cost: $399.00

b. Flow chamber assembly; catalog number 190709; cost: $42.50

A forthcoming change to NAVSHIPS-INST 9940.21 will include the above information.

NUC TESTS OBSERVATION COMPARTMENT

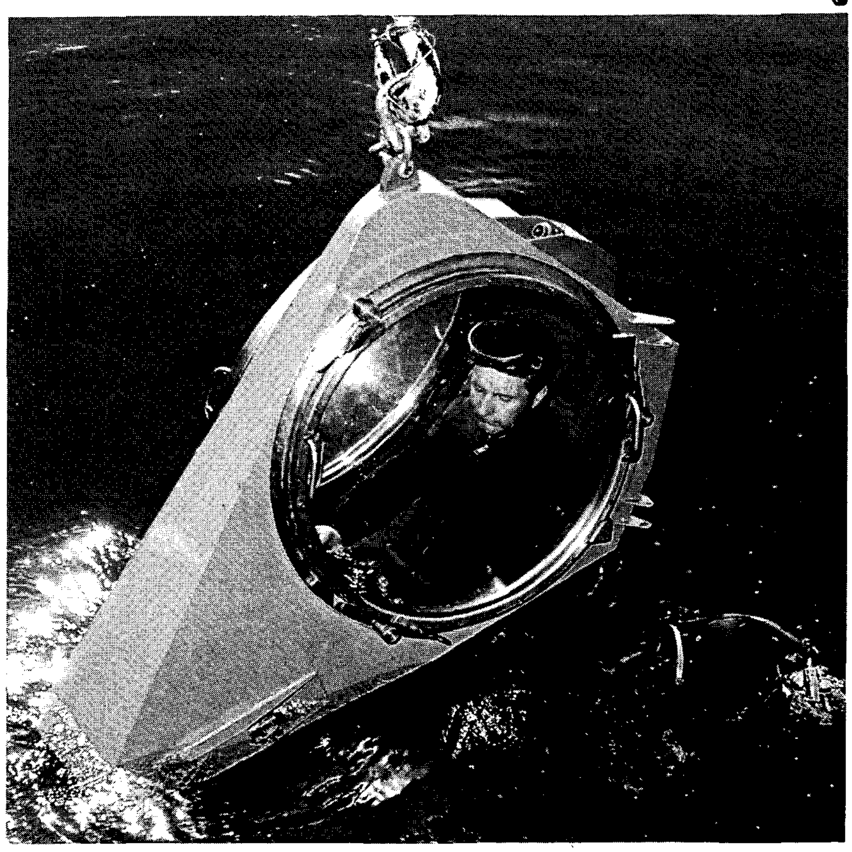
Initial tests of the underwater observation compartment of the Naval Undersea Center's new Hull Inspection Platform (HIP) were successfully completed recently during trials on board the research vessel CAPE.

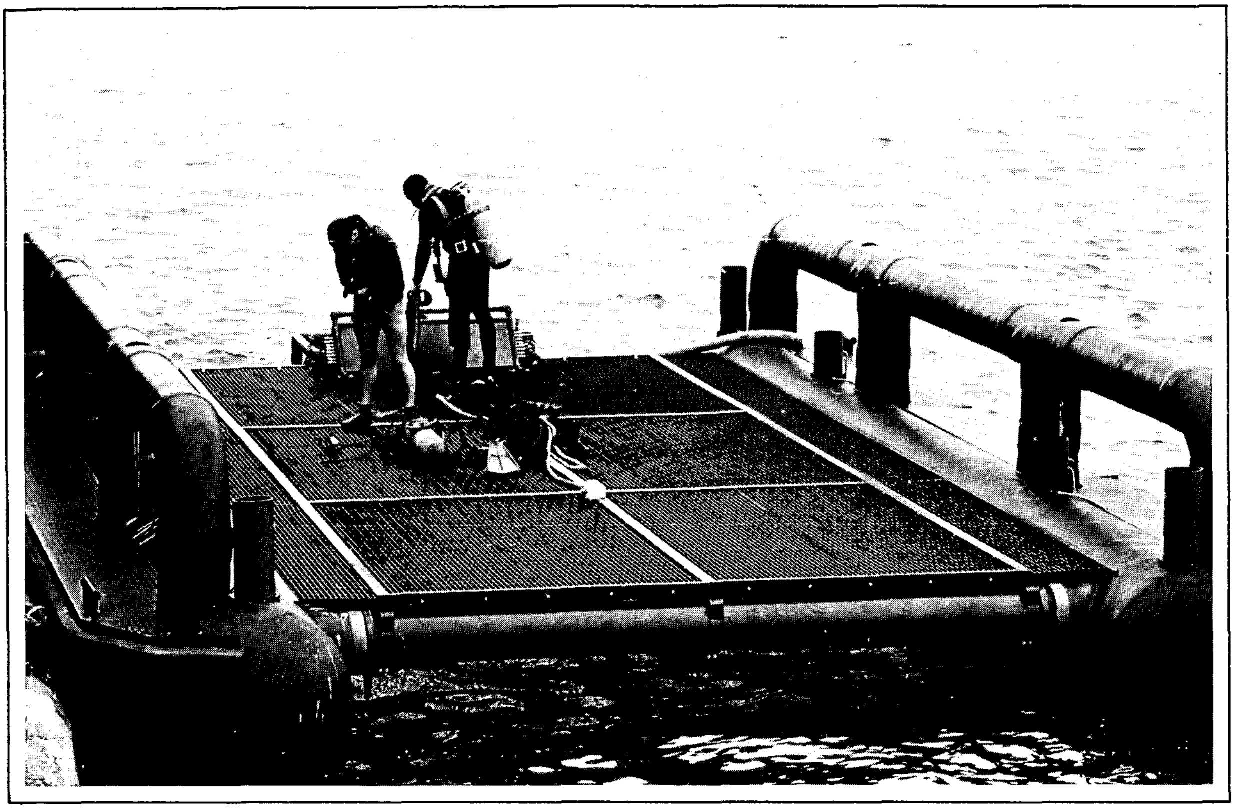
Manned by Project Engineer, Larry McKinley, the prototype capsule, nicknamed "Dragonfly," was lowered by crane into the water alongside CAPE. Prior to the manned test, the compartment underwent a series of unmanned tests, including a 2-hour immersion on the bottom of San Diego Bay.

The 550-pound observation capsule has windows or ports on each side, allowing virtually unobstructed visibility. The ports, which also serve as access hatches, are constructed of acrylic, 34 inches in diameter and 1-1/4 inches thick. The compartment's air, control and communication lines are connected to the platform.

In addition to the primary function of hull inspection, the underwater capsule/hydraulic arm subsystems could be equipped with an array of tools and components for operations currently performed by divers, such as fighting underdock fires, light salvage, or direct supervision of marine engineering.

On completion of the initial test phase of the system, the project responsibility will be assumed by the Ocean Technology Department for operational evaluation.





SUBTRAP

NAVSHIPS OOC has recently sponsored the development of a new training device which resembles an undersea catamaran. Called a Submersible Training Platform (SUBTRAP), the craft will provide the Naval Inshore Warfare Commands, ATLANTIC and PACIFIC, with a much improved capability in all aspects of underwater training operations. SUBTRAP was designed and developed by the Naval Undersea Center, San Diego, for primary utilization by U.S. Navy Underwater Demolition and Sea-Land-Air (SEAL) Teams. The craft will provide the UDT/SEAL diver with a simulated deck of a submerged, underway submarine for various training operations. It has been designed to be towed by a surface support craft while submerged at depths to 100 feet. The SUBTRAP is a more rugged and sophisticated version of NUC's Launch and Recovery Platform (LARP) which was displayed during NUC's 1971 Ocean Engineering Demonstration at San Clemente Island.

It is expected that SUBTRAP will pay for itself in its first few weeks of operation. The total fabrication and annual maintenance costs are estimated to be less than a few days' operational cost for a fleet submarine. This is especially significant since submarines are now seldom available to serve as regular training platforms for fleet divers.

The 24-foot x 36-foot SUBTRAP was designed by the Naval Undersea Center's Hawaii Laboratory and assembled at NUC's San Diego headquarters during December 1972. Training and OPEVAL were conducted in San Diego by representatives of both the Atlantic and Pacific Naval Inshore Warfare Commands in January and February 1973.

The SUBTRAP has two 3-1/2-foot-diameter longitudinal fiberglass pontoons braced and joined by four large aluminum cross-tubes. Side rails above the steel mesh decking contain six sealed, sectional buoyancy tanks which provide permanent buoyancy to keep the platform in an upright position. The rails also contain four floodable variable ballast tanks arranged in T-sections.

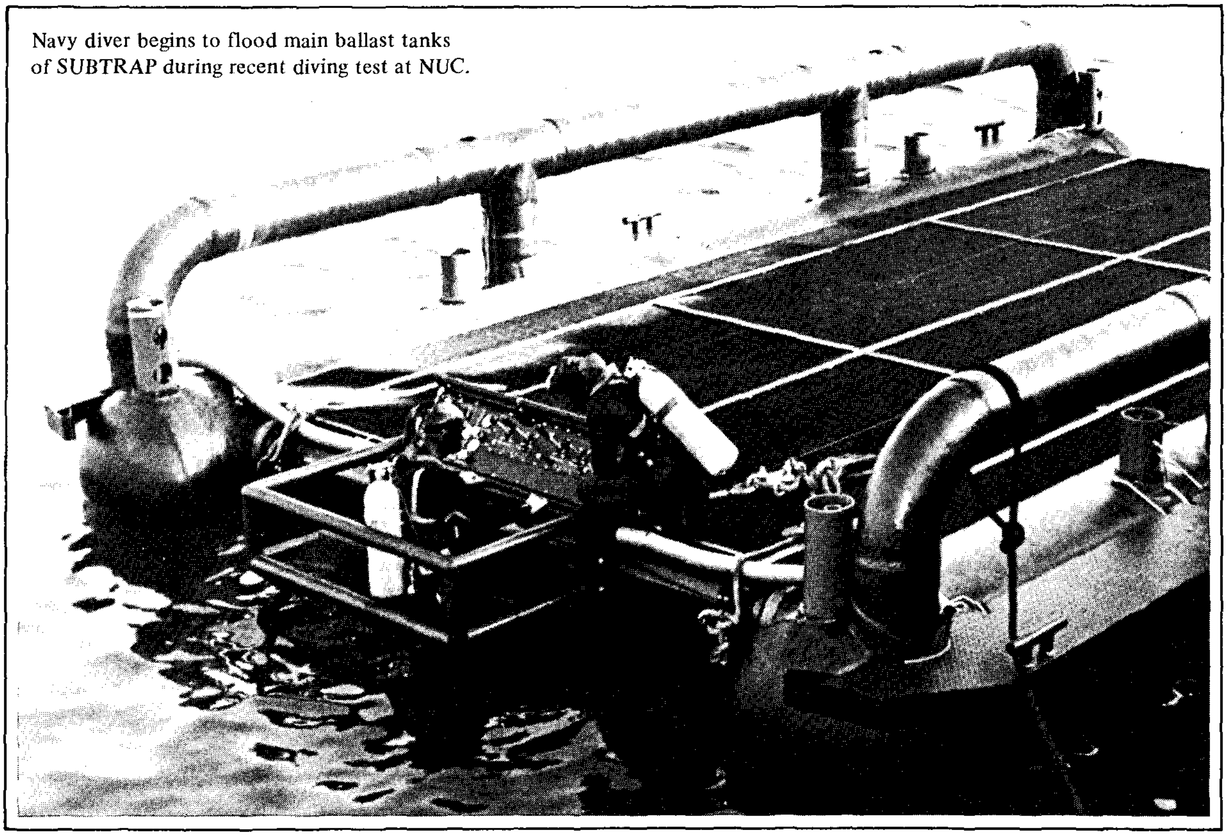
Control of SUBTRAP is accomplished by selective flooding and/or blowing air into the main ballast tanks and variable ballast tanks. Each tank has a remotely-controlled flood valve which, when open, allows water to enter. A remotely-controlled air line blows the water out of the tank bottom. The platform operator can flood or blow all of the tanks simultaneously or in selected groups.

The control console faces aft so the operator can see the entire platform. The controls are operated by compressed air. Two bottles, providing 1,600 cubic feet of air at 2,400 psi are located in the aluminum cross members beneath the deck. The bottles supply sufficient air to empty flooded main ballast tanks approximately four times before recharging. SUBTRAP can be operated by one diver, although two are normally used to permit trading off during long operations.

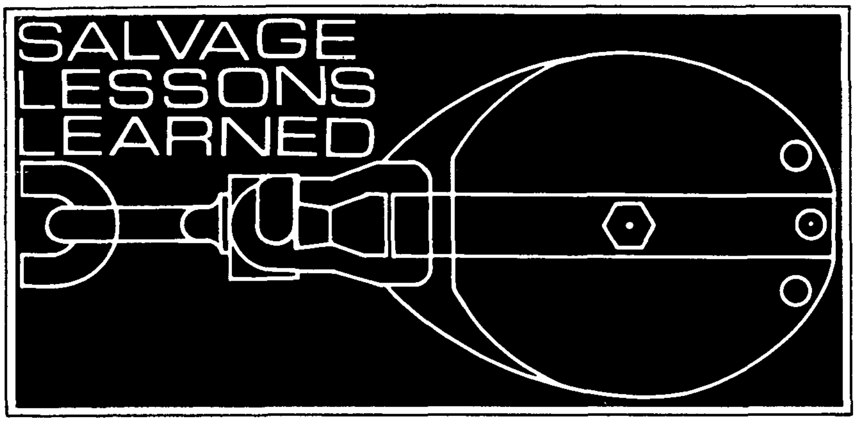
Operator controls are four short levers, each with eight positions, working off a single plastic manifold. To descend, the operator floods the main tanks simultaneously. The deck settles below the surface and the air-filled variable ballast tanks remain on the surface until they, too, flood. The platform can hover at any depth in a stationary mode or while being towed slowly. Complete control of trim is achieved through the main and variable ballast tanks, with adjustments being made for off-center loads, etc. To raise the platform, the operator merely blows the variable ballast tanks and then the main tanks.

SUBTRAP was designed and engineered in Hawaii by the Ocean Sciences Division of NUC's Ocean Technology Department. Mr. Ron Seiple was the project manager, with Mr. Fred Middleton providing the engineering data. Mr. John Lindquist, Technical Services Branch Head and the assistant project manager, contributed valued engineering to the project which resulted in an estimated savings of over $100,000. LCDR I. C. LeMoyne was the NAVSHIPS OOC program sponsor and coordinator.

Although designed for primary use by UDT/SEAL Teams, the SUBTRAP has use potential beyond mere personnel training. This undersea catamaran may well become a versatile and useful tool for the diving Navy in general. The platform has adequate space to ride 40 or more divers down and up simultaneously for various training or administrative tasks. Other uses include salvage work. The platform has the inherent capability to lift a 2-ton weight from the sea floor. In addition, its ability to hover near the bottom makes it a good search platform possibility as a deck from which swimmers could operate to locate sunken objects. Delivery of the equipment to fleet operational forces is now in progress.



Navy diver begins to flood main ballast tanks of SUBTRAP during recent diving test at NUC.



Towing Memo. A WLV under tow during the mid-Pacific rainy season experienced severe flooding during the transit. Approximately 6,000 gallons of water accumulated in the after lower decks area of the ship and caused a starboard list. The source of the water was not known. The tow ship, therefore, put a boarding party on board to investigate, eliminate the source, and dewater the vessel.

While dewatering was in progress the investigating team determined that the source of the water was from the main deck and secondary drainage systems. The open end pipe to funnel type connections in and between these systems allowed water to back up into the ship since the overboard discharges for these systems had been plug-welded. No sea water was taken aboard the tow during the trip – torrential rains accounted for the total amount of water in the ship.

Lesson Learned: Ensure *all* drainage systems and other water paths are securely plugged at the source as well as at the discharge.

Load Test for Inflatable Pontoons. Three TYPE I 8.4-ton inflatable pontoons were rigged together to provide additional lift during a salvage exercise. While being inflated, the bottom pontoon ruptured and the rapid ascent to the surface caused the other two pontoons to rupture. The relief valves were unable to compensate for the air expansion during the free ascent to the surface. The combination of the air bubble and pontoons piercing the surface provided a very disheartening picture to the salvor after the initial shock was over. The bending shackle failed causing the lower pontoon to rupture. Upon inspection it appeared that either the taper pin had never been installed allowing the shackle pin to slip out, or the shackle pin was never installed.

Lesson Learned: All pontoons of this type should have a load test or internal inspection if at all possible prior to use by the salvor.

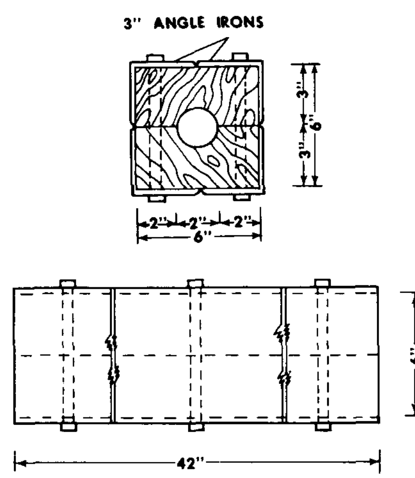
Lowering Lifting Straps. A salvage operation to lift a landing craft from 175 feet in 34°F water was undertaken using hard hat divers. Lifting slings were to be employed by the salvage team to raise the craft. The sling was lowered on to the craft, with the divers following to make attachments. Several problems immediately presented themselves. Fishing nets had become entangled with the craft, making working conditions difficult. Also, the cold environmental conditions with the extreme working depth sapped the strength of the divers rapidly making it necessary to complete the work as quickly as possible. The entanglement of the slings with each other and the net made it impossible for the divers to work with it. To solve the problem, the lifting sling was returned to the surface and rigged by tying off each end with a slip knot two feet above the adjoining sling. This allowed the diver to remove the slip knot on one strap and work with it without being encumbered by the others.

Lesson Learned: To solve the problem, the lifting sling was returned to the surface and rigged by tying off each end with a slip knot 2 feet above the adjoining sling. This allowed the diver to remove the slip knot on one strap and work with it without being encumbered by the others.

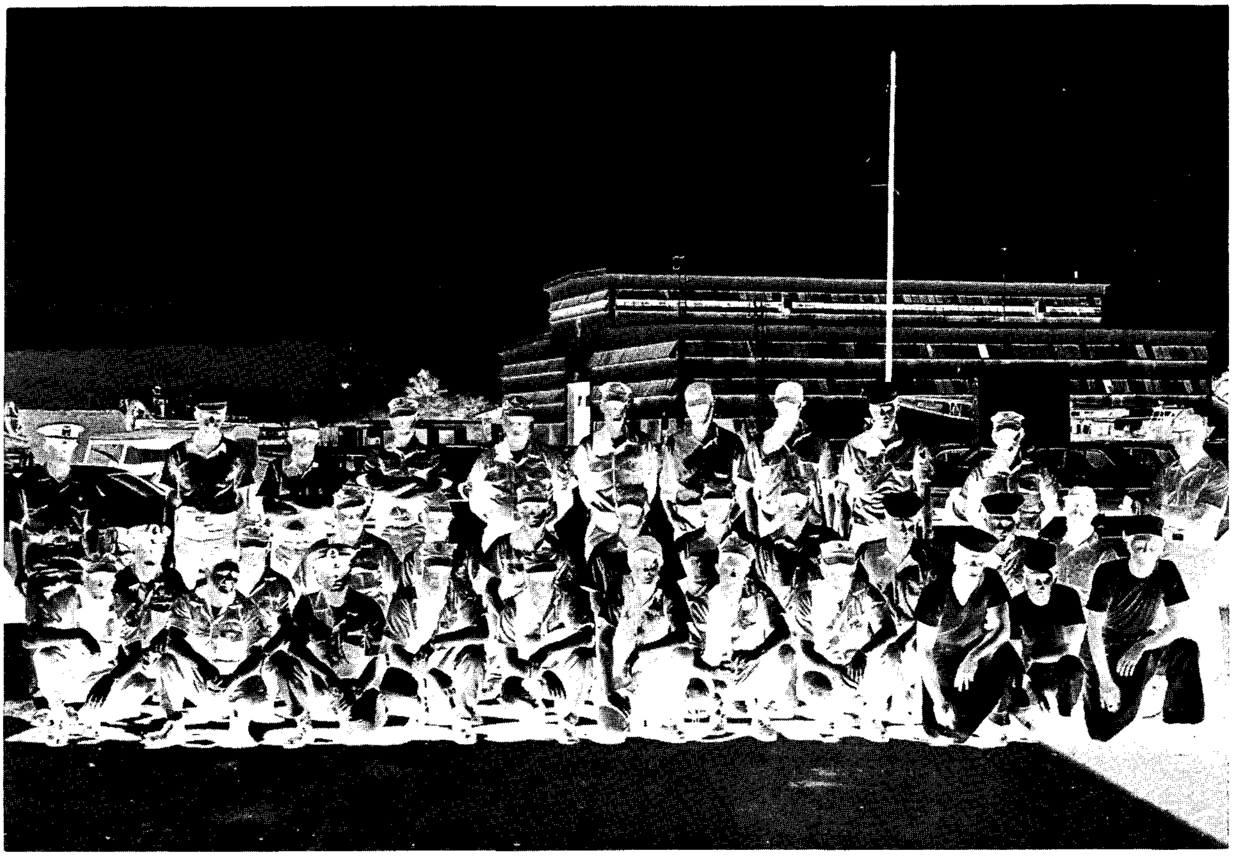
Data Marker Buoys. During a recent large search operation, two Data Marker Buoys were dropped to determine surface set and drift information. They were transmitting on the same frequency and the helicopter pilots reported much difficulty in localizing these buoys. As a result, position information was conflicting during the search operation.

Lesson Learned: If several buoys had been deployed at different locations and the progress more carefully monitored, the problem would have been eliminated and accurate information obtained, reducing search time.

Chafing Block For 2-Inch Towing Hawser. A chafing block for the towing hawser for use at the stern roller has been used very successfully by a few ATF'S. It is illustrated below:



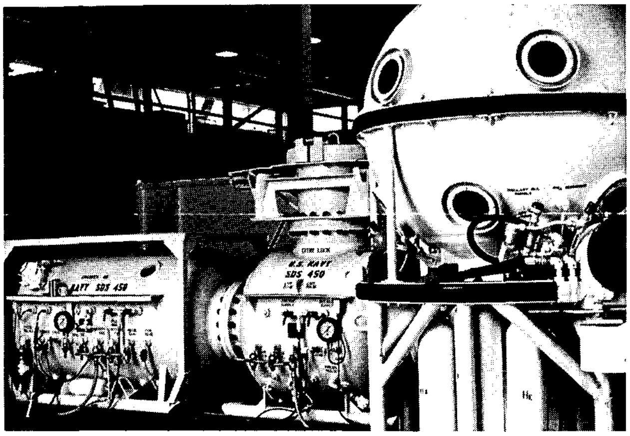
Diving, Salvage, & Training in the Pacific



HCU-1

Having thoroughly proven herself in the combat environment of Viet Nam, Harbor Clearance Unit One has, since her change of home port from Subic Bay, R.P., to Pearl Harbor, Hawaii, in June 1971, been upholding her tradition in the peacetime Navy.

With a personnel allowance of five officers and 55 enlisted men, HCU-1 is presently commanded by LCDR Y. L. Swift. The command stretches across the Pacific from Pearl Harbor to Subic Bay, having various types of craft within its reach. At Subic two Yard Heavy Lift Craft (YHLC's) are in reserve awaiting activation by HCU-1 personnel who stand by to operate them should the need arise. These are singular craft designed for heavy lifting salvage operations with a



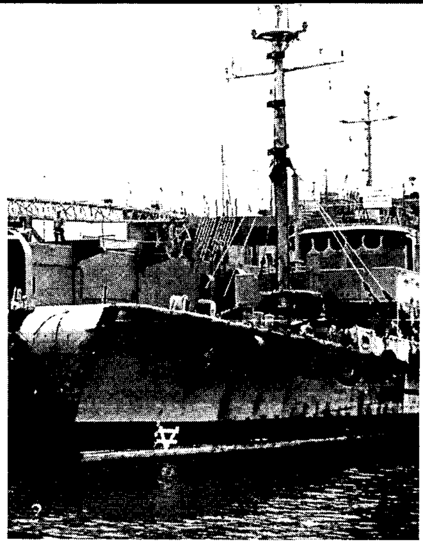


Photo 1: SDS-450 System; Photo 2: EX-BUTTERNUT along side YRST-1; Photo 3: Special handling system for SDS-450.

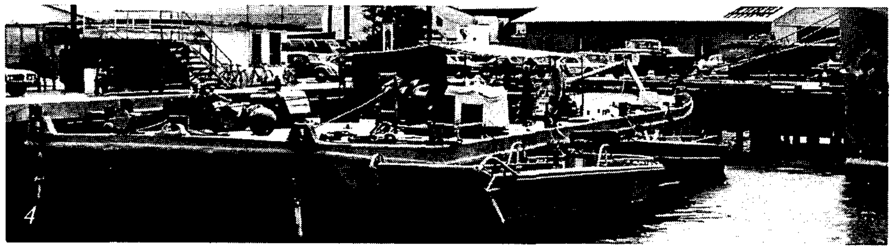


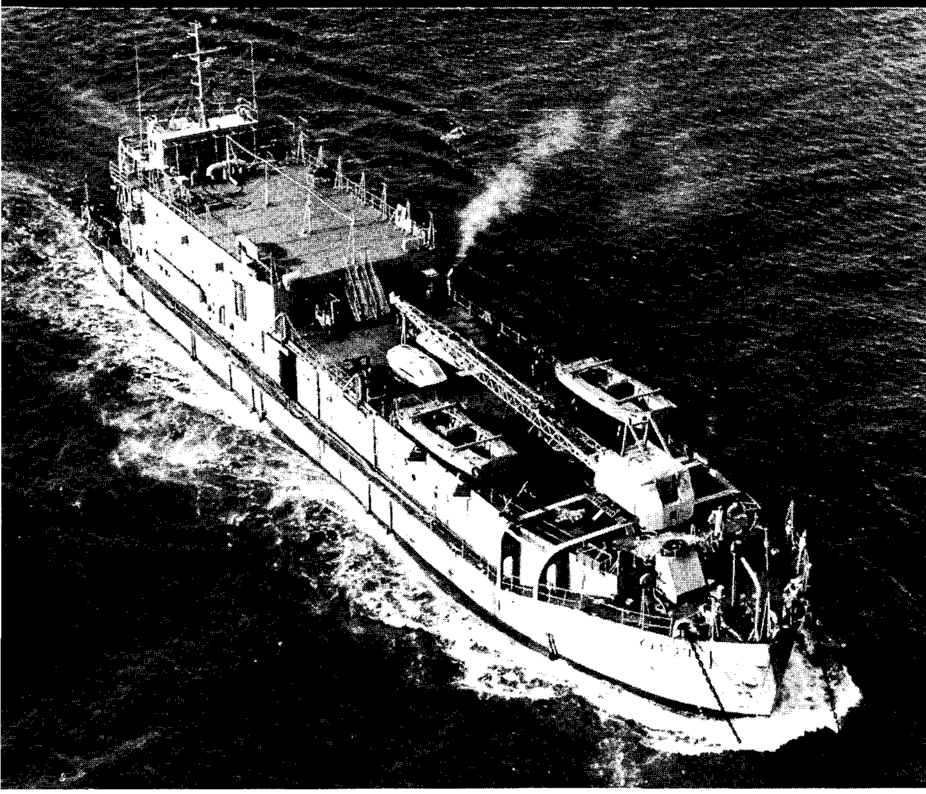
Photo 4: HCU-1's Ecology barge; Photo 5: Inside view of CCV; note closed circuit TV used in monitoring dives.

capability of lifting in tandem 4,500 tons. In Pearl Harbor, however, YRST-1 is "home" for HCU-1. This Yard Repair Salvage Tender contains offices, berthing, messing, repair shops, stowage area and a 15-ton deck crane. The YRST-1 has a diving and salvage capability, housing a self-sustaining unit capable of being towed to remote areas to undertake salvage operations. The YRST-1 is complemented by numerous small craft including a Yard Diving Boat (YDB-1) which also contains its own hard-hat diving capability.

For local salvage jobs, HCU-1 has access to an "ecology barge." This is a converted YC rigged with "A" frame, beach gear, winches, anchors, diving compressor and generator. It is an "in-house" conversion, conceived, designed and constructed by the men of HCU-1 from a dilapidated hulk. It was originally to be HCU-1's contribution to Pearl Harbor's ecology program, but has since proven itself in a number of local salvage operations including refloating a large scale model "Floating City." It was also used in the repair of a major break in a submerged water main.

Also, the ecology barge has been used in removing tons of debris from Pearl Harbor, including remains of old piers and hulks dating back to WWII, resulting in HCU-1's nomination for the Navy Environmental Protection Award.

In January 1973, Commander Service Squadron FIVE presented the Unit with a formal citation: "For extraordinary achievement and service as the *primary*



Left:
Starboard bow view of HCU-1's YRST-1 under way off coast of Oahu, Hawaii.

Service Squadron FIVE diving, salvage and training organization during calendar year 1972." The Unit's 24 divers are divided into three dive teams which stand by to respond to salvage commitments anywhere in the Pacific Ocean. This quick response capability is made possible through HCU-1's implementation of the "Fly-away" concept whereby salvage gear is palletized and stands ready for air shipment on short notice. In 1972 HCU-1 participated in over a dozen salvage operations.

The EX-BUTTERNUT, the hulk of an ANL which has been refitted, is used by ships of Service Squadron FIVE. HCU-1 has custody of BUTTERNUT and provides support personnel during training operations, including such things as fire fighting and strandings ashore.

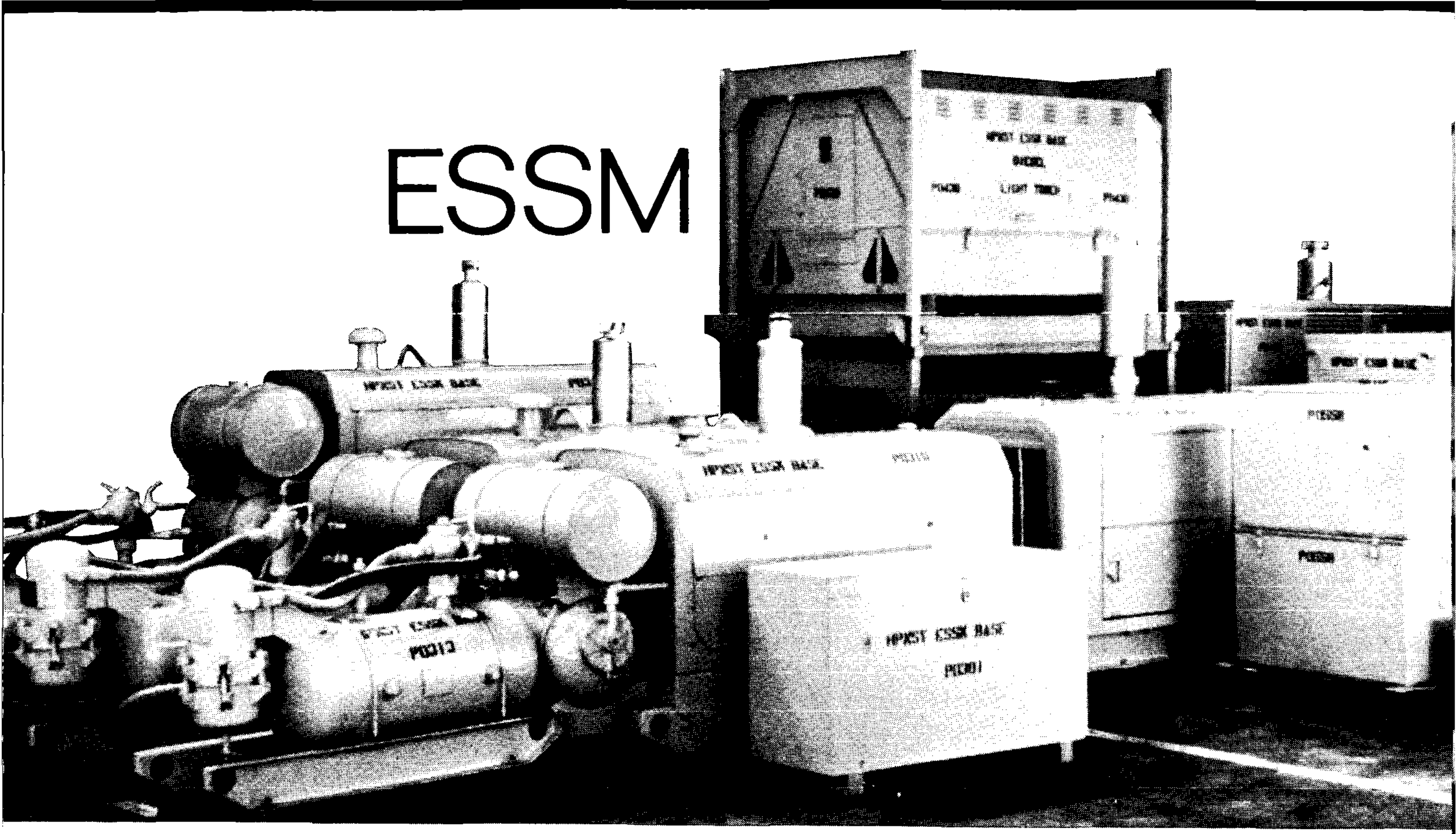
A barge industrial building with work shops and storage area is surrounded by a "salvage yard" of pumps, chain, anchors, and buoys, all of which are under the custodianship of HCU-1. These assets are available for use by the Mid-Pac salvage forces, and HCU-1's trained crane operators provide transportation services when the need arises.

The newest member of the Harbor Clearance Unit Team is the SDS-450. Salvage Diving System-450 is a subsaturation diving system with capabilities of deploying to 450 feet. The system can be operated using air or mixed gas from the YRST-1, and from ARS/ATF/ATS ships of opportunity. Eventually it will be incorporated into the Fly-away system. A specialized handling system has been designed and constructed aboard.

The main components of the system are the Personnel Transfer Capsule (PTC), Deck Decompression Chambers (DDC), Entry Lock (EL) and a Control Console Van (CCV). Each component, except the CCV, can be pressurized independently, or the entire system pressurized as one unit. The CCV contains gas control and monitoring devices as well as a closed circuit TV to monitor the condition of the divers in the PTC. The PTC dives with two divers who deploy one at a time, at depth, with one remaining inside maintaining communications. The divers are attached to the PTC by an umbilical and utilize KMB-9 dive helmets. SDS-450 will permit diving at greater depths and for longer periods of work time than is now possible with the MK V hardhat.

YRST-1 will get under way soon for the operational evaluation of the Navy's new MK XII hard hat which is designed to replace the bulky and awkward MK V. YRST-1 and HCU-1 personnel will provide support for this large operation. Following this, quick preparations will be made for the first Pacific Sub-Salvex scheduled later in the summer in which the EX-BLUEGILL, sunk for training purposes 2-1/2 years ago, will be raised. This salvage operation presents a major challenge, since all compartments are flooded in 140 feet of water. Through these operations, HCU-1 hopes to further her reputation as the principal salvage organization of the Pacific Fleet.

ESSM system expands capabilities



by
EARL BAKER
Office of the Supervisor of Salvage

Since World War II the Emergency Ship Salvage Material (ESSM) System has been operating around the world to provide extensive support to major salvage operations when necessary equipment was not available on-scene. New equipment and new demands in the salvage business necessitated an ESSM Base and Pool reorganization in 1971 to make the system more effective. The improvements in the system have continued since then, and more are planned for the future.

In the past, procurement of all material destined for Bases was accomplished by NAVSHIPS. In order to provide a greater degree of flexibility to the ESSM System and to reduce centralized control at the NAVSHIPS level, Base managers are now authorized to procure selected small components and ancillary items to fill allowance deficiencies. High value major items continue to be procured by NAVSHIPS.

NAVSHIPS recently initiated action to distribute overages in ESSM Base assets to fill deficiencies where they existed in other Bases. This action provides a more equitable balance of Base assets and improves response capability. Many shortages such as rotating equipment, pontoons, and beach gear components have been filled where deficiencies formerly existed. The next action to be taken by NAVSHIPS will be to distribute Pool assets to further alleviate Base deficiencies.

One of the most frequently asked questions by the Fleet salvage and tow forces is what actually constitutes a standard leg of beach gear. Investigation by the NAVSHIPS ESSM manager revealed that Base allowance components were not complete. In conjunction with Commander Service Squadron Eight, a study was conducted to fully document the components of a standard leg. As a result, individual components are now clearly defined to ensure such requirements as all wire rope having the correct fitting, carpenter stoppers and wire rope bridles having all the necessary shackles and pins, etc. (Hull Standard Drawing 805-2482951 has been revised [Rev C] to reflect the latest change.)

Repair/overhaul facilities at Naval Construction Battalion Centers (NCBC) Port Hueneme, California and Gulfport, Mississippi promise to be significant improvements in the ESSM System. The advantage in this arrangement lies in the fact that there now

Editor's Note:

The Fall 1971 issue of Faceplate *carried an article on the streamlining effort of the Emergency Ship Salvage Material (ESSM) System. Covered in the article were allowances, inventory control, issue procedures, and the ESSM Manual. Since publication of that article, several new developments have occurred. The following article provides new information on improvements and future plans.*

exists a repair capability within a price range that can be afforded in the ESSM budget. The Construction Battalion Centers have extremely well equipped repair shops, are expert in the field of diesel repair, and are completely familiar with ESSM equipment, thereby ensuring a better overhaul. Before returning repaired equipment to the System, NCBC tests, preserves, packages, and crates it, as well as providing maintenance and instruction manuals at NCBC.

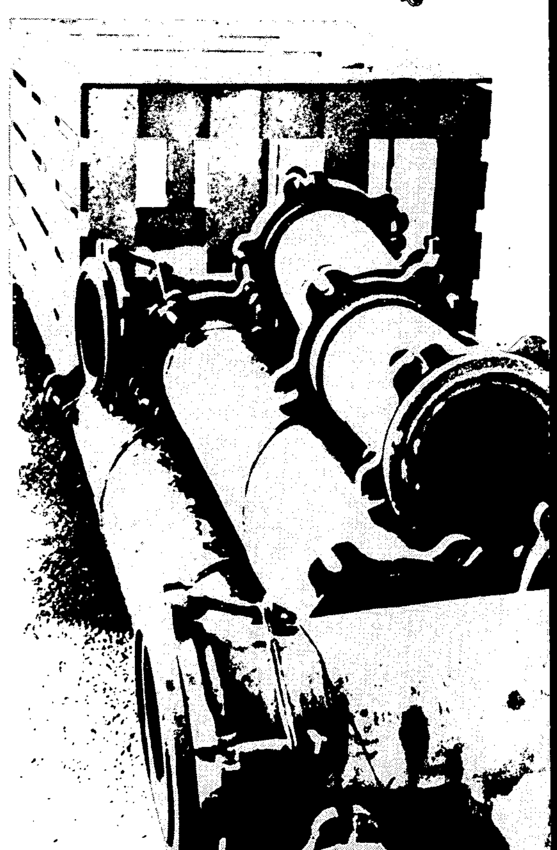
Communication has been established between Bases in the form of "ESSMGRAMS," which are published as newsworthy items occur, generally on a monthly basis. Covering subjects of current interest, they provide information on changes to allowances or other changes which might subsequently result in a manual change.

An ESSM milestone was recently reached with the establishment of the Hunter's Point, California, ESSM Base as an on-line operating model Base. A great deal of effort and money went into this project, and the dividend realized is a guideline from which standards and specific guidance for other Base managers can be obtained. All action at Hunter's Point has been documented for dissemination throughout the system, including information on color coding, shipping crate construction, Base layout, and security and emergency issue procedures. The Hunter's Point Base is up to full allowance, with all ancillary components stowed with the parent equipment and checked to ensure compatibility.

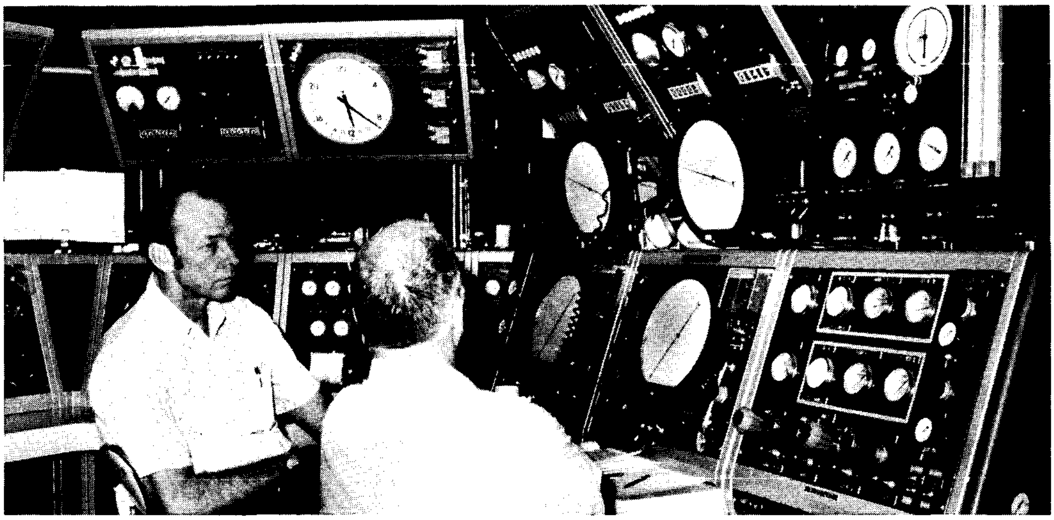
To provide coverage in the North Sea area and further increase world-wide response capability, a new ESSM Base will be activated on July 1, 1973, at Rosyth, Scotland. The site at Rosyth contains 3600 square feet of covered storage and unlimited uncovered storage space. The area is located 100 yards from a deep water ocean pier and close to British salvage equipment, served by a major rail line, and is about 20 miles from Edinburgh airport. The SUPALV representative stationed in London has been designated as the Base manager at this new Scotland site.

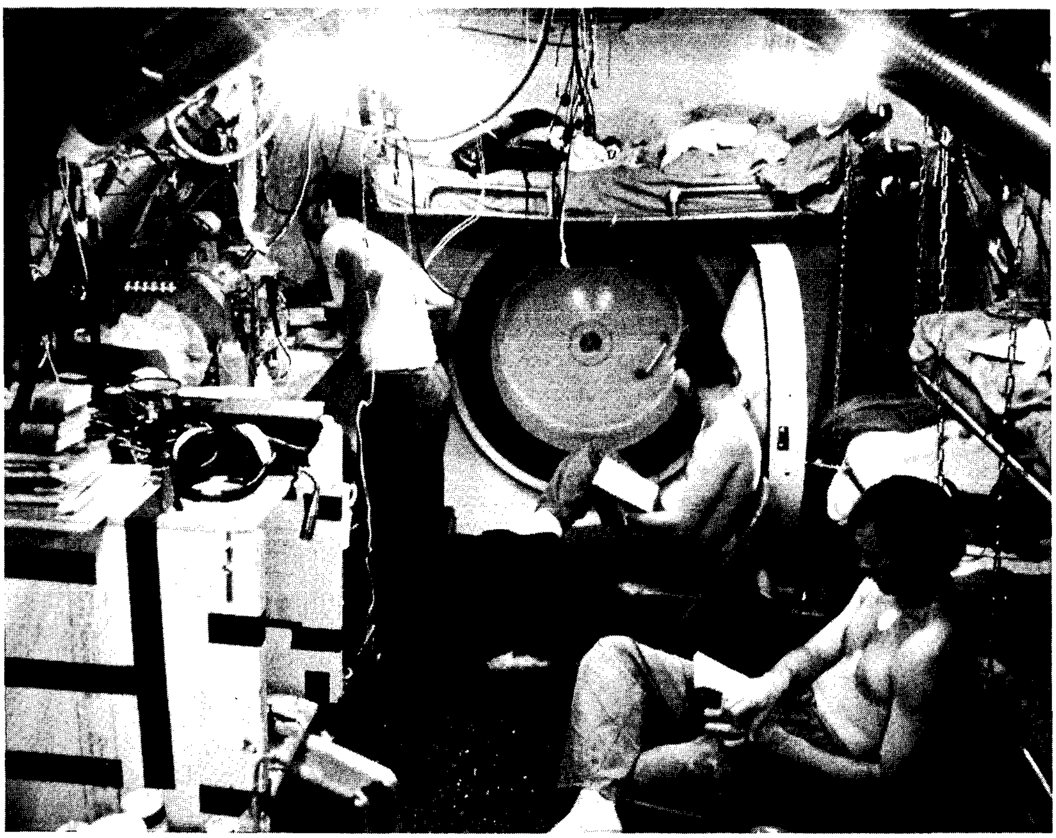
Plans have been initiated to establish an ESSM Base in Australia. This Base will be similar to the Base in the Philippines, and also will be written into the terms of a salvage contract. By stowing and maintaining equipment for use by the Supervisor of Salvage, U.S. Navy, the Australian Base will greatly expand world-wide coverage and permit SUPSALV to respond to salvage needs more rapidly in the Indian Ocean area.

The ESSM System has proved its value in such recent tasks as the salvage operation of the SS SIDNEY E. SMITH, Port Huron, Michigan (see *FP* Winter 1972), where a quarter million dollars worth of machinery and rigging was provided. It appears that the time and expense required to maintain the system is readily justified by the support it provides to both major and minor salvage operations in responding to emergency requirements. The ESSM manager intends to continue the growth and refinement that has marked ESSM to date.



Operations superintendent Roy Gray of Aberdeen, Scotland and Joe Beitl of Duke University Medical Center monitor the control console during pressurization. Helium speech tests were conducted at various levels during the descent.





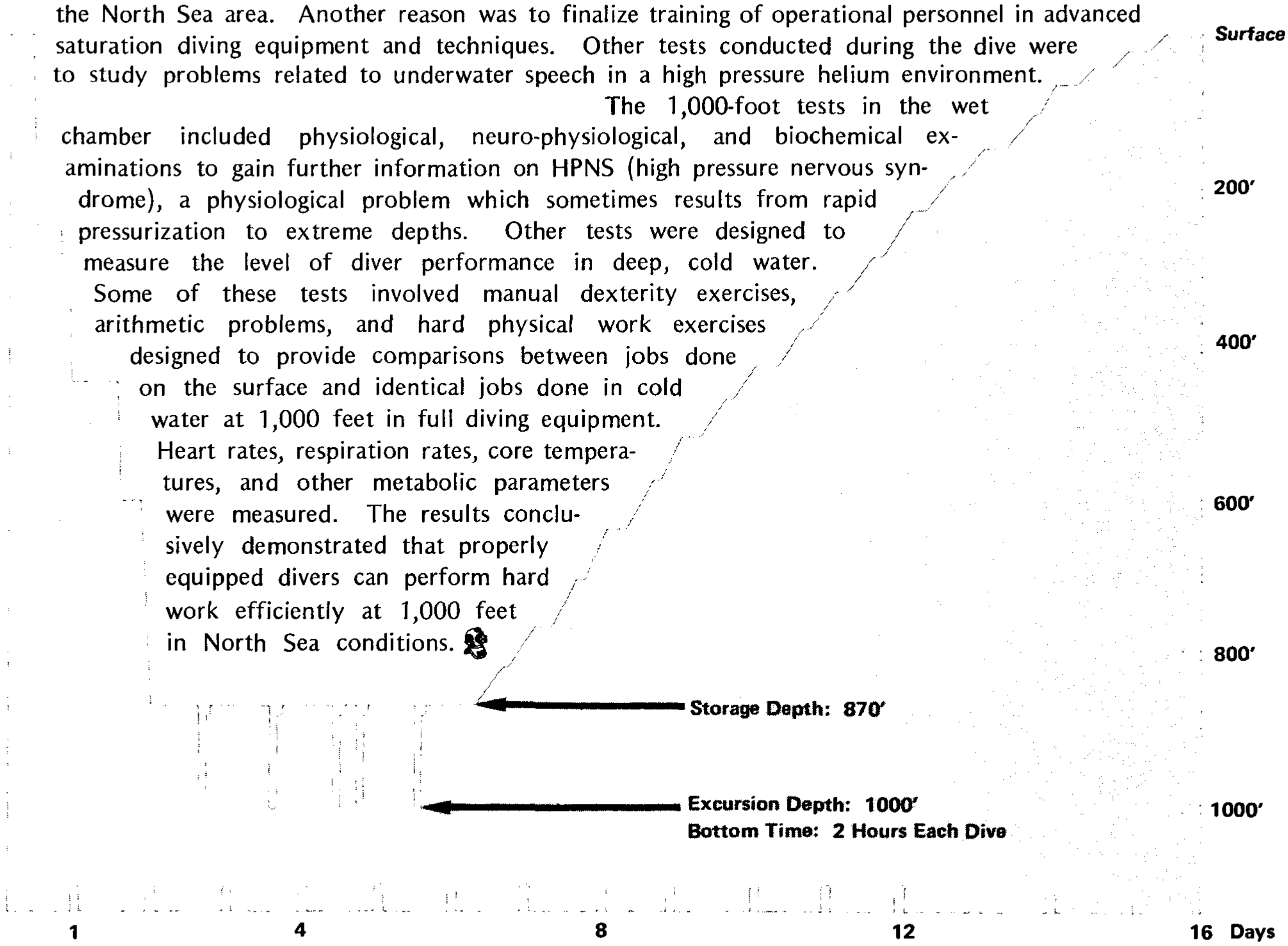
Three of the participants in Project Deep Work 1000 relax in the living chamber at 870 feet. The equipment and instrumentation at left are part of the physiological and speech experiment program.

Oceaneering Completes 1,000 ft. Dive

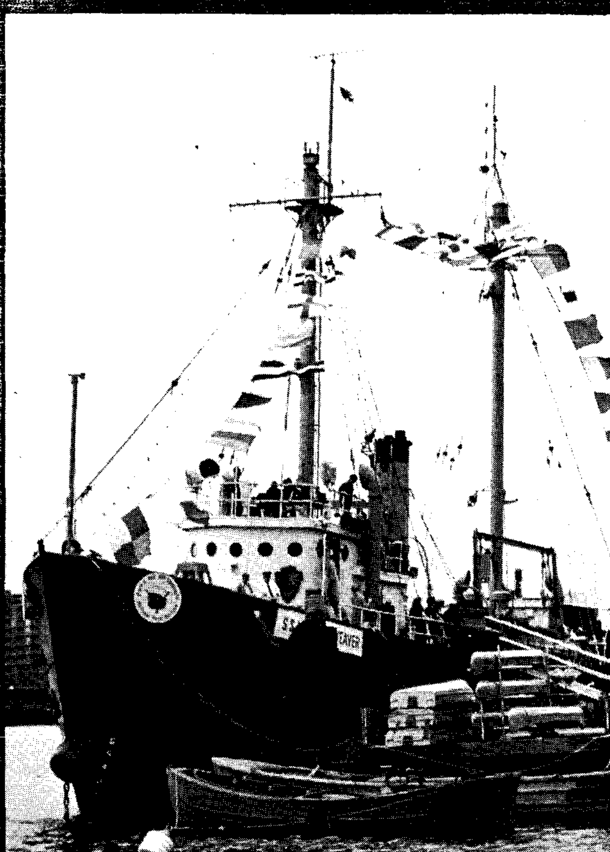
Six divers, including two men from Oceaneering International, Inc.'s operations base, Great Yarmouth, Norfolk, England, successfully completed a series of 1,000-foot dives recently, conducted in the Hyperbaric Research Chamber Facility at Duke University, Durham, N.C. The divers spent 16 days under pressure and made five 2-hour excursion dives from the 870-foot storage depth to 1000 feet in an ice-filled wet chamber. The divers stayed at storage depth for a total of 4 days. While submerged in the freezing water, the divers performed a series of human performance and physiological experiments under the direction of Dr. Peter Bennett, formerly with the Royal Navy Physiological Laboratory and now a resident professor at Duke University. The test program, which was labeled Project Deep Work 1000, was designed to obtain conclusive information related to offshore work in the British Sector of the North Sea.

The primary reason for organizing and conducting the deep diving program was to evaluate divers' work performance under conditions which realistically simulated the environmental stresses of 1,000-foot cold-water oil field diving, such as will be encountered in the upper reaches of the North Sea area. Another reason was to finalize training of operational personnel in advanced saturation diving equipment and techniques. Other tests conducted during the dive were to study problems related to underwater speech in a high pressure helium environment.

The 1,000-foot tests in the wet chamber included physiological, neuro-physiological, and biochemical examinations to gain further information on HPNS (high pressure nervous syndrome), a physiological problem which sometimes results from rapid pressurization to extreme depths. Other tests were designed to measure the level of diver performance in deep, cold water. Some of these tests involved manual dexterity exercises, arithmetic problems, and hard physical work exercises designed to provide comparisons between jobs done on the surface and identical jobs done in cold water at 1,000 feet in full diving equipment. Heart rates, respiration rates, core temperatures, and other metabolic parameters were measured. The results conclusively demonstrated that properly equipped divers can perform hard work efficiently at 1,000 feet in North Sea conditions.



LCDR Joe Murray, USN(Ret), Captain of Lightship CHESAPEAKE.



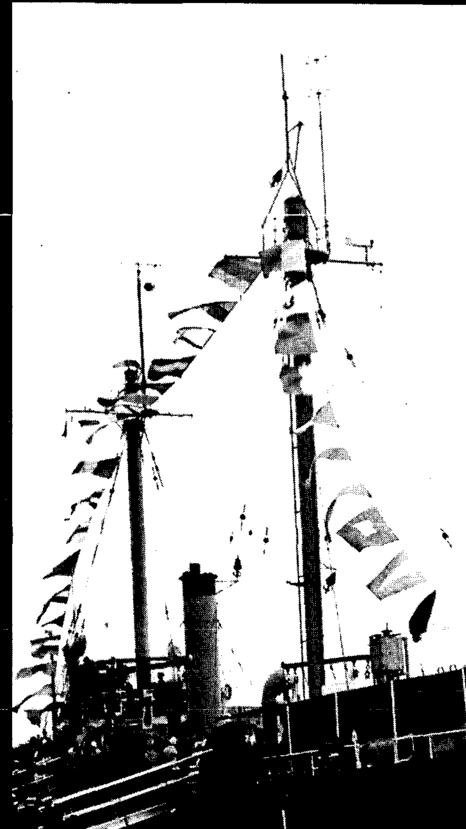
The Lightship

What happens to a 43-year-old, completely inoperable ship when it is officially retired from military duty? For the Lightship CHESAPEAKE decommissioning has meant finding a new and important mission in an area of increasing public concern - ecology. Acquired by the National Park Service in 1971, CHESAPEAKE has been transformed into a floating environmental awareness exhibit for educational and recreational programs.

Complete rehabilitation of the ship in the Baltimore Shipyard and the Washington Navy Yard was completed in the fall of 1972, at which time the CHESAPEAKE established her permanent mooring facilities off-shore from East Potomac Park in the Washington channel, Washington, D.C. Washington-area Sea Explorers did most of the repair work on the CHESAPEAKE, including cleaning and painting compartments, rewiring, and repairing main engines. The ship is 130 feet long, with a displacement of 630 tons, and has a 350-horsepower, diesel-electric engine capable of maintaining a maximum speed of 9 knots.

The CHESAPEAKE offers a wide variety of facilities and programs designed to make the public, and particularly students, aware of the pollution hazards threatening their natural surroundings. Several aquariums on board, built by the Sea Explorers, house specimens of typical local marine life. An environmental laboratory with microscopes and other instruments is in the process of being completed with surplus and donated equipment. Also, the forward lower hold is being equipped with closed circuit television screens, aquariums stocked with Potomac River estuarine life, and other special effects to simulate a submarine's "water-level" view of the river.

The Navy School of Diving and Salvage in Washington has made many contributions to this National Park Service endeavor. In the ship repair phase, an instructor



CHESAPEAKE

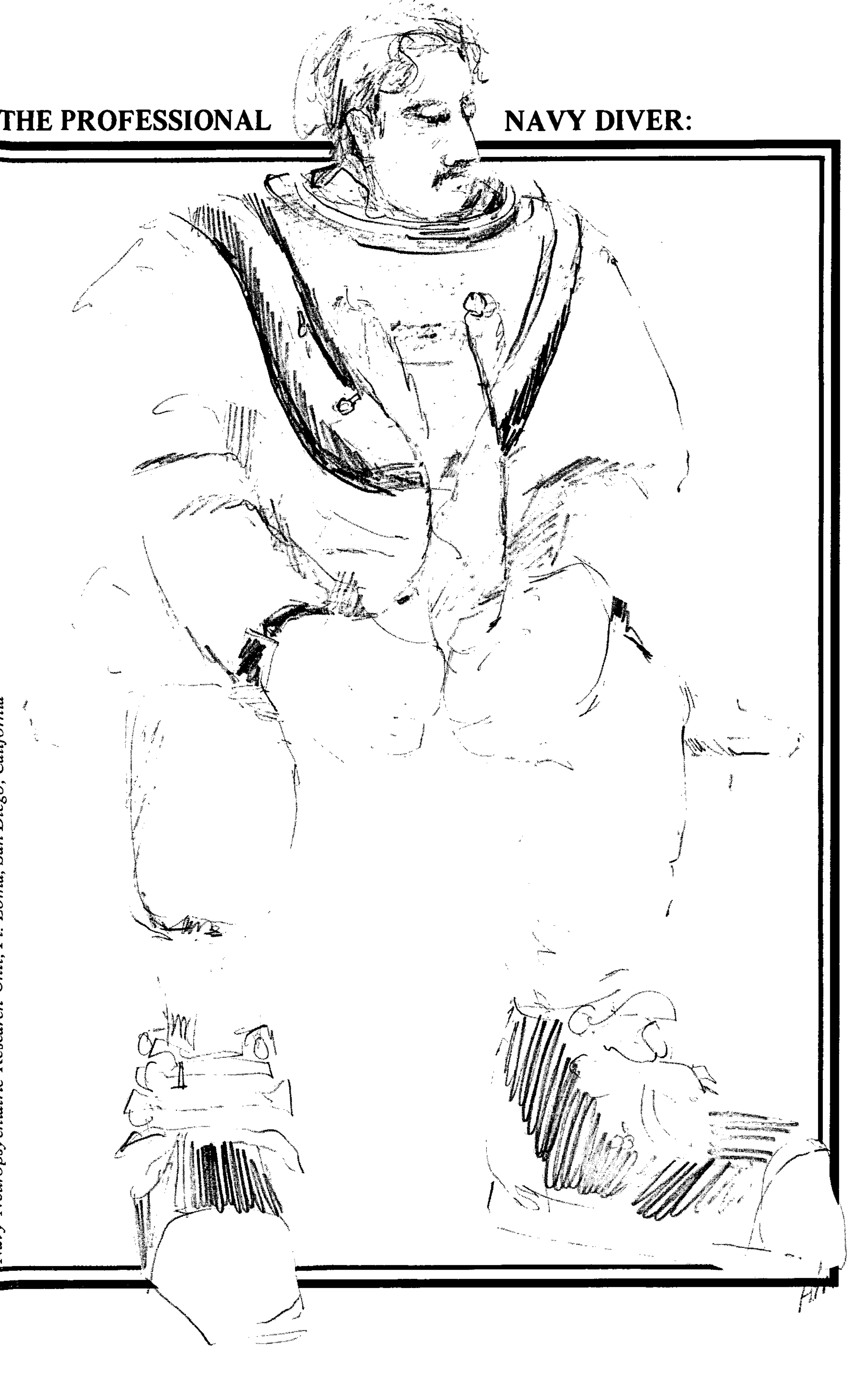
from the School versed the Sea Explorers in welding. After the ship became operational, four Explorers trained on board the School's YDT-14 and became qualified helmsmen capable of handling the CHESAPEAKE. Sets of deep sea diving equipment and SCUBA diving equipment are on loan from the School to illustrate, particularly to younger school children, how man lives and works under water. The U.S. Oceanographic Office has also donated equipment and displays which further exemplify underwater life to the public.

All of these facilities on board are enjoyed by both the public and by student groups from the Washington area. Elementary school children visit CHESAPEAKE each weekday to examine environmental problems first-hand and to discuss possible solutions. Class groups have the benefit of several activities once on board, including a boat excursion before moving on to three classrooms that feature movies, the laboratory, and a discussion room. High school students involved in the Students Toward Environmental Participation (STEP) program come on board to study such subjects as marine biology, marshland community relationships, and water quality analysis. College students also make use of the facilities in supplementing their regular classroom studies and in independent studies in environmental education and ecology of the area.

LCDR Joe Murray, USN(Ret), is the Captain of the CHESAPEAKE. With over 20 years of diving experience behind him, including duty as Executive Officer of the USS SUNBIRD and of the Navy School of Diving and Salvage before retiring on June 30, 1972, LCDR Murray is now officially employed by the Park Service as Master of the ship and as an environmental and ecological instructor.

From June to September, the CHESAPEAKE is open for tours every Tuesday, Saturday, and Sunday from 1:00 p.m. until 5:00 p.m.

THE PROFESSIONAL NAVY DIVER:



Presented September 1972, to the American Psychology Association in Honolulu, Hawaii, by LCDR Robert Biersner, PhD., of the Navy Neuropsychiatric Research Unit, Pt. Loma, San Diego, California

WHO IS HE, WHERE DID HE COME FROM, AND WHAT DOES HE DO?

The accomplishments of divers, although perhaps occasionally exaggerated, have been a matter of record for at least 2,500 years. In 1966, CAPT W.F. Searle, USN (Ret.), summarized the history of diving in the *U.S. Naval Institute Proceedings*, reviewing the significant developments which have occurred over the years in diving equipment and operations. He described how diving has advanced from shallow excursions limited by the amount of time a man could hold his breath to the complex operations of today. Such current operations enable divers to work at depths of over 1,000 feet for indefinite periods, breathing exotic gases and performing jobs similar to those done on the surface. Modern diving, however, remains wearisome and dangerous. Much of the gear is heavy and cumbersome, diving chambers and habitats are confining and noisy, and accidents are a constant threat to diving operations. According to reports of the Navy Experimental Diving Unit, Washington, D.C., an average of two divers are killed each year, and another 80 are injured in the performance of their underwater duties. This is among a total diver population of less than 3,000 men.

A personal account of his reaction to diving was given by a SeaLab II aquanaut who had made a 200-foot dive in the cold, dark waters off the Pacific Coast. He spoke of diving being a function of stress. He did things in the water, he said, that didn't reflect good judgment, good forethought. One doesn't move as fast, one gets tired sooner, and colder sooner. Vision and dexterity are impaired. Things float away, lines get in the way, gear becomes fouled in equipment, and one worries about the animal life surrounding him.

What kind of man would subject himself to these conditions? Do those who volunteer for diving have special, perhaps abnormal, personalities? In his review of diving history, CAPT Searle stated emphatically that "divers' personalities have not changed through the ages" and that anyone who talks to them, including psychologists would "do well to consider with skepticism most sea stores told by divers . . ." With this warning, *Faceplate* considers here the stories divers tell psychologists about themselves.

Who Is He?

The diver mentioned most often in this article will be the U.S. Navy Diver First Class with 9 years of diving experience. To qualify for this classification, a man must complete a rigorous 26-week course at the Navy School of Diving and Salvage (NSDS) in Washington, D.C., which includes training in physical fitness, SCUBA, air and mixed gas diving, decompression chamber operation, ship salvage and rescue techniques, and diving medicine and physics. Although a combined GCT/Mech score of 105 is required for admission, it has been found that those diving students with better mechanical ability do better at NSDS, and probably make better divers. Civilian sports divers are similar, with those who have backgrounds in engineering and science, and who have earned the best grades in high school or college, doing the best in sport diving courses.

The diving profession seems to have a motto; probably coined by a non-diver, "You'd have to be crazy to be a diver." Nothing could be further from the truth. Although sailors with emotional or discipline problems occasionally volunteer for – or are transferred to – diving school, their stay is usually brief. The stresses of the diving program tend to aggravate existing psychological difficulties, and in some instances may endanger the life and safety of the disturbed student, as well as his diving partners.

Several articles have been written comparing the personalities of divers with other groups, including parachutists, airline pilots, and fleet sailors. The diver has been found to be normal in every case, although more aggressive, nonconforming, and active than other populations, including the average fleet sailor. The diver is also less concerned about himself, and is much more willing to take risks, at least in a gambling situation, than his counterpart in the fleet. (This may be the most sensational finding of all, considering the ability of the typical American sailor to make bets on almost anything.)

Psychologists studying the highly experienced divers on SeaLab II also found them to be normal on an extensive battery of psychological tests. They discovered that those who were judged by their supervisors, i.e., Master Divers, to be the best divers, spent more time in the water, and helped their diving partners more often than those divers who were judged less competent. The best divers also had several common background characteristics. They usually came from small cities and towns, and were among the younger children in their families. It appears that many of the divers who came from large cities, or who were the first or only child in their families, apparently had volunteered for diving merely to achieve recognition and status, and did not fully realize their inability to adjust to the dangers and stresses which were also part of the job.

The biographical characteristics of the Navy diver are much the same as those of the typical fleet sailor, with a few outstanding exceptions. The diver's family was larger, and his parents were more likely to be separated or divorced. This may explain the limited control and discipline he had from his parents. His behavior was most likely guided or directed by other children in the family, as well as those in school. This probably resulted in his being fairly independent and self-sufficient. He may have played hooky and run away from home not only because of dissatisfaction, but to test his ability to get along on his own. His independence is further shown by the early age at which he got his first job. He seems to have assumed this responsibility earlier in life than most others, and he was apparently successful at it. This in turn probably reassured him, and he has continued to assume more responsibility.

In becoming a diver, he has entered a career for which he is ideally suited. Most diving jobs are done alone, and often involve independent thought and action. At the same time, the diver gains recognition as an individual who is specially qualified for a difficult and dangerous job. It should be emphasized, however, that successful divers are not only independent, but have been able to get the job done if given the responsibility. Those who are not responsible probably do not remain long in diving.

It is interesting that swimming experience is apparently unrelated to diving experience or success. Most divers, although competent swimmers, did not show unusual ability or skill for this sport, nor did they go swimming more than average. This suggests that anyone who passes the standard swimming test required of all Navy recruits could probably swim adequately enough for diving.

What Does He Do?

What has the average diver done during his 9 years of diving? He has made about 50 dives a year during his career. At least 60 percent of his dives are to a depth of 50 feet or less, while 90 percent are to depths of less than 100 feet. He has made at least 10 dives to depths of over 200 feet. Half of his dives are in water that is warmer than 60°F, but he has made an average of 10 dives during his career in water of less than 40°F. The average diver has also made about 30 dives at night. He dives most often in harbors (about 25 percent of the time), followed by dives in the open sea (20 percent), bays or sounds (10 percent), and swimming pools or in unpressurized chambers (8 percent). The remaining dives are made in pressurized chambers, rivers, streams, lakes, ponds and estuaries, in that order. The diving equipment used most often is open circuit SCUBA (60 percent), shallow water gear or hooka (15 percent), and hardhat air (10 percent). The remaining gear includes hardhat helium, semi-closed circuit SCUBA, and closed circuit SCUBA, respectively.

Routine Navy diving also has its own particular hazards and accidents. Forty-five (68 percent) of the 66 divers interviewed had at least one accident specifically related to diving during their careers, while a third of them had two or more diving accidents. Sixty percent of all the divers interviewed had some form of "squeeze," which came about because of an inability to equalize an air space on or within the body. "Squeeze" usually involves the ears, sinuses, lungs, or results from compression of the diving suit or face-mask against the body. A few of the divers had the bends or decompression sickness, which results from the formation of gas bubbles in the blood or tissues while ascending from a dive. Over 20 percent had developed nitrogen narcosis while on a dive. A few had been stung or bitten by some kind of underwater animal (scorpion fish, snakes, jellyfish, etc.) It is remarkable, moreover, that attrition from diving remains so low, considering the high rate of accidents and injuries.

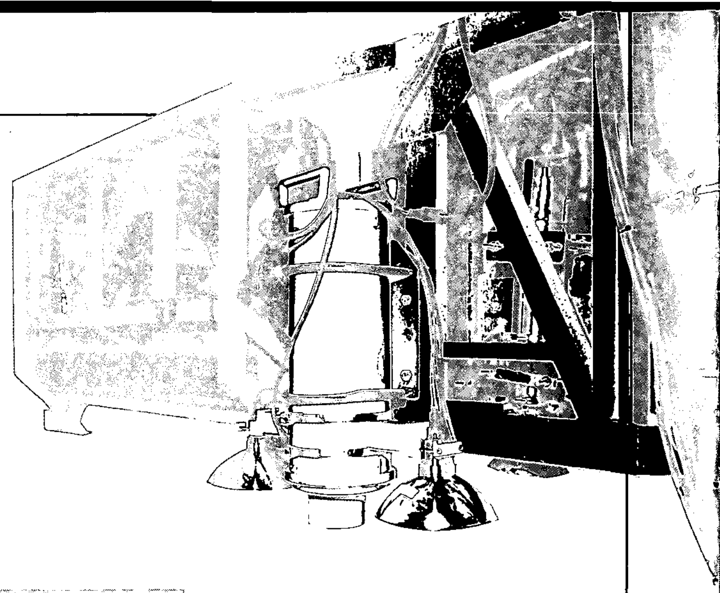
This personality sketch shows the typical Navy diver to be a normally adjusted individual who has achieved recognition as a dedicated professional. There is some indication that he was able to successfully establish his independence at an early age. Those who have not successfully developed an independent life style and who do not have a realistic estimate of their own abilities probably would not do well in diving. It is believed that the experienced diver has been in enough risky situations to know his chances of success, and he can usually adjust in the event of failure.

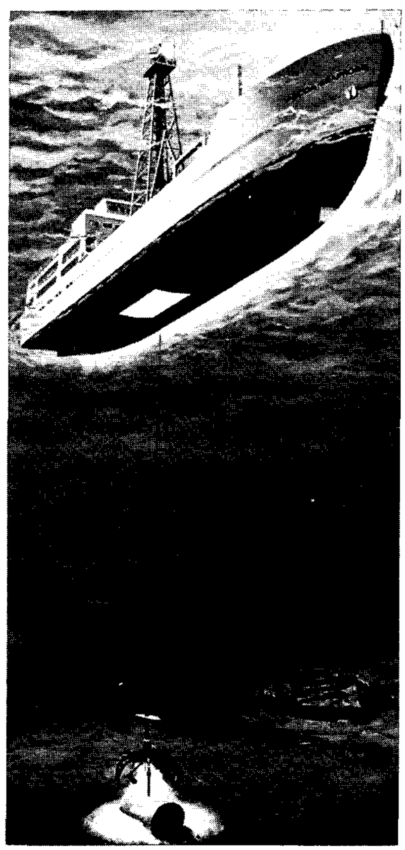
All evidences of his background and personality appear to have prepared him well for the demands and stresses of Navy diving.

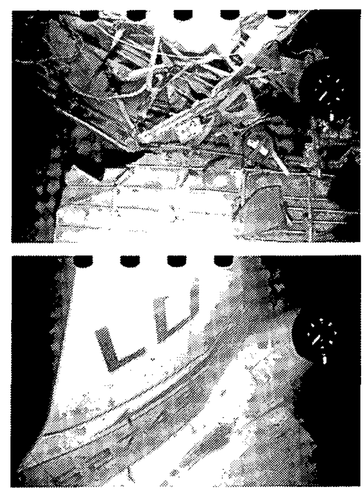
ATLANTIC "PROBED" in SEARCH and RECOVERY

The search and recovery expertise of SUPSALV is frequently called upon to perform a variety of tasks with emphasis always on selectivity and efficiency. Never were these goals better demonstrated than during a recent search and recovery operation off the coast of Brunswick, Maine. A Navy P-3B four-engine patrol plane was lost on March 18, 1973 while on a routine training flight. Flying out of the Naval Air Station at Brunswick, Maine, the plane went down in approximately 550 feet of water. The cause of the accident was unknown. In a preliminary search, the approximate location of the crash was determined to be about 40 miles south of Brunswick when floating debris and an oil slick were spotted by helicopters.

Clockwise from right: Search pod on SEA PROBE showing cameras, lighting, and sonar; wreckage and tail section of aircraft on the bottom photographed by the search pod equipment; artist's conception of SEA PROBE and grabber; EDENTON (ATS-1).





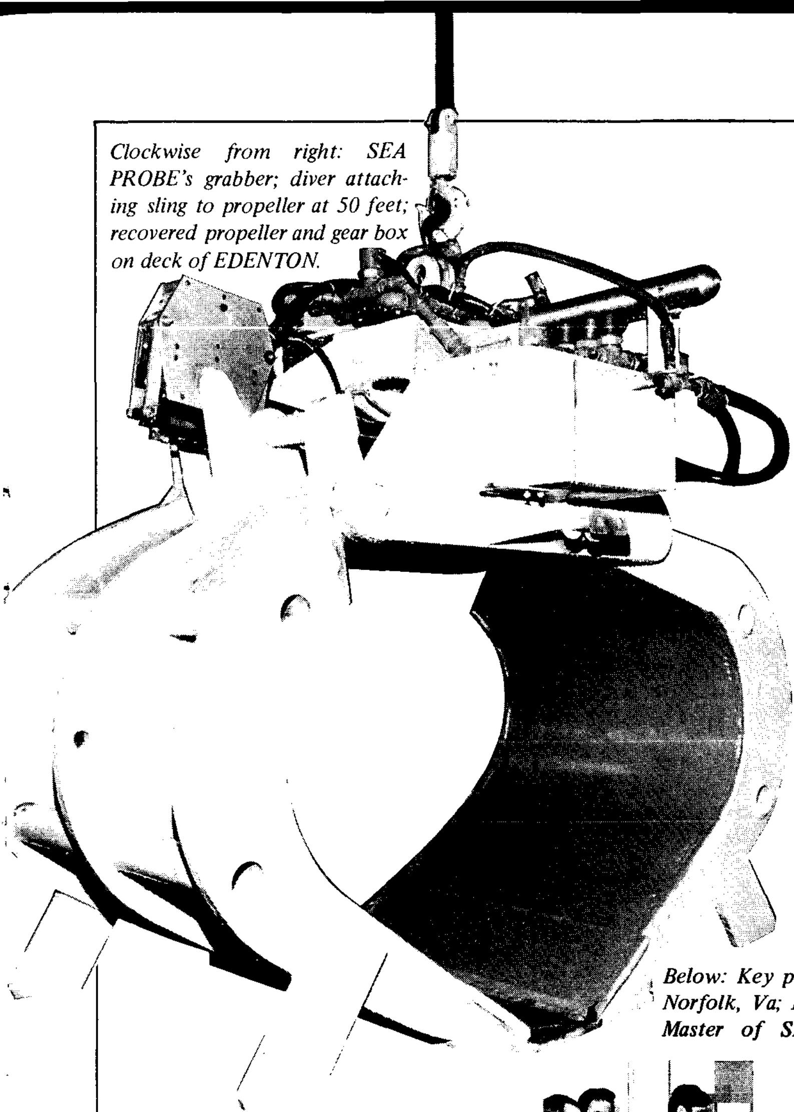


The Supervisor of Salvage was notified on March 16, and in conjunction with the Coast Guard and the Naval Safety Center, Norfolk, Virginia, a search plan was devised to locate the submerged aircraft in hopes of recovering it and determining the cause of the accident. The depth of the water and the weather conditions were significant in choosing the equipment to be used for the salvage portion of the operation. A conventional salvage vessel requiring a four-point moor was considered but eliminated because of the time and expense involved. A deep dive system was another alternative; however, it was decided to use the R/V ALCOA SEA PROBE instead. Operated by Ocean Search, Inc., SUPSALV's prime contractor for search and recovery, the SEA PROBE is a unique salvage vessel particularly suited to the needs of this type of operation. Using a sectioned pipe system, the SEA PROBE deploys a search, identification, and sensor package called "search pod," which contains obstacle avoidance sonar, side-scan sonar, black and white and color television, still camera, and lighting equipment. A device called the "grabber," one of several specialized attachments, can also be fitted to the pipe, enabling the ship to lift multi-ton weights from the ocean floor. SEA PROBE can be precisely navigated to hold a position in the open sea against winds and currents by virtue of its flat bottom and Voith-Schneider cycloidal propeller units fore and aft..

To provide the necessary diver support and accommodate the recovered wreckage, the EDENTON (ATS-1) was deployed from SERVRON-8. The EDENTON afforded ample deck space, a crane with a 20-ton lift capability, and great maneuverability with its twin-screw variable pitch propellers and bow thrusters.

With the tentative search plan set, the Coast Guard Cutter YANKTON was outfitted with Radist precision navigation equipment and side-scan sonar and proceeded to the area to begin the search on March 19. By March 21, the precise location of the wreck had been found and a marker buoy dropped. The recovery phase of the operation commenced with the arrival of SEA PROBE and EDENTON at Portsmouth Naval Shipyard. On April 5, after the necessary

Clockwise from right: SEA PROBE's grabber; diver attaching sling to propeller at 50 feet; recovered propeller and gear box on deck of EDENTON.



Below: Key personnel from left to right: CDR Dan Daley, Safety Center, Norfolk, Va; LCDR Bob Frost, SERVRON–8; Mr. Ian (Scotty) Crighton, Master of SEA PROBE; LT Craig Mullen, SUPSALV; LCDR Kurt Gustafson, SERVRON–8; Mr. Bill Sherwood, Operations Manager, Ocean Search, Inc.

equipment was aboard, the ships put to sea, heading for the designated location.

Upon arrival, SEA PROBE began its systematic survey of the wreckage site, covering about 400 square yards. Using sonar, videotape, and underwater television, the positions of the recognizable pieces of wreckage were mapped and recorded. Approximately 400 still photographs and several hundred feet of videotape were taken during this initial survey. From the data gathered, the Naval Safety Center personnel determined what needed to be recovered: four propellers and engines, a wing section with flap attached, and a portion of instrumentation from the cockpit.

The search pod was retrieved, the grabber attached to the pipe, and the search pod returned to a position on the pipe above the grabber. The equipment was again lowered to recover selected pieces. The grabber is also equipped with an underwater television camera, monitored in the control room of SEA PROBE, which allows the operator to sight items as they come into range of the jaws of the grabber. It is hydraulically actuated using sea water pressure supplied through the drill pipe. Using the Voith-Schneider positioning system, Radist precision navigation, side-scan sonar, and television, the SEA PROBE team positioned the grabber over the desired wreckage. The drill pipe was slowly lowered and the grabber closed around the wreckage. When the grabber and wreckage were elevated to a depth of approximately 50 feet, the EDENTON diving team descended into the 44° F water to the wreckage, attaching nylon straps which were in turn attached to wire from a crane on the SEA PROBE. The grabber then released the wreckage and when it had swung free, the crane on the deck of SEA PROBE completed the lifting. Once out of the water, the wreckage was transferred to a work boat off of the EDENTON and eventually moved to the deck of the EDENTON.

By April 15, 1973, all of the selected pieces of wreckage had been recovered and deposited on the decks of EDENTON to be transported to Harpswell Fuel Depot, Maine. The advantages of sophisticated equipment and complete documentation of the operation marked this search and recovery task as major progress in improving efficiency and reducing costs.

UNDERWATER REPAIR VS. DRYDOCKING

by Roy Sea
Supervisor of Salvage Office

When the 63,000-ton aircraft carrier USS FD ROOSEVELT arrived at Mayport Naval Station in December 1972 after a 10-month deployment in the Mediterranean, she was suffering from a damaged port rudder. A cursory inspection using the UDATS underwater TV system revealed that welds which join a horizontal plate at the top of the rudder and the shell had failed. The partially detached plate was jamming against the skeg when the ship was under way. Whether the casting to which the plate was welded had cracked or whether further internal damage existed, could not be determined without dismantling the rudder.

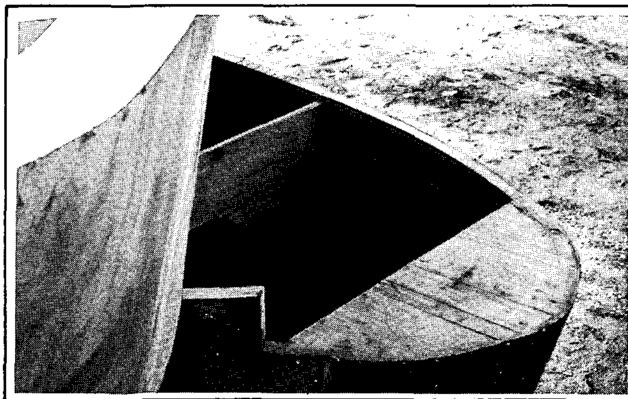
The normal procedure in making a repair of this nature would be to drydock the ship (minimum cost of $100K) and drop the rudder. Since no drydock was available on the East Coast, an attempt was made by SUPSHIPS Jacksonville to make the repair with the ship in the water. SUPSHIPS-JAX called upon the Director of Ocean Engineering of NAVSHIPS to provide technical assistance in determining whether the repair was feasible. This done, planning conferences were held over the Christmas holidays and a plan was developed by which the structural integrity of the rudder could be restored, providing the main casting was not cracked.

Because of the unavailability of in-house Navy facilities to do the job, Taylor Diving and Salvage Company, New Orleans, Louisiana, was contracted by Jacksonville Shipyard to aid in the repair phase of the $5 million restricted availability (RAV). In order to assist the divers who would be working in 50° F water with near zero visibility, a plywood mockup of the rudder was constructed and brought to the pier where the ROOSEVELT was moored. This enabled the divers to familiarize themselves with the rudder they would be working on, and established better understanding among the topside engineers, divers, and supervisors involved in the job.

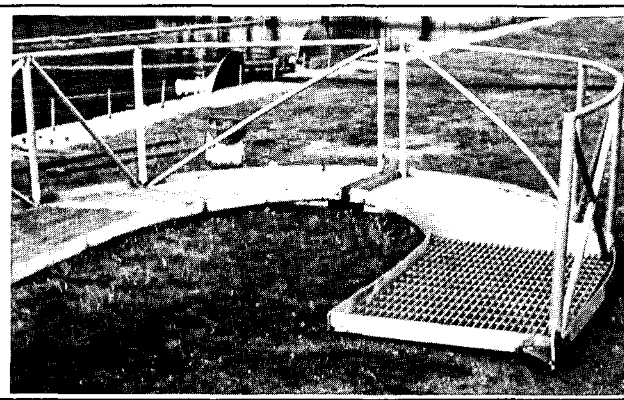
On a pontoon barge a diving platform was set up under the fantail of the 979-foot ROOSEVELT. Initially, the divers set up a hogging line on the rudder and installed an aluminum stage on the upper forward part of the rudder. The time and effort put into building the stage was well spent, since this "catwalk" around the rudder became the stable platform from which most of the work was done. Using oxy-arc cutting equipment, the divers then removed the horizontal plate at the top of the rudder where welds had failed. With the top plate removed, a thorough inspection of the inside and outside of the rudder was performed. Inspection revealed that the upper two feet of the transverse bulkhead inside the rudder had fractured and separated. The rudder was large enough to accommodate divers working inside the rudder and installing a new section of bulkhead. When ultra-sonic testing revealed that there were no cracks in the main casting, the decision was made to proceed with the repair work with the ship in the water.

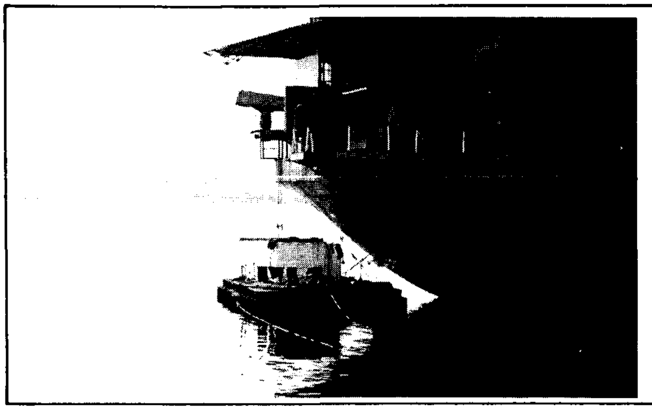
The plan adopted was to manufacture and install a new transverse bulkhead and flanged cap plate.

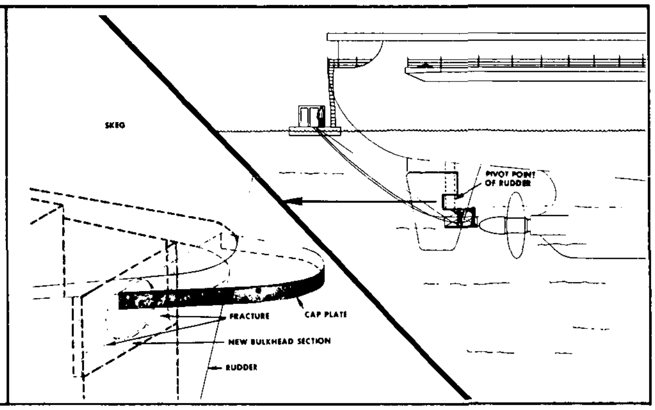
Wooden mock-up of rudder section that underwent repair, showing portion on which new cap plate was attached.



Working stage which attached to rudder under water, allowing divers to move freely around area of rudder being repaired.







Threads would be tapped in the rudder shell and flat head bolts would be used to fasten the new parts. Underwater welding was eliminated because of the STS steel of which the rudder was constructed. Because of the precision fit required on the cap plate and the bulkhead, templates and jigs were made up that allowed the compound curves and angles from the rudder to be transferred to the pieces under construction. From inside the rudder divers drilled and tapped holes on the inside of the rudder skin to receive bolts that would secure the new bulkhead section. After the bulkhead was installed and topside engineers had inspected the installation using an underwater TV camera held by the divers, preparation was made for installing the 1050# cap plate between the skeg and the rudder. The cap plate was installed using chain falls and wire running underneath the ship between the rudder and the propellers. Buoyancy could not be added to make the cap plate "light" because of extremely close quarters in the installation. The clearance between the top of the rudder and the skeg above it was only 2 inches. The first attempted installation revealed that the cap plate would have to be brought back to the surface for re-fitting. When installed the second time, a near perfect fit was achieved which had no more than .125 of an inch clearance at any one point.

With the cap plate in place the divers began the job of drilling and tapping over 100 holes in the side of the rudder to receive 1/2-inch flat head bolts. The holes in the cap plate had been pre-drilled and countersunk in order to keep the underwater drilling to a minimum. The drilling operation proved to be very difficult because of the overall hardness of the rudder shell plate and the extreme hardness of heat-affected zones of prior welding. A special drill press was set up that was clamped between the cap plate and the skeg above it with hydraulic fingers, after the pilot drill was aligned with the holes. In this way the divers were relieved of maintaining the drill at the correct angle, and instead they concentrated on the difficult task of feeding the brittle carbide tipped drills into the hard steel without braking them. With the pilot holes drilled, the task of enlarging the holes to tap size and tapping the threads was accomplished more easily.

After some on-the-scene experimenting was done, it was discovered that Locktite thread locking compound worked well under water, and it was, therefore, used to lock the cap plate bolts into the rudder shell. When all the bolts were torqued down, an underwater epoxy was used for attaching the cap plate to the rudder.

The complex repair job was completed to the satisfaction of the SUPSHIPSJAX inspectors. How the repairs will stand up under the tremendous stresses imposed when the ROOSEVELT is under way remains to be seen, but all indications are that the job will hold. Success will mean a great savings in time and money over the conventional method of repairing in drydock, and will illustrate an original application of state-of-the-art techniques. With today's difficulty of getting into drydocks and the high cost of their use, naval repair activities would do well to give every consideration possible to performing the job by skilled "underwater mechanics" instead of their surface counterparts.

In the cumbersome and often expensive business of salvage, there is always a market for new ideas and better methods. Among the innovative systems, some of which have been featured in *Faceplate,* is the Pressurized Sphere Injector (PSI) developed by Cyclo Manufacturing Company, Denver, Colorado.

PSI is a buoyancy salvage system which makes use of 11-inch-diameter, thin-walled, hollow polyethylene spheres. They are designed to be reuseable and tough, with each one providing 25 pounds of net buoyancy. They are also each equipped with a two-way diaphragm valve. The valve provides a small preset pressure differential which allows the transfer of air, or gas, or pressurizing and depressurizing, but which prevents the transfer of water as long as the internal and external pressures remain about the same.

The other major component of PSI is a huge pressurizing chamber aboard a floating barge. A 12-inch-diameter conduit of neoprene tubing leads from the pressure chamber to the sunken vessel. When the spheres are pressurized to roughly the pressure depth of the sunken vessel, they are automatically fed down the conduit and into one or more compartments of the vessel on the sea floor.

Commercial Salvage gets a Lift

The spheres are pressurized to the appropriate depth in the pressure chamber shown here on the truck bed. The delivery tube can be seen at right.

When the sunken object is in relatively shallow water, gravitational force is sufficient to introduce the spheres into the body of the subject. In deeper water, a mechanical conveyor system is attached to the lower end of the conduit, to force entry of the spheres.

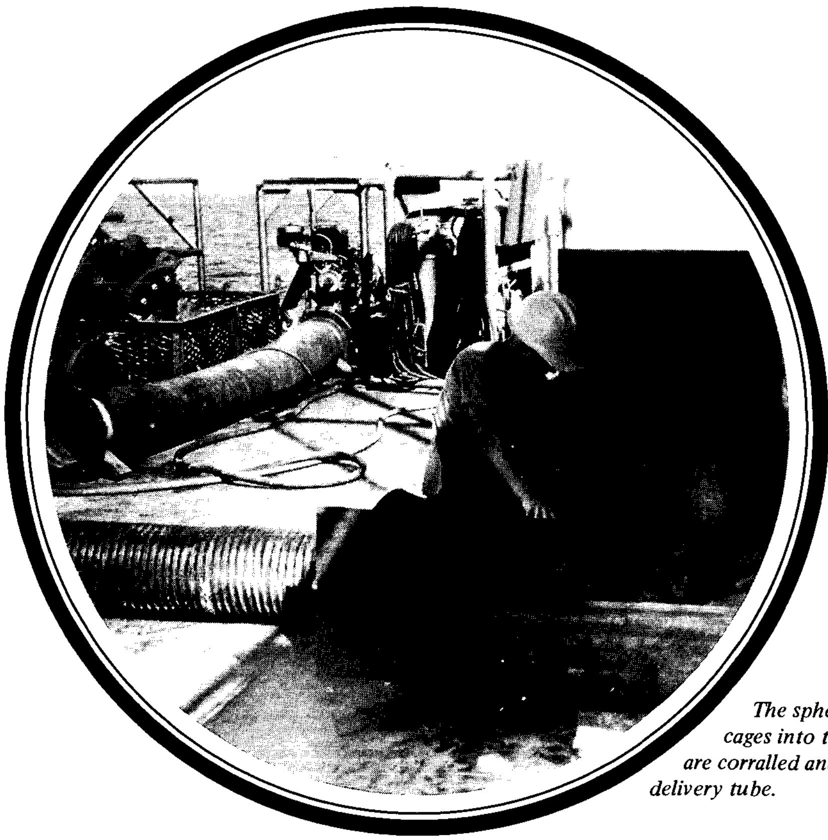
Either through the utilization of already existing holes in the hull, or by cutting new openings in water-filled compartments of the vessel, divers prepare openings for the conduit pipe.

Once the divers have attached the conduit to the hull openings, the pressurized spheres slide down the conduit and enter the body of the hull, where they rise to the top of the compartment. As the compartment or compartments begin to fill with spheres, water within the compartment is displaced. When enough spheres have been introduced to offset the pressure of the water, the vessel begins its ascent to the surface. As the vessel rises, and water pressure lessens, the small valves in the spheres gradually de-pressurize in direct ratio to the outside pressure. Thus the threat of explosion or implosion is avoided.

Once the vessel has surfaced, several alternatives exist. The vessel may be towed to a docking area elsewhere with the spheres still in place, or in the case of high seas or bad weather at sea, the vessel can remain with spheres intact at the site of its surfacing. A third possibility is to repair the holes in the vessel at the surfacing site. The spheres are then removed and the vessel towed to the docking area.

Once the spheres have done their job, they are retrieved from the vessel's hull by means of a vacuum conduit. They are then stored for future use.

Certain specific advantages exist in such a system over more conventional methods. There is no depth limitation, the only qualification being that at extreme depths it may be desirable to use helium instead of air for pressurizing the spheres, since at 25,000 feet the density of air would approach that of water. The buoyancy spheres are non-compressible and have the same displacement and, therefore, the same lift at any depth. When inflated, the spheres' lifting forces are applied to side walls, frames, bracing, machinery, etc. This spreads the lifting forces over much more area as compared to using air for buoyancy, which applies lifting force only to the top of the compartment.



The spheres drop from the cages into tunnels where they are corralled and inserted into the delivery tube.

The system was successfully tested on a salvage operation in the Gulf of Mexico in 1971. A 2400-ton pipelaying barge, the BOOTH, had sunk in 50 feet of water in a storm two years earlier 38 miles south of Sabine Pass, Texas, and had constituted a navigational hazard ever since. The spheres were propelled into the submerged vessel through approximately 60 12-inch-diameter holes which had been cut in the hull's compartments and fitted with solid standpipes to receive the delivery tube. A rigid delivery conduit was used since underwater turbulence was considerable. Once the barge had surfaced, an ocean-going tugboat pulled alongside. Workmen from a nearby crewboat boarded the surfaced barge in preparation for towing the BOOTH to Sabine Pass. At the dock the spheres were removed by using the delivery hose as a big vacuum cleaner. The spheres were stored to be reused later.

On September 12, 1972, Cyclo also employed the PSI System in a joint venture with Murphy Pacific Marine Salvage Company, when the 1600-ton sludge barge JUDSON STICKLE was successfully raised from 100 feet of water approximately 6 miles off the coast of New Jersey at Ambrose Light. This and other recoveries have further demonstrated the practicality of the Pressurized Sphere Injector System.

Salvage Officers' CONFERENCE

LCDR Joe Bradshaw, SUPSALV's west coast representative, meets with LCDR James Bladh, Operations Specialist for SUPSALV.

Salvage - past, present and future - was the subject that brought approximately 100 salvors together on March 9, 1973, for the annual Salvage Officers' Conference in San Diego, California. Organized by Miss Helen Bebout and Mr. James Walker of SUPSALV and hosted by Submarine Development Group One, the program included such topics as recent notable salvage jobs, on-going Navy diving and salvage projects, salvage-related oil pollution abatement operations, and plans for future modifications to various equipments and procedures.

Acting as chairman and moderator, CDR Robert B. Moss, Deputy Director of Ocean Engineering, greeted the assembly and opened the program by introducing CAPT R. L. Murril, Commander, Submarine Development Group One. CAPT Murril welcomed the group to San Diego and briefly outlined SUBDEVGRU–1's activities in the development of deep submergence systems.

CAPT Eugene B. Mitchell, Director of Ocean Engineering, then delivered the keynote address, including in it a recap of salvage, diving, and deep ocean recovery projects undertaken during his tour as SUPSALV. He noted two highly successful salvage operations of the past year as being particularly interesting: The MV ORIENTAL WARRIOR and the SIDNEY E. SMITH, the latter of which he described as the most difficult salvage job he had encountered. CAPT Mitchell also noted the increase in the responsibilities delegated to SUPSALV over the past few years; the increasing number of contracts being awarded to provide instant response to salvage requirements; and the future progress already underway in diving with such activities as the 1600-foot dive in New Orleans and the move of the Navy Experimental Diving Unit to Panama City, Florida. CAPT Mitchell then announced that CDR J. Huntley Boyd would be relieving him on the CAPT's retirement from the Navy on June 30, 1973.

Conference attendants are registered before the program by the *Faceplate* editors.

SUPSALV search and salvage contracts, their need and their benefits, were discussed by LCDR Alex Paszly, SUPSALV's Assistant for Resources and Logistics. Among other advantages, LCDR Paszly pointed out that contracts alleviate fleet operations disruptions and allow a quick, world-wide response capability to salvage needs.

CDR J. Huntley Boyd, ED. Officer Assignment, BUPERS, and Supervisor of Salvage-Select, spoke on the status of ED. salvage billets and officer assignments, devoting most of his time to an extensive question and answer period covering individuals' questions on billets, needs, careers, etc. The next speaker of the morning was Mr. Worth Hobbs, vice-president of Ocean Search, Inc. Mr. Hobbs discussed the RV ALCOA SEA PROBE as an innovation in deep ocean operations. (The SEA PROBE has recently been involved in a deep ocean salvage job off the coast of Brunswick, Maine; see page 21.)

A highlight of the morning session was a colorful account and slide presentation on the salvage of the S.S. SIDNEY E. SMITH. Mr. Earl Lawrence, SUPSALV Operations Specialist, discussed this monumental salvage operation, which was successfully completed last fall in Port Huron, Michigan.

(Left) CAPT R.L. Murril, Commander, SUBDEVGRU-1, CAPT E.B. Mitchell and Mr. Ray Minnick, State Land Commission, California.

Salvage-related oil pollution abatement was the first topic discussed in the afternoon session of the conference. Mr. Denis Irons, oil pollution abatement specialist for the Supervisor of Salvage, narrated a movie made by the Army Corps of Engineers on the Liberian tanker OCEAN EAGLE, which marked the first involvement by SUPSALV in the pollution aspect of salvage operations. Mr. Irons also covered several oil pollution involvements in recent salvage jobs and pointed out that one "won't find any future salvage operations that don't have pollution considerations."

Mr. Tom Odum, Program Manager at the Naval Coastal Systems Laboratory in Panama City, Florida, gave the assembly up-to-date information on the progress made at NCSL in the SUPSALV/SUPDIV efforts to improve the lot of the diver and his equipment. Following Mr. Odum was CAPT J. B. Mooney, Chief Staff Officer of SUBDEVGRU-1. Using slides, CAPT Mooney explained the status of on-going projects at the Development Group and their mission in the areas of deep ocean search, location, and rescue.

The topic of discussion then turned to the Emergency Ship Salvage Material (ESSM) System re-alignment, and newly established capabilities in this area. Mr. Earl Baker, ESSM Program Manager for SUPSALV, stated that one of the latest accomplishments was the designation of the model ESSM Base at Hunter's Point, California, as operational, having been brought up to full allowance as a complete storage activity for salvage materials. Mr. Baker also mentioned that the Supervisor of Salvage is presently setting up an ESSM Base in Scotland with an opening date set for July 1, 1973. (See page 12.)

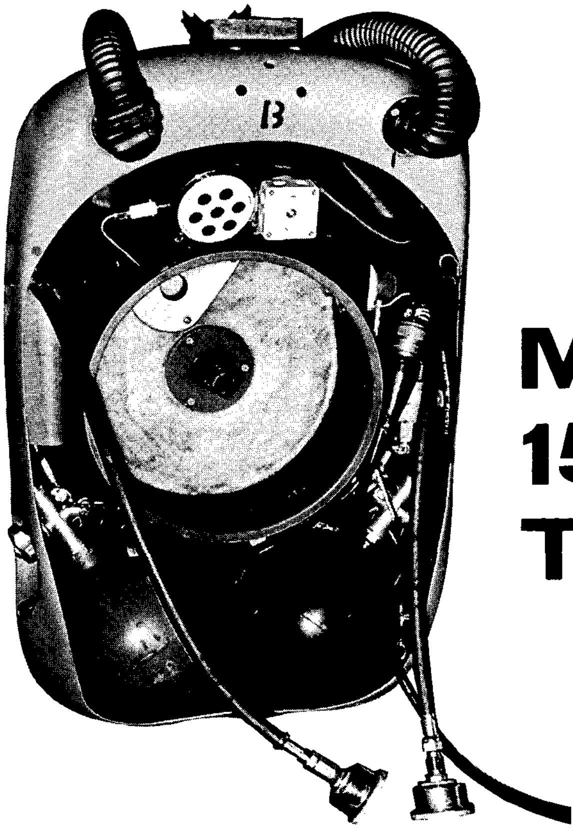
The Dredge ATLANTIC and the Barge WEEKS salvage operations were two jobs handled by the Supervisor of Salvage in the past year in the Norfolk, Virginia, area. LCDR John M. Ringelberg, COMSERVLANT Salvage Officer, reported on the various phases of the removal of oil pollution hazards and the actual salvage of both vessels. The ATLANTIC salvage job also involved a sunken tug and fishing boat. (See *FP* Winter, 1972.)

Mr. John Quirk, SUPSALV Project Manager at the Naval Civil Engineering Laboratory, gave a slide presentation on numerous on-going SUPSALV programs at NCEL. Mr. Quirk's report was supplemented by an explanation of new sonar dome cleaning equipment and techniques, presented by Mr. John Mittleman, also of NCEL, Port Hueneme, California. (See *FP* Spring, 1973.)

The next point on the program was a film version of the formidable MV ORIENTAL WARRIOR salvage job. LCDR James Bladh introduced the movie, which dramatically illustrated the on-site operations off the coast of Jacksonville, Florida, completed in October, 1972.

A special addition to the conference agenda was next with a slide presentation of the various aspects of Special Warfare under the Supervisor of Salvage. LCDR Charles Le Moyne, SUPSALV's Assistant for Special Units, discussed the UDT/SEAL Team capabilities, the SDV's now available in the fleet and those being developed. The final topic on the program was a brief explanation on the work that Battelle Memorial Institute is doing for the Supervisor of Diving. Substituting for Mr. Art Coyle, the Program Director at Battelle, was Mr. Jim Glasgow, the Chief of the Marine Systems Division of Battelle, Long Beach, California. Mr. Glasgow discussed the portable recompression chambers and other on-going programs at Battelle.

CDR (CAPT Select) J. Huntley Boyd, ED Officer Assignment, BUPERS, and incoming Director of Ocean Engineering.



by LT THOMAS L. HAWKINS
OFFICE OF THE SUPERVISOR OF DIVING

MODEL 1500 UBA TESTED

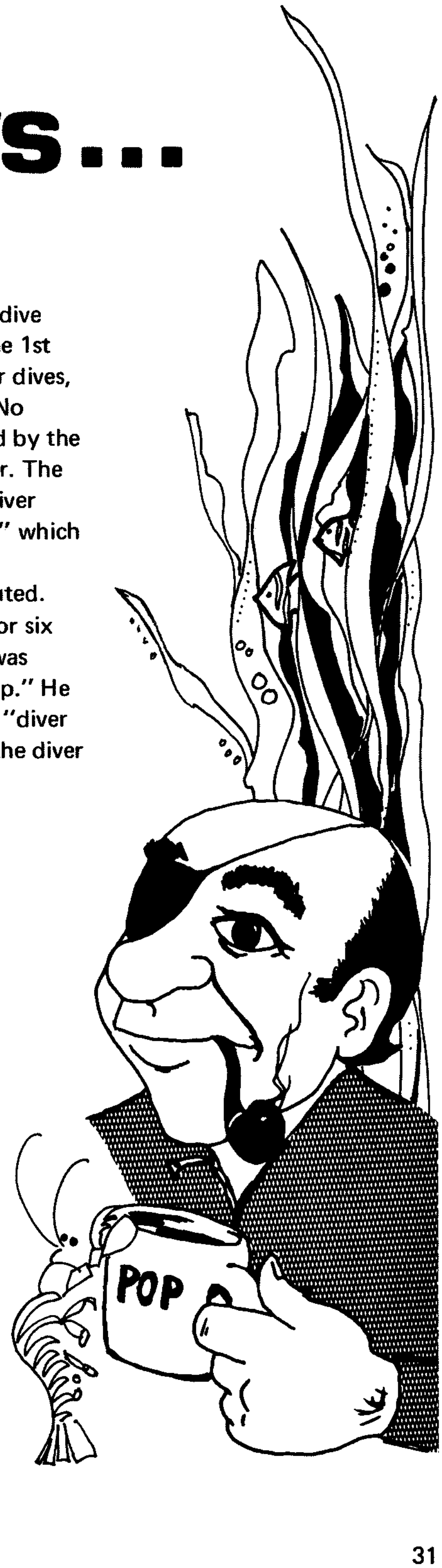
The Navy Experimental Diving Unit, under the sponsorship of the Supervisor of Diving, is now in the process of completing a subjective test series with the General Electric Corporation's prototype Model 1500 underwater breathing apparatus (UBA). The GE MOD 1500 is a sensor-controlled, closed circuit, mixed gas, underwater breathing apparatus which employs oxygen as the primary gas source and a diluent gas which can be a mixture of N_2O_2, HeO_2, pure N_2 or He, depending on the depth of the dive. The GE MOD 1500 test program represents a continuation of testing by the Navy to evaluate a new generation of sensor-controlled UBAs for possible Navy-wide application. Similar units previously tested by the NAVXDIVINGU were the Westinghouse Corporation CCM-1, the BioMarine Industries CCR-1000, and the General Electric Corporation's MK 10 Mod 5 (see *FP*, Fall 1972). Recent testing of the prototype GE MOD 1500 has been accomplished through the combined efforts of the Experimental Diving Unit, Naval Inshore Warfare Command, Atlantic, and the Explosive Ordnance Disposal Facility, Indian Head, Maryland. LT Thomas Hawkins, USN, and EMCS Thomas King, USN, of the NAVXDIVINGU served as the MOD 1500 Project Directors. LT James Harper, USN, and BMCM C. J. (Corney) Leyden, USN, of NAVINSWARLANT were the MOD 1500 Project Officers. EMC C. B. Morton, USN, served as the senior EODFAC project advisor and participant.

Supervised wet pot tests were conducted at the EODFAC, Indian Head, during January and February 1973 and an open-sea test series was conducted at the Naval Station, Roosevelt Roads, Puerto Rico, in March and April 1973.

All training requirements, open-sea swims, and Swimmer Delivery Vehicle (SDV) operations have been conducted and only the deep dive portions of the test series remains to be accomplished. The deep dive series is scheduled to be completed in Little Creek, Virginia, in early May 1973.

The data compiled during the overall test series is now being evaluated for formal publication in a forthcoming NAVXDIVINGU Report. Initial test criteria indicate that the equipment will meet a desired 6-hour CO_2 absorbant and gas duration profile. In the final analysis, however, the equipment will be judged in general areas of reliability, maintainability, human engineering, and compatibility with existing fleet equipments. Further testing by the Navy of all sensor-controlled breathing apparatus is under study at this time.

the Old Master says...



The case in question is that of a routine MK V air dive to a dive depth of 180′ for the purpose of connecting up a lifting line. The 1st class diver performing the dive had not made any recent deep air dives, nor had he made any deep air dives at his present duty station. No master diver was in attendance; the diving station was supervised by the senior 1st class diver onboard and a newly assigned diving officer. The diver's descent was routine and upon reaching the bottom the diver reported, "on the bottom." Topside told the diver to "ventilate" which was acknowledged and executed. The diver was then told to "circulate;" the transmission was again acknowledged and executed. The diver proceded to move toward his work. After taking five or six steps he reported he felt like he was "blacking out." The diver was ordered to "ventilate and stay heavy," and "stand by to come up." He was then raised to 150′. Upon reaching 150′ the diver reported, "diver ok and ventilating." Routine decompression was executed and the diver returned to the surface in fit condition with no abnormalities.

Diving without a master diver always rubs me wrong, but I'm bound to be biased. And besides, that is not the issue in this case. You will note that the action taken was successful but let's look again. You can bet your diver's air that this diving gang should now fully recognize the value of having divers in a fully worked up condition and acclimatized to deep air conditions. This diver was not. Ventilating on the bottom was fine and it appears the ventilation rate/time was adequate. The diver's past performance on deep air dives was unknown and his corresponding susceptibility to narcosis was a mystery. The supervisor heard the blacking out call, and he assumed nitrogen narcosis and raised the diver to relieve the symptoms. His assumption was probably correct and his action worked. We can also say he was lucky since many other things might have happened; for instance, what if the diver was fouled, or what if he blew up? The diving supervisor probably didn't know his diver's susceptibility to narcosis, and I doubt that he had assured himself that the diver fully understood the effects of narcosis and knew how to act accordingly. Seems to me they should have played it safe and put a standby diver in to assist the diver. You may think this is excessive conservatism but let me assure you that action just to be expedient is not always the correct action.

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