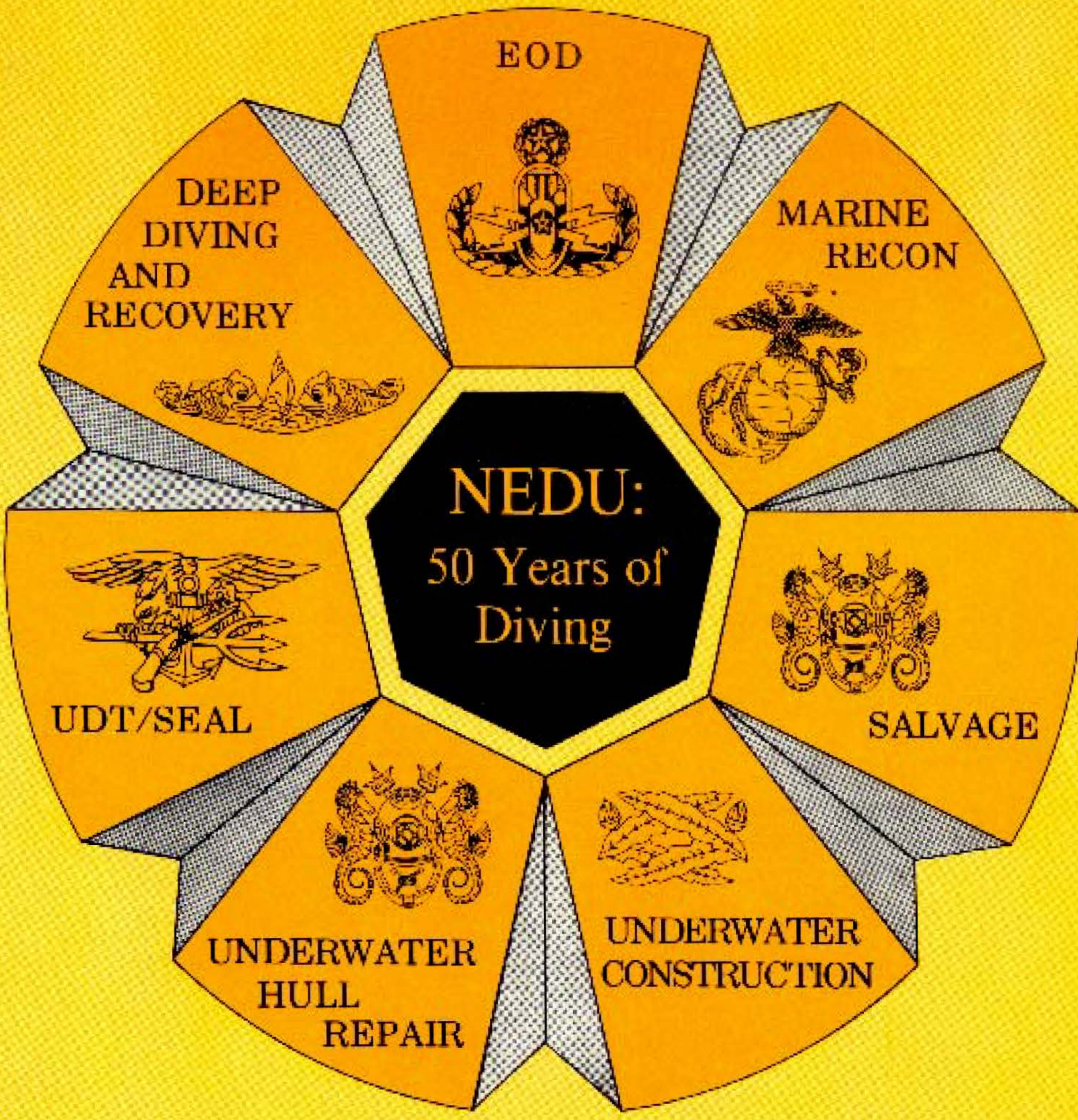
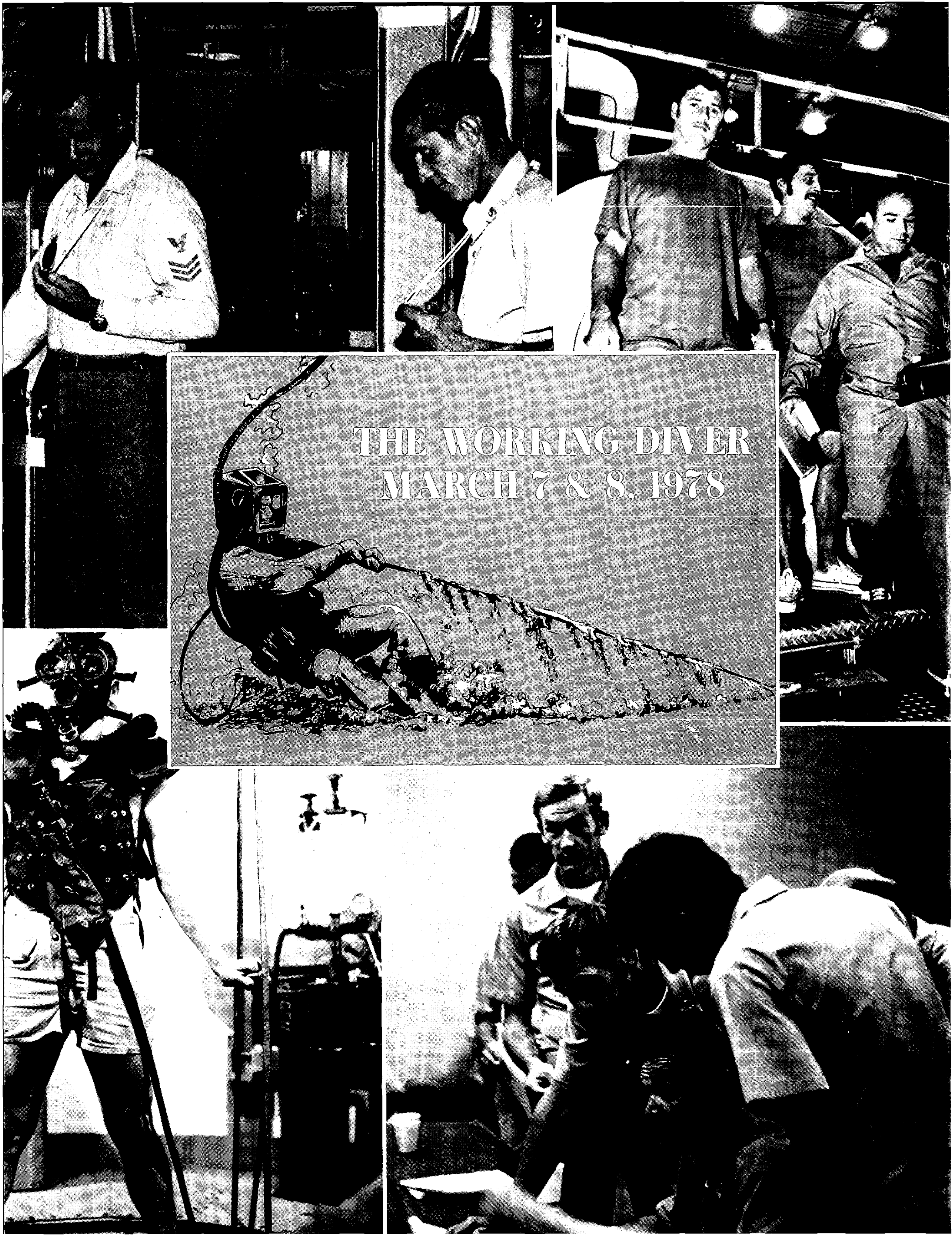
# FACEPLATE

FALL 1977




THE WORKING DIVER
MARCH 7 & 8, 1978

# FACEPLATE

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

VOLUME 8, NO. 3

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.

Request for distribution copies or for changes in distribution should be directed to FACEPLATE, Supervisor of Diving, Naval Sea Systems Command, Washington, D.C. 20362. Telephone (Area Code 202) OX7-7606 or AUTOVON 227-7386.

EDITOR-IN-CHIEF
CDR F. Duane Duff

ASSISTANT EDITOR-IN-CHIEF
LCDR Bruce Banks

MANAGING EDITOR
Joanne L. Wills

LAYOUT
Bill Seals

PRODUCTION
Jan Sanders



Front cover honors the 50th anniversary of the Navy Experimental Diving Unit, whose efforts towards advancing diving technology have benefited every branch of the diving community. (Story on page 16.) Inside front cover photos show (clockwise from upper left): Controls of NMRI chamber now operational (see page 11); NEDU divers at the completion of the first Mk 14 dive in Aug.; scene from the Master Divers' Conference (see page 6); and an old photo of an oxygen scuba rig tested at NEDU during the 1950's (see page 16). Back cover photos show the traditional Mk 5 hard hat and its new replacement, the Mk 12 SSDS.

# SOUNDINGS

## NEDU 50TH ANNIVERSARY YEARBOOK

The year 1977 marks the 50th anniversary of NEDU, a long time for any group to have been in the business of diving. The celebration started last March, when the Unit issued 50th anniversary certificates to all hands and actively participated in a divers' reunion that coincided with NEDU's change of command. More recently, a golden cover has been used for the 1977 NEDU reports.

A Golden Anniversary Yearbook has been authorized to commemorate the occasion. Featuring pictures and stories about the first 50 years, the book will not be an official Navy publication and will be supported entirely b, subscription and advertising.

For more information contact:
BMCM(MDV) James L. Tolley
NEDU
Panama City, Florida 32401

## "KEEP THOSE CARDS AND LETTERS COMING . . ."

Comments at the Master Diver Conference in September 1977 included the recommendation that a *Letters to the Editor* column be re-instituted as a regular feature of the magazine. The purpose of this column will be to serve as an effective vehicle for members of the diving community to ask questions on topics about which they would be reluctant to send a formal letter through the chain of command. An example of such a question could be: Why are civilian contractors being tasked to do what I perceive to be my job (i.e., hull scrubbing and welding)?

The creation of this type of regular feature will provide another forum of communication between the operating forces and the policy-makers of the diving community. Questions and comments should be of a constructive nature. Responses will be published not only from the Supervisor of Diving, but also from Master Divers and Diving Officers from the fleet.

The success of this feature depends on fleet response and participation. It can be a great benefit to the entire diving community.

## LCDR MACLIN NOW AT OOC

LCDR Charles S. Maclin, USN, took over the duties of Assistant for Salvage in the Office of the Director of Ocean Engineering/Supervisor of Salvage on October 3, 1977. He relieved CDR F. D. Duff, USN, who has concurrently served as the Supervisor of Diving and the Assistant for Salvage (CDR Duff remains the SUPDIVE). LCDR Maclin came to NAVSEA OOC from the SERVLANT Staff in Norfolk, Virginia, where he held the position of Fleet Salvage Officer for 2 years. Before his SERVLANT duty, he served for 2 years as Salvage Material Officer on the staff at SERVRON Eight, also in Norfolk.

## MK 12 SSDS APPROVED FOR SERVICE USE AND CERTIFIED!!

At long last the Mk 12 Surface Supported Diving System (SSDS) air mode has plowed through the final stages of approval. RADM Wilson, Deputy Commander, Naval Sea Systems Command, signed the Mk 12 system certification documents on November 18, 1977. Independent of this event, but of equal importance, the Mk 12 SSDS air mode was officially Authorized for Service Use (ASU) on November 21, 1977. The Mk 12 represents the first piece of Navy diving equipment to successfully complete the newly evolved and enforced certification and ASU procedures. The first major procurement of approximately 50 helmets has been awarded recently to Morse Diving Company for distribution primarily to the Navy Training Commands. The contract award for the first fleet issue should occur in early to mid calendar year 1978.

## COMEX REACHES 1,644 FEET

Comex Services of Marseilles, France, has successfully completed the deepest operational dive ever attempted. The project, called Janus IV, was conducted in the Mediterranean Sea. Consisting of six dives performed over a 3-day period, the operation included 10 hours of work at a depth of 1,508 feet. In addition, two 10-minute dives went to an even greater depth of 1,644 feet.

## INTERNATIONAL DIVING SYMPOSIUM '78

The Association of Diving Contractors' 1978 International Diving Symposium will be held at the Hyatt Regency Hotel in downtown New Orleans, Louisiana from January 30 through February 1, 1978. It is co-sponsored by the Association of Offshore Diving Contractors, American Society of Mechanical Engineers, National Ocean Industries Association, Association of Commercial Diving Educators, Undersea Medical Society, and the Associated Builders and Contractors of Louisiana.

The program will be a diverse one dealing with many of the practical problems of deep sea diving. For additional information write to:

Mr. I. F. "Jiff" Hingle
Association of Diving Contractors
1799 Stumpf Blvd., Bldg. 7 Suite 4
Gretna, Louisiana 70053

NAVSEA 281916Z Jul 77: Diving Boat, Diver's Air Supply (AIG 239 FY77-29).

NAVSEA 022033Z Sep 77: Recompression Chamber Vent Requirements (AIG 239 FY77-30).

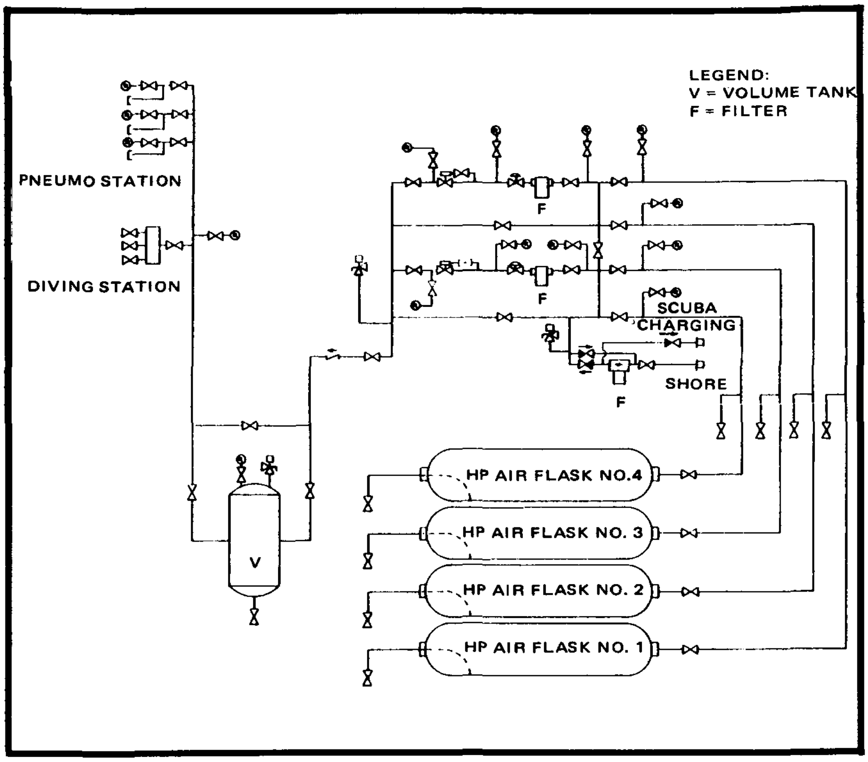
NOTICE:

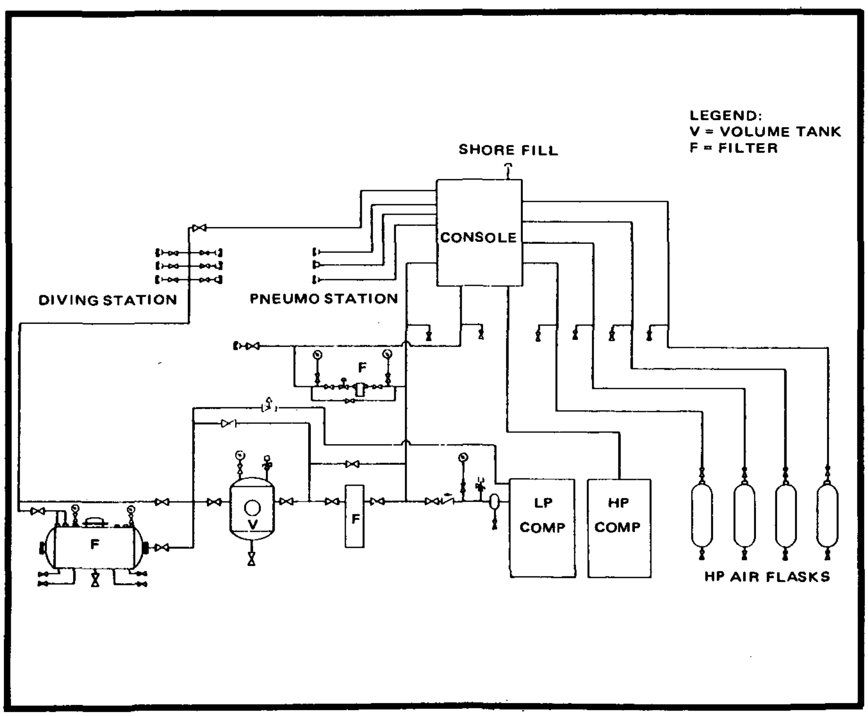
In the last issue of *Faceplate* (Summer 1977), there were several references to the Shipcheck Program that require additional information. In the article entitled "A Few Words from SUP-DIVE," a paragraph dealing with Shipcheck listed two contacts for the certification of shipboard diving equipment (Mr. Al Dietrich and Mr. Ron Snyder: 202-697-7386). However, it is also necessary to point out that there are separate contacts for each of the diving systems areas of shipboard, shore-based, and submersibles in regards to certification procedures.

Those who have shore-based hyperbaric facilities should contact Dr. Mike Yachnis at NAVFAC 04B. His phone number is 202-325-0044. Those concerned with submersible certification should call Mr. John Purcell at SEA 924, 202-692-9258.

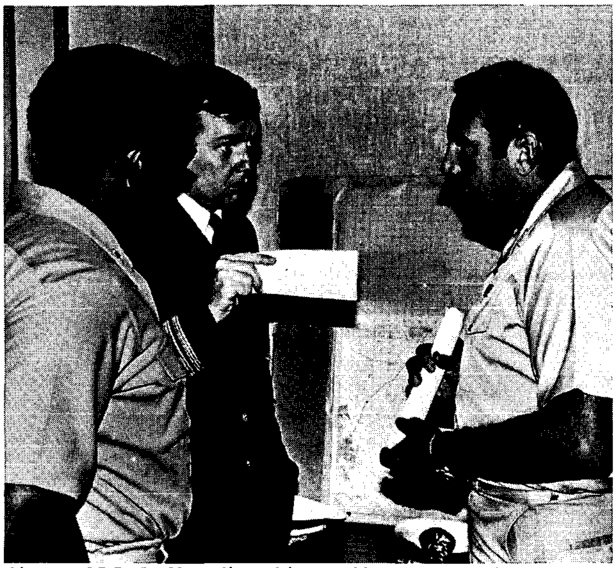
Certification surveys are conducted following an official request for the survey. Informal contact with the appropriate system certification authority before officially requesting a survey to arrive at mutually agreeable dates is encouraged. The list of commonly recurring discrepancies on shipboard systems (developed by Mr. Dietrich and Mr. Snyder) can be obtained by a phone call to either of the authors.

An article entitled "SHIPCHECK Program Completed" also appeared in the last edition. Within this article were two figures illustrating diving boat air systems. These figures have now been superseded by more detailed versions. The drawings presented here show the correct layout of these systems. The figures published in the Summer 1977 *Faceplate* are no longer valid.

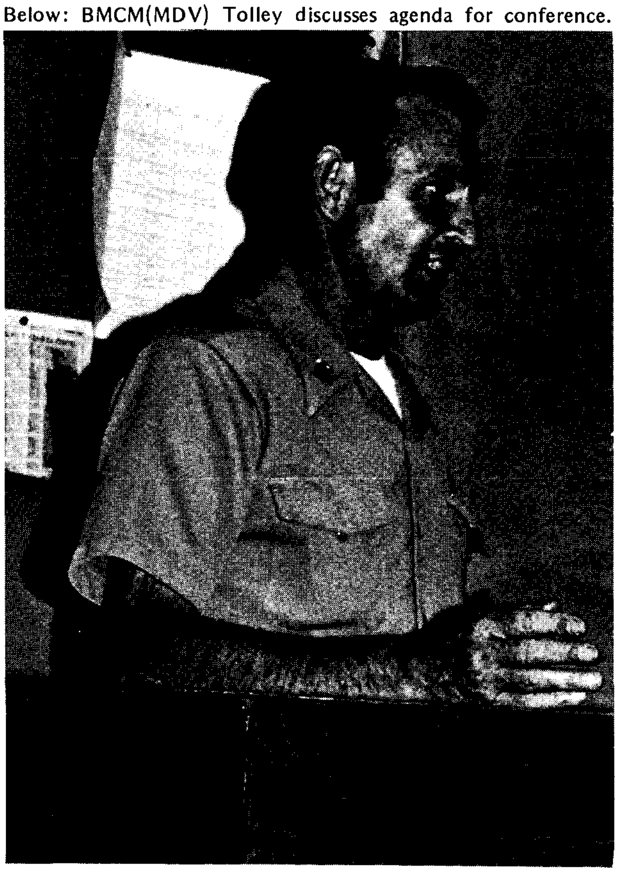


# *Master Divers Gather to*



Above: CDR Duffy talks with two Master Divers during break.
Below: BMCM(MDV) Tolley discusses agenda for conference.



Over 50 Master Divers from around the world traveled to the U.S. Naval Station at Treasure Island, California on September 19-20, 1977, to discuss a wide range of topics of current interest to the Navy diving community. The 2-day working conference was hosted by the Supervisor of Diving in response to recommendations from various members of the Master Diver community that such a gathering would be beneficial in opening the channels of communication between various Navy diving sectors.

There has been a growing concern within the diving community that a lack of communication throughout the ranks is a problem of increasing importance, particularly since there have been and continue to be significant changes in Navy diving equipment, practices, and missions. As the "core" of the diving Navy, Master Divers need to be provided with a suitable forum to exchange ideas, discuss policy with those who form it, and to receive regular updates on new equipments and procedures. A meeting of Master Divers has never been held for this purpose; the Treasure Island gathering is a first step in the possible establishment of this conference as a regular event.

The agenda featured two different formats. The first morning, the Master Divers gathered to hear presentations on the topics of Navy Diving, SUPDIVE Remarks, Saturation Excursion Tables/Thermal Treatments, etc., Training/Schools, Certification, and Air Sampling by a specialist in each area. An active question and answer period with the speakers followed these remarks. Because of the number of items of interest under consideration, the topics and members of four separate work groups had been previously arranged. Each group discussed a different set of topics and formulated a set of comments and recommendations to present to the entire gathering.

Topics under consideration in group one included diver qualification and requalification, diving school candidate screening, and recompression chamber training. Members of this group also discussed diver pooling, a Master Diver's authority in the chain of command, diving pay, and the listing of Master Diver billets, locations, names, etc. HTCM(MDV) Bennett (from the Naval School, Diving and Salvage) was the chairman of this group; BMCS(MDV) Petrasek (Office of the Chief of Naval Personnel) was the alternate chairman. Group two

# Discuss U.S. Navy Diving

dealt primarily with diving publications. *U.S. Navy Diving Manual* corrections, OPNAVISNST 9940/1, *Faceplate, Fathom,* and approved products listing (NAVSEAINST 9597.1) were among the topics discussed. The 1978 Working Diver Symposium was also included as a subject. HTCM(MDV) Spickerman (San Diego Naval Training Center) and QMCS(MDV) Fenwick (Submarine Development Group One) were chairman and alternate chairman, respectively, for group two.

The third group of Master Divers considered such topics as conventional (non-saturation) diving systems' certification procedures, recompression chamber certification, and recompression chamber ventilation. In addition to these items were the areas of supply support for diving equipment (ILS), regular overhauls for diving equipment/systems, and standardization of diving equipment and procedures. Chairman and alternate chairman for this group were TMCM(MDV) Gholson (USS FLORIKAN) and GMCM(MDV) Powell (SUBDEVGRU One).

Under the chairmanship of MMCM(MDV) Schunk, group four considered underwater cutting and welding equipment, commercial vs military equipment, new equipments, and air sampling. The fly-away concept (in diving, salvage, etc.), Jack Browne mask, and the Mk 5 hard hat phase-out were also discussed. MMCM(MDV) Parfinsky served as alternate chairman for group four.

The final portion of the conference began with a report from each of the group chairmen on the results of their individual meetings. This was followed by a general discussion of and agreement on overall recommendations on the topics under consideration. (*Faceplate* will report on these recommendations in the next issue.) An action item recap by CDR F. D. Duff, Supervisor of Diving, and closing remarks by both CDR Duff and BMCM(MDV) Tolley concluded the meeting.

The general opinion was that the conference was extremely beneficial to all concerned. In his introductory remarks to the attendees, CAPT R. B. Moss, Director of Ocean Engineering/Supervisor of Salvage, had remarked that this gathering was an opportunity for the Master Divers to open communications, to express their concerns about Navy diving today, and to put forth their recommendations. In their final comments, both CDR Duff and BMCM(MDV) Tolley noted that the meeting had indeed been successful in making the most of this opportunity.

Above: MMCM(MDV) Parfinsky speaks during question/answer period. Below: TMCM(MDV) Gholson presents group two results.

# Diving School Update

Plans for the relocation of the Naval School, Diving and Salvage from the Washington, D.C. Navy Yard to Panama City, Florida have solidified considerably since the beginning of September 1977. The most noticeable change to the new facility since the last published description (*FP*, Fall/Winter 1975) is in the building design. The complex, which will be called the Naval Diving and Salvage Training Center (NDSTC), will not be circular, as initially intended, but straight-sided, as shown in the accompanying illustrations.

The new school will be located on a 6-1/2-acre section on the west side of Alligator Bayou, adjacent to the U.S. Coast Guard Station. This site places the school across the bayou from the Navy Experimental Diving Unit and the Naval Coastal Systems Laboratory. Relocating NSDS to Panama City will strengthen its close liaison with NEDU and will provide a much improved diving environment in regards to underwater visibility, available water depths, and year-around weather conditions.

The awarding of contracts for the construction of various components of the new school has already begun. In regards to upcoming events, the following milestone schedule, valid at this publishing date, gives a fairly complete time table:

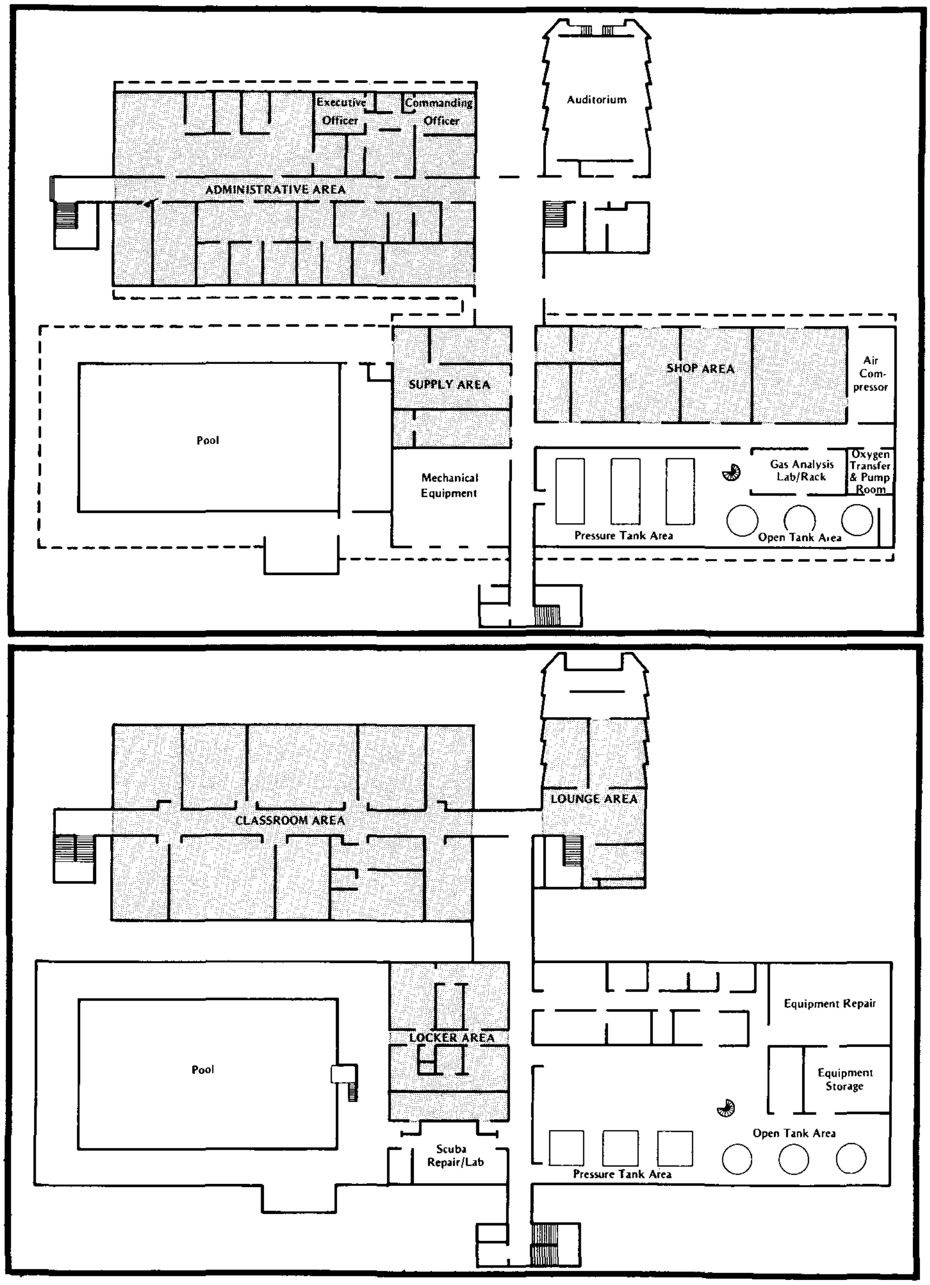
| | |
|---|---|
| September 1977: | Award Pressure Complex contract. |
| October 1977: | Award Interface piping and instrumentation contract. |
| December 1977: | Award building construction contract. |
| December 1977: | Break ground. |
| July 1979: | Close down NSDS, Washington, D.C. (approximate date). |
| October 1979: | All new school construction complete. |
| January 1980: | Commence training at NDSTC, Panama City, Florida. |

The staff at the Panama City NDSTC will consist of 11 officers, 38 instructors, 28 military support personnel, and seven civilian support personnel. The average onboard student attendance number at the school is estimated to be 217.

The Naval School, Diving and Salvage is the only training command authorized to qualify officer and enlisted personnel in all phases of diving, ship salvage, and submarine rescue for the entire U.S. Navy, U.S. Armed Forces, and selected allied nations. This is also reflected in the official mission assigned to NDSTC, which is as follows:

To train selected officers and enlisted personnel in diving, ship salvage, and submarine rescue, and to perform additional tasks assigned by the Chief of Naval Education and training.

Moving NSDS to Panama City merges the functional responsibilities and all resources of the Naval School with a portion of the diver second class and scuba diver training from the Service School Command in San Diego, California. NDSTC will be teaching the same curriculum it has to date, with the addition of separate curriculums in 2nd Class diving school and scuba. This merger is based on the continued efforts to provide adequate facilities for existing and future requirements with a reduction of operational costs. The courses that will be provided at NDSTC are as follows: He-$O_2$ Deep Sea Diving Officer, Ship Salvage Diving Officer, He-$O_2$ Diving Officer Cross Over, Ship Salvage Operations Officer for Engineering Duty Officers, Diving Medical Officer, Recognition and Treatment for General Medical Officers (1 week), and a course for ARS/ATF/ATS Prospective Commanding/Executive Officers. Also included are courses in Master Diver Evaluation, First Class Diver, Deep Sea Medical Technician, Second Class Diver, Scuba Diver, and miscellaneous classes for refresher training and Reserve Harbor Clearance Unit diver training.



# F-14 Found at 5,184-Foot Depth

An F-14 operating in designated air space offshore the Mexican/San Diego, California coast experienced problems and subsequently crashed into the ocean on June 28, 1977. Both pilots had ejected and were recovered by SAR procedures. Other aircraft operating with the lost F-14 circled the area, not only monitoring the downed pilots, but also recording fixes from both Tacan and an INS computer that was installed in one of the aircraft. Upon their return to the U.S. Naval Air Station at Miramar, California, the INS fix was further refined so as to minimize any errors. The water depth in the crash area was approximately 6,000 feet, the deepest depth to date in a search mission. Very fortunately, the lost F-14 aircraft had been modified to carry a Dukane underwater acoustic beacon or pinger for location in the event of just such a crash. However, this pinger had been further modified from a 30-day life span (once activated), to an approximate 10-day life span.

After a somewhat lengthy decision-making process, it was decided to initiate a search in the crash area in order to listen for, hopefully hear, and mark the position of the aircraft debris as displayed by the pinger. Accordingly, on Friday, July 1, the Supervisor of Salvage, U.S. Navy, was tasked to provide such a service through their commercial search and recovery contractor, Seaward, Inc., of Falls Church, Virginia. The next day, Mr. Ron Green, the Supervisor of Salvage Representative, and Mr. Robert E. Kutzleb, Project Manager from Seaward, Inc., traveled to San Diego to commence the outfitting of the USS CHOWANOC (ATF-100). Navigational gear was called in and set up. A representative from the Underwater Sound Division of the Naval Research Laboratory in Orlando, Florida, arrived the following day with a hydrophone for the search.

Because of the long holiday weekend (July 4th), some of the equipment required for the hydrophone set-up was not easily obtained. However, on July 4, CHOWANOC got under way to commence the hydrophone search. On July 5, a possible acoustic contact was heard by the hydrophone team aboard CHOWANOC. Shortly after this, the USS DOLPHIN, a deep diving submarine from the Submarine Development Group in San Diego, arrived on the scene and confirmed that they too had possibly heard the bottom noise source while on the surface.

The sonar search commenced in the area on July 21 and continued until August 3, at which time a promising contact was acquired. This contact was further investigated and was felt to be the missing F-14. A deep ocean transponder (D.O.T.) was set near to the debris field for follow-on verification.

The deep submergence vehicle SEA CLIFF was requested from the Submarine Development Group on August 4 and arrived on scene 2 days later. A verification dive was conducted and the debris found and confirmed as the wreckage from the missing F-14. A complete photographic and visual examination of the wreckage was conducted by SEA CLIFF until August 19, when the overall effort was terminated.

Techniques and Equipment Employed:

The search tool used to find the aircraft was a combination of EG&G and Klein dual side-scan sonar equipment. Extensive modifications were required because of the extremely long cable length required by the 5,000-plus-foot water depth.

Problems encountered in driving the signal through the 24,600-foot cable resulted in initially using the 125-meter scale as the maximum range of the sonar. However, onsite modifications by the sonar team as the search progressed permitted the use of the 200-meter scale for greater efficiency and overall coverage.

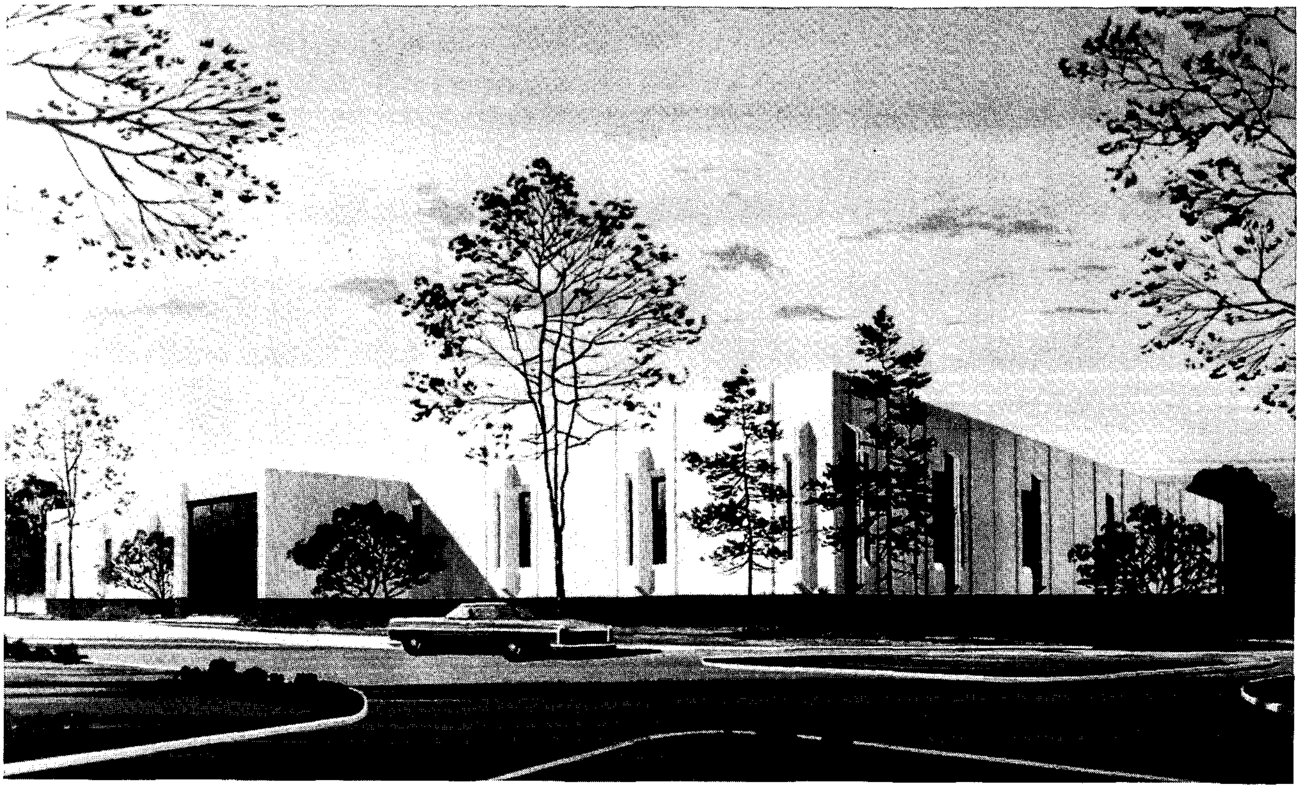
The lack of a commercially available winch to handle 24,600 feet of cable resulted in the dispatch of an electro-hydraulic winch from the Naval Coastal Systems Laboratory in Panama City, Florida. Two 40-kw generators were supplied from the ESSM pool to further power the winch.

Support Services Furnished:

A variety of support services were provided to the search team. The Commander of Service Squadron One provided overall guidance, liaison, and logistic support, without which this task would have been even more difficult than it proved to be. USS CHOWANOC (ATF-100) under the command of LT C. H. Cohlmeyer, USN, was made available as the search platform. Her officers and crew provided invaluable assistance in every area and are deserving of special credit. (An interesting note is that this was CHOWANOC's final mission before she was decommissioned.) Crane and rigging services were provided by the U.S. Navy Public Works Center at the Naval Station. The crew aboard the USS ENTERPRISE supplied helicopter services when necessary. Valuable pinger location assistance came from the deep diving submarine, DOLPHIN; and aircraft verification services were performed by the Deep Submergence Vehicle SEA CLIFF.

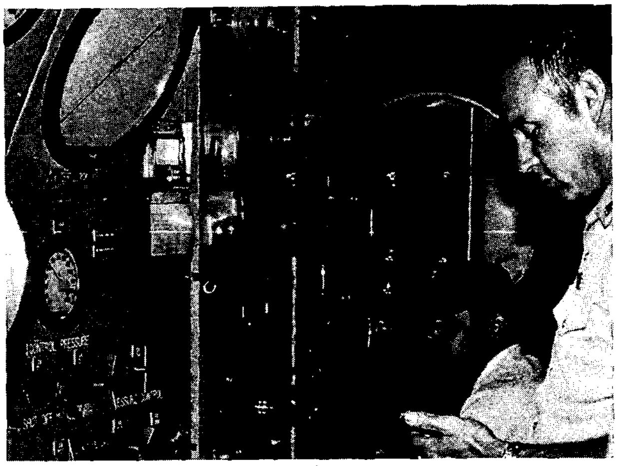
LCDR Scott Stevenson, CEC, USN
Mr. John Nacquin
*Naval Medical Research Institute*

# NMRI's New Dimension

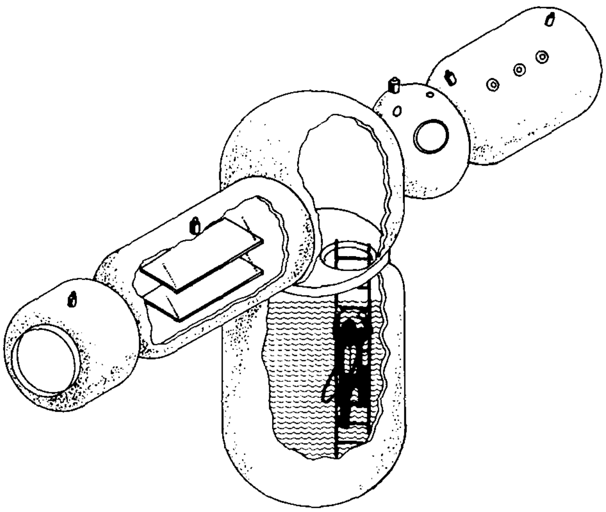


The Navy's diving research program is taking on a new dimension at the Naval Medical Research Institute (NMRI) in Bethesda, Maryland. This dimension is the addition of a diving biomedical research capability with the unique combination of research scientists, sophisticated hyperbaric facilities, and operational personnel necessary to provide deep diving medical research support to the diving Navy.

Since its commissioning in 1942, NMRI has been an active force in the world of Navy diving medicine. Early and continuing work in the area of cold stress has provided guidance for diver thermal protection. In fact, the requirement for heating diver breathing gases resulted from NMRI research programs. Over the years, NMRI scientists have contributed significantly to the understanding of decompression sickness and of other aspects of diving medicine by conducting basic and advanced research in these areas. NMRI physiologists and behavioral scientists were active participants in the SEALAB, TEKTITE, and MAKAI habitat programs. (The basic saturation tables for SEALAB III were developed at NMRI.) More recently, working with the Navy Experimental Diving Unit (NEDU) and others, NMRI researchers provided human factors evaluations of the new Mk 12 hard hat that resulted in beneficial design changes. In 1973, NMRI personnel were principle research coordinators and participants for the SUPDIVE, NEDU, NMRI joint saturation diving program, which culminated in a 1,600-foot dive in the Taylor Diving and Salvage Company complex (see *FP*, Fall 1973).



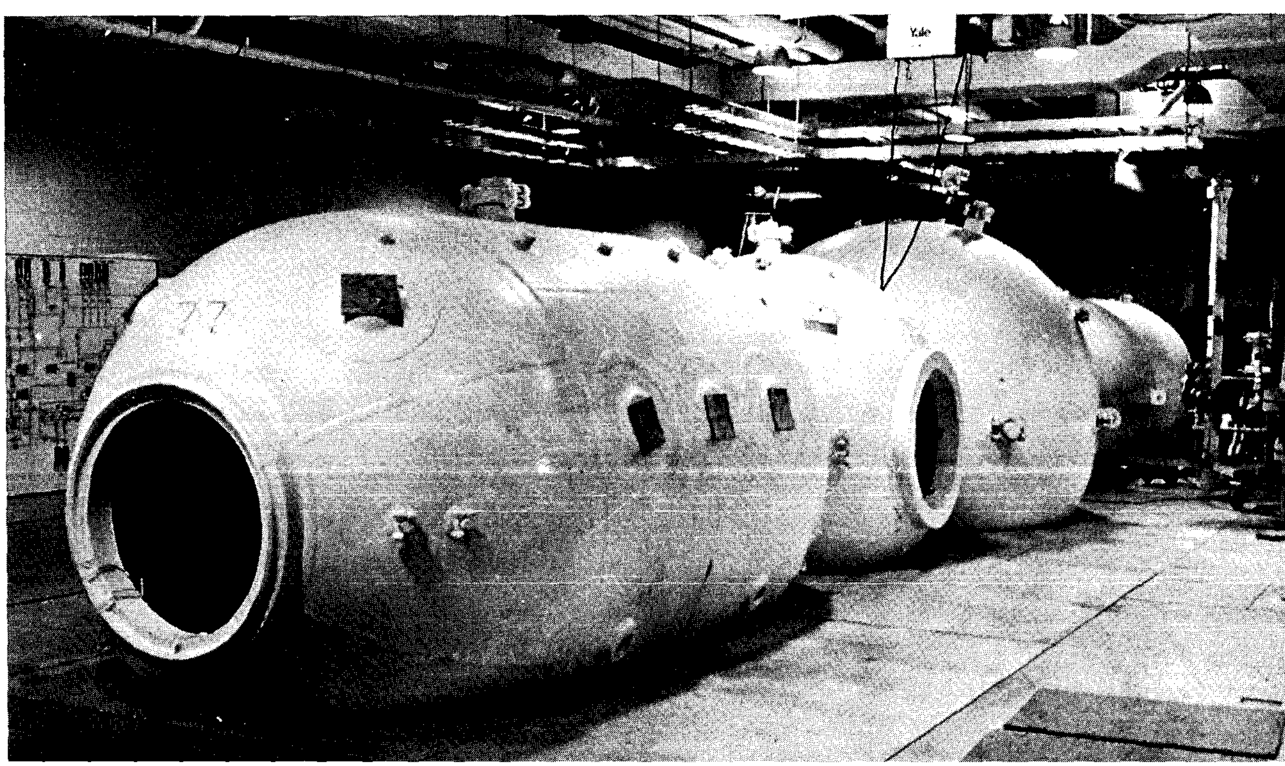
ENCM(MDV) Winters (standing) and HT1 Seeley at the controls of NMRI's 750-foot depth capability chamber complex.



Above: Artist's concept of new complex. Photo below shows basic chamber structure of new complex installed thus far.

Today, NMRI is engaged in an expanding diving research program with basic scientific work in thermal stress, respiratory and cardiovascular response, toxic contaminant effects, decompression theory, decompression sickness, underwater performance, hyperbaric biology, and hyperbaric microbiology. Before the advent of deep saturation diving, NMRI relied primarily on its 750-foot chamber complex (vintage 1938) for most manned research. This facility was recently certified and is still serving the Institute well. In recent years, NMRI has participated heavily in deep diving experiments using NEDU and civilian facilities. However, as previously reported in *Faceplate* (Spring 1976), NMRI is soon to acquire its own major hyperbaric research facility, one that is unequaled in depth capability within the United States Navy. The opening of this facility, scheduled for the summer of 1978, will add an in-house capability to conduct diving research far beyond our current deep diving limitations.

Called the Environmental Health Effects Laboratory (EHEL), the new facility consists of separate complexes of man-rated and animal chambers with a pressure capability of 1,500 psig, or approximately 3,400 feet of seawater. In addition, extensive laboratory spaces are available. The man-rated chamber complex consists of five horizontally mounted chambers with a wet pot connected below the central chamber "igloo". The system includes complete capabilities for atmospheric control using air, helium-oxygen, and other mixes. Wet pot water temperature can be varied down to 34°F (1°C). Gas farm, compressors, gas mixer, helium reclaimers, communications, video monitoring, computer links, and semi-automated diving control systems are also included. Table 1 provides more particulars.



**MRCC STATISTICS**

| CHAMBER | OUTER CHAMBER | RESEARCH CHAMBER | DIVING CHAMBER (dry) | DIVING CHAMBER (wet) | INTERIM CHAMBER | RESEARCH CHAMBER | SERVICE LOCKS |
|---|---|---|---|---|---|---|---|
| DIAMETER | 7 ft | 7 ft | 10.5 ft | 8.5 ft | 8 ft | 8 ft | 19 in |
| LENGTH | 8 ft | 14 ft | spherical | 11.6 ft | spherical | 15 ft | 22 in |
| WORKING PRESSURE | 1,000 psi | 1,000 psi | 1,000 psi | 1,000 psi | 1,500 psi | 1,500 psi | |
| DEPTH | 2,250 ft<br>685 m<br>68 atm | 2,250 ft<br>685 m<br>68 atm | 2,250 ft<br>685 m<br>68 atm | 2,250 ft<br>685 m<br>68 atm | 3,360 ft<br>1,036 m<br>103 atm | 3,360 ft<br>1,036 m<br>103 atm | |
| VOLUME | 260 $ft^3$ | 504 $ft^3$ | 562 $ft^3$ | 555 $ft^3$ | 262 $ft^3$ | 658 $ft^3$ | 3.8 $ft^3$ |

NOTE: (1) The dry diving chamber service lock is 34" in length with a surface volume of 5.6 $ft^3$ to facilitate equipment transfer.

(2) Water temperature in the wet diving chamber may be chilled to 34°F (1°C) or heated to 90°F (32°C).

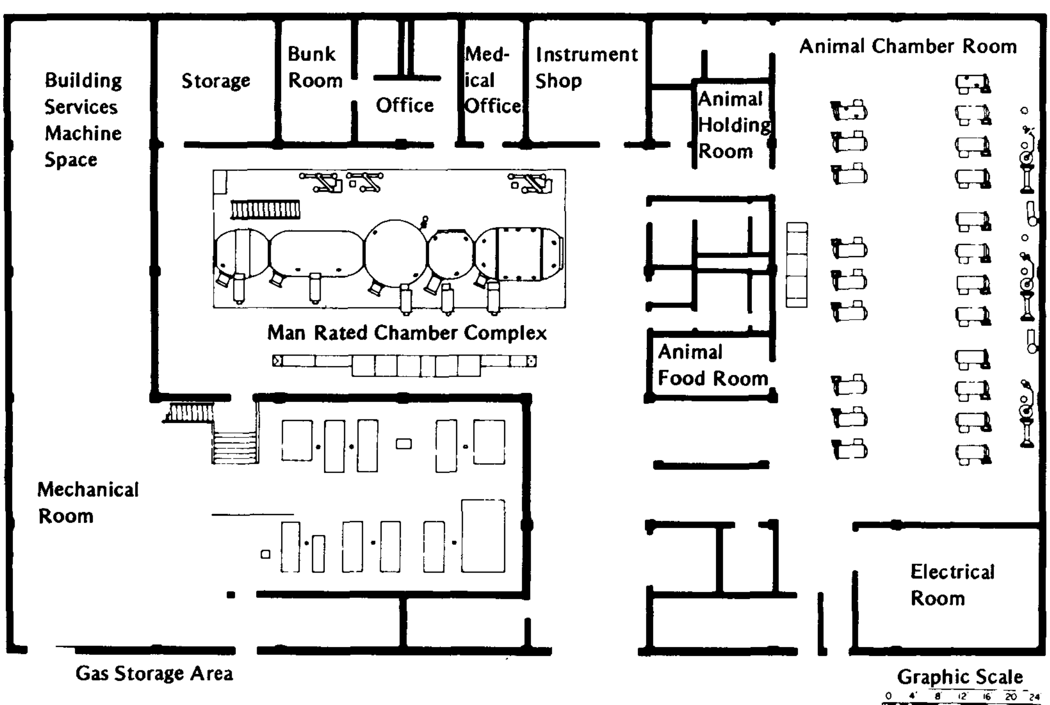
Table 1: Operational specifications for the man-rated chamber complex of EHEL.

The animal chamber complex includes 21 small animal chambers with life support capabilities equivalent to those of the manned complex. The complex is designed to conduct long-term studies of the effects of various toxic materials in hyperbaric environments. Basic studies in other areas of diving will also be conducted. New diving concepts will be tested on animals before manned dives are attempted.

Currently, the construction of the EHEL has progressed to the point where all chambers are in place and a considerable amount of piping has been installed. The gas farm is nearly complete. During the coming months, the compressors, gas supply systems, control panels, and associated equipment will be installed. Completion is expected in mid-1978, at which time NMRI will take full control of the complex. Then begin the tasks of unmanned and manned work-up dives, check in/out systems, and overcoming all those hurdles required to turn a new diving complex into an operational facility. If all goes according to plan, research in the man-rated complex will begin before the end of 1978.

Until next summer, NMRI will continue to monitor the construction, procure ancillary equipment, develop a trained staff of military and civilian divers, prepare operations and maintenance procedures, and procure and stock a spare parts inventory. Staffing requirements include 25 enlisted saturation divers in addition to the Institute's staff of diving medical officers, diving corpsmen, and civilian diver personnel. Currently, ENCM (MDV) W. Winters is the Command Master Diver; HTCS (DV) C. Gross, MMCS(DV) R. Brewer, HMC P. West, BMC(DV) R. Vandine, and HT1 R. Seeley make up the core of operating personnel. The remainder of the billets will be filled as soon as the "friendly detailer" can find the people.

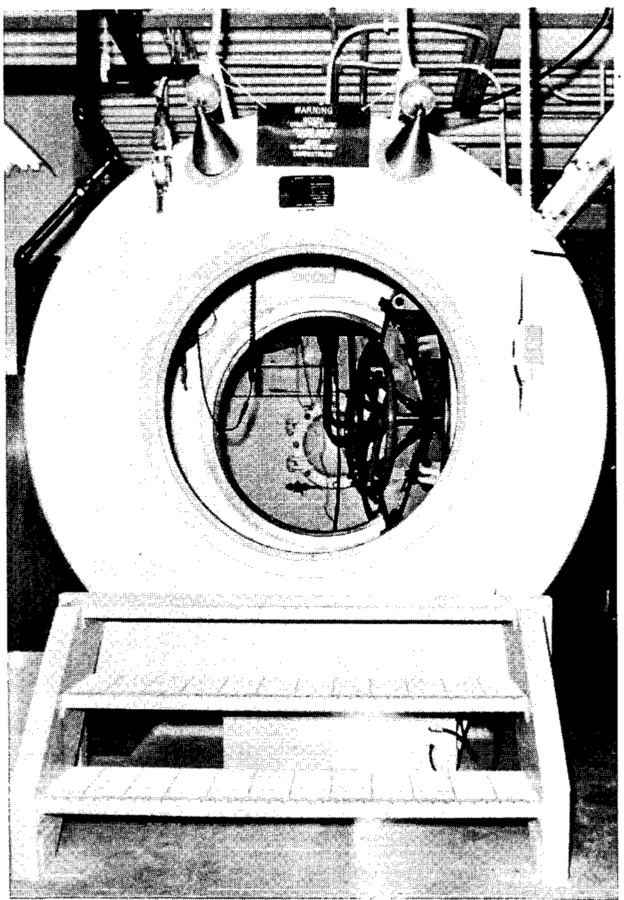
In summary, NMRI, a long-time contributor to the well-being of Navy divers, is entering a new era. As the operator of what will be the Navy's newest and deepest diving research facility, the Institute will be a keystone in expanding the diving biomedical research program of the Navy. Close coordination with NEDU and civilian institutions will continue; and, by working together, it will be ensured that the Navy diver is the safest diver in the world.




Floor plan of EHEL chamber operating spaces

# NAVEODFAC Chamber is Readied for Emergency

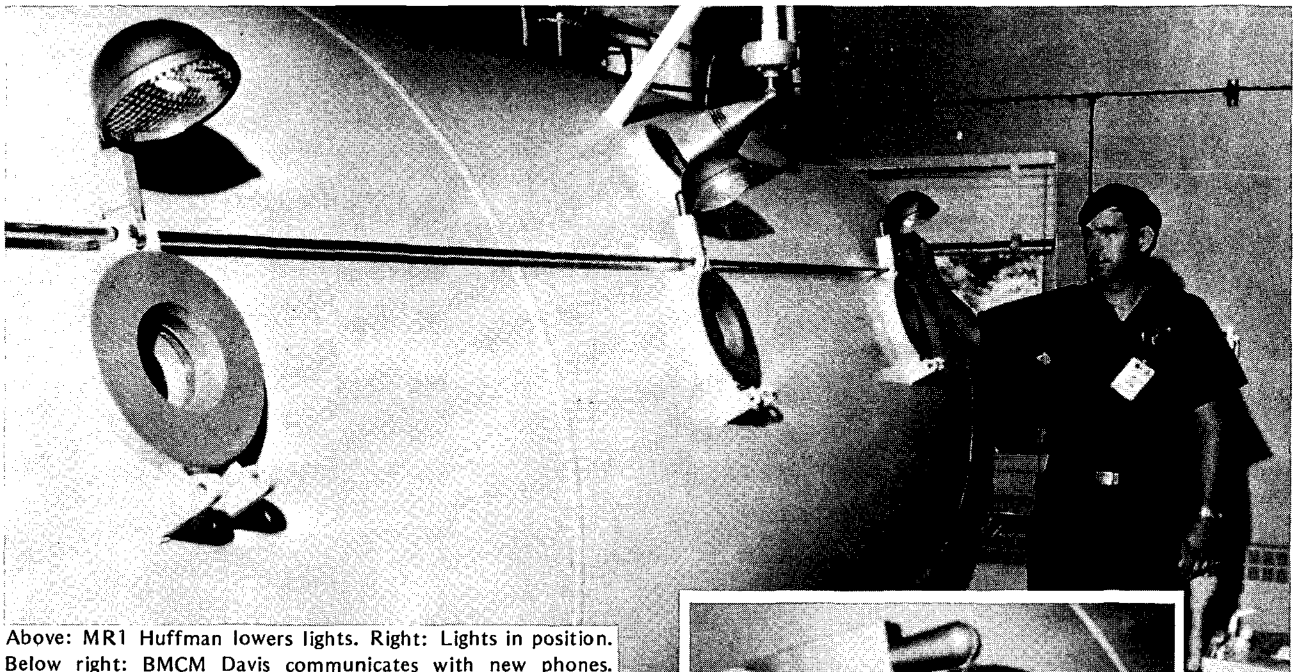
LT Steven Robinson
*Naval Explosive Ordnance Disposal Facility*



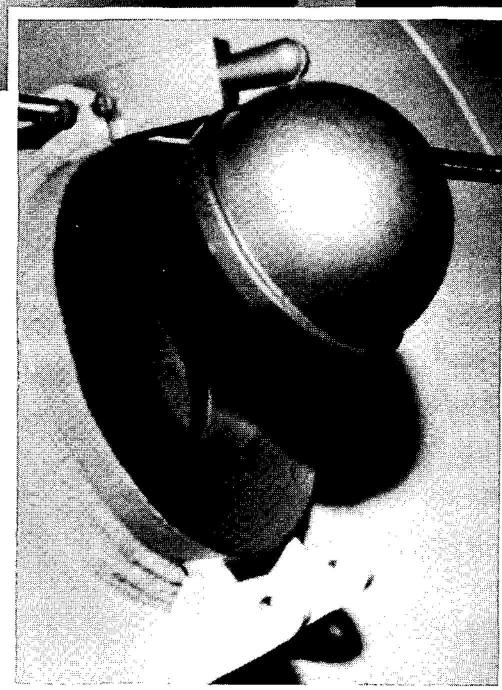
The problem of continuing safe and effective treatment operations in a hyperbaric chamber in the event of a power failure has been under study at the Naval Explosive Ordnance Disposal Facility (NAVEODFAC) in Indian Head, Maryland. To provide the maximum degree of operational safety and efficiency in case of power failure during chamber use, modifications were made to the NAVEODFAC recompression chamber and its hyperbaric environmental facility igloo complex. These modifications were devised and fabricated by a group of EOD Facility Diving Locker personnel consisting of BMCM(MDV) J. B. Davis, MR1(DV) S. A. Huffman, and Mr. E. J. Sopchick.

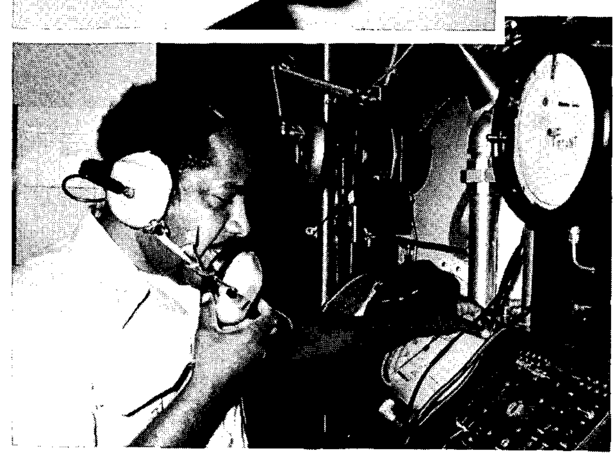
The EOD Facility performs research, development, test, and evaluation functions that provide tools and techniques for the joint-services EOD community. In support of this mission, the diving locker performs various tests and verifications of underwater projects. To provide the most effective support for this effort, continual self-evaluation of the facilities and methods used have resulted in several improvements. Among the changes made are the two described below.

The emergency lighting system is made up of off-the-shelf items that can be procured locally and for which there are several available substitutes. The primary intent is to provide lighting both inside the chamber and for the console operators on each of the locks so they could continue operating during an electrical power failure. The lights turn on automatically upon loss of power and can be lowered into position rapidly and easily. This



Above: MR1 Huffman lowers lights. Right: Lights in position. Below right: BMCM Davis communicates with new phones.





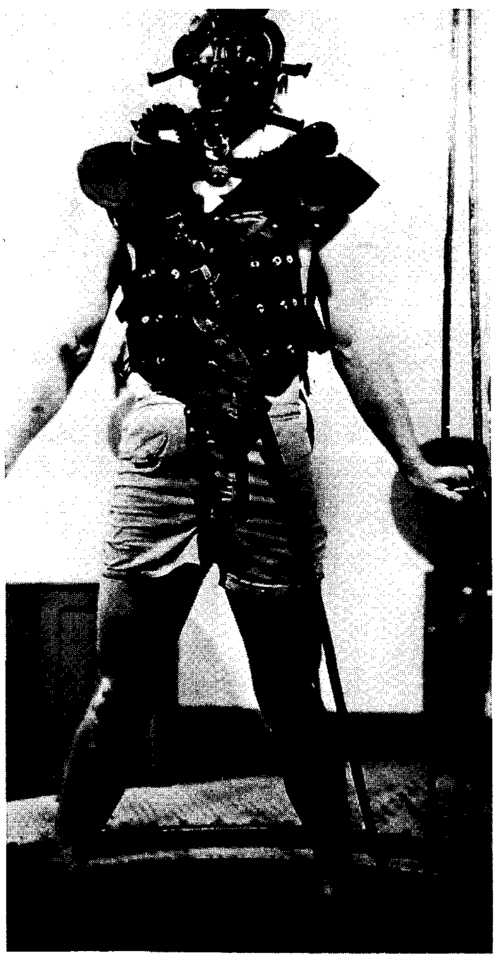
swing-away feature enables the use of the ports during normal operations. The total cost of the system was approximately $450. Harbor Clearance Unit TWO uses a similar system, incorporating battle lanterns.

To permit communications during power loss, sound-powered phones were selected instead of an intercom system. In making this decision, several factors were considered in addition to power requirements. A primary goal was to eliminate unnecessary noise in and around the chamber; an intercom system amplifies the noise of vents and other background noises and tends to carry this sound throughout the area. Although normal shipboard sound-power phones reduce this noise somewhat, the muffled sound-powered phone system selected is even more effective. Another consideration in the selection came from a medical standpoint. A major concern during the treatment of a patient is to keep him comfortable and relaxed. The use of the muffled phones allows the inside tender to communicate freely with outside personnel without disturbing the patient with either noise or what might be distressing medical information. An important factor that must be remembered when using these muffled phones is that holes must be drilled in each of the earpieces before their use to prevent external ear squeeze. The total cost of the phone system, including three phones, was approximately $500.

This information is presented as one command's solutions to several common problems encountered by diving commands everywhere. Although these improvements are not the only solutions, they have proved extremely successful at NAVEODFAC.

# NEDU Celebrates 50th Anniversary 1927—1977

LT Rob Carter, MSC, USN
*(Written while stationed at the Navy Experimental Diving Unit)*

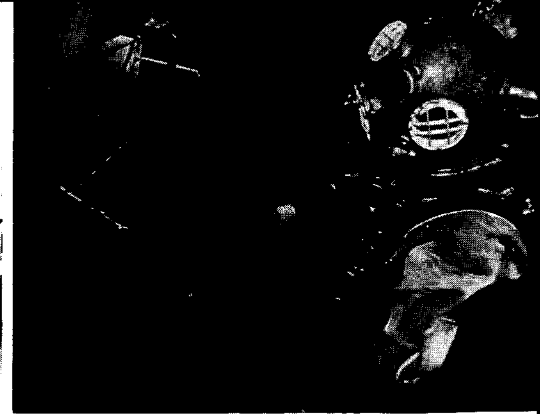


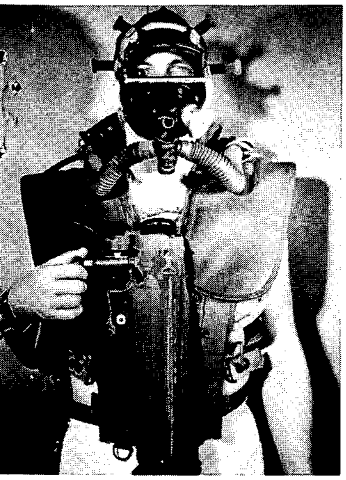
The U.S. Navy Experimental Diving Unit is observing its golden anniversary—50 years of continuing progress in diving research, development, test, and evaluation. The facility, located in Panama City, Florida, contains the most advanced testing and diving equipment and houses the world's largest hyperbaric complex, the Ocean Simulation Facility, which can simulate an ocean environment to a maximum pressure of 1,000 psi, or 2,250 feet of seawater. NEDU's mission is to support the fleet through development, test, and evaluation of diving equipment and procedures. The fulfillment of this mission has enabled operating forces to conduct diving, salvage, and underwater swimming safely and effectively.

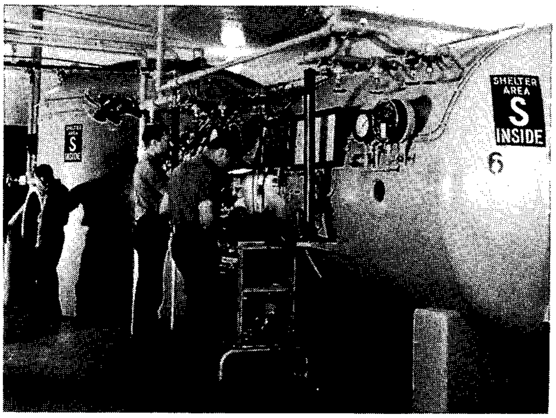
An experimental diving organization has existed in one form or another since 1912, when it was established at the New York Navy Shipyard under Gunner George Stillson. The purpose of the original experimental diving unit was to assess diving techniques, equipment, and personnel. Besides testing the decompression tables developed by the Scottish physiologist Dr. John S. Haldane, CWO Stillson and his group began a related program to develop standardized diving dress. By 1915, through the efforts of this small group, an up-to-date diving manual was published and a new diving dress was adopted. This diving dress was the forerunner of the Mk 5 Deep Sea Diving Outfit, the standard U.S. Navy diving dress for many years. In addition, a diving school was opened at Newport, Rhode Island (this school was disbanded during World War I). CWO Stillson's group more than quadrupled the maximum diving depth of U.S. Navy divers, which until that time had been limited to 60 feet.

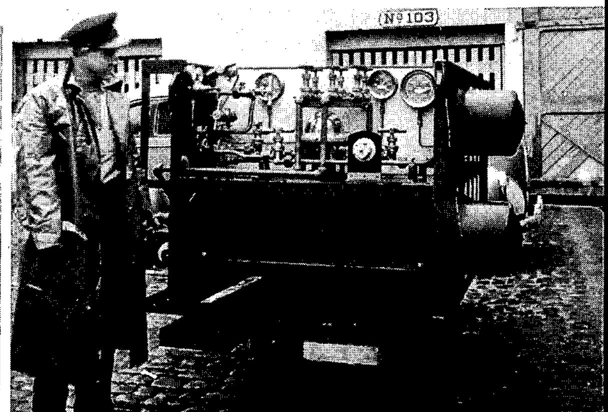
The value of Gunner Stillson's efforts was demonstrated during the salvage of the submarine USS F-4, which sank of Honolulu, Hawaii, in 1915. However, the divers experienced physiological problems that were determined to be the result of breathing compressed air during the dives. This problem (which led to the use of

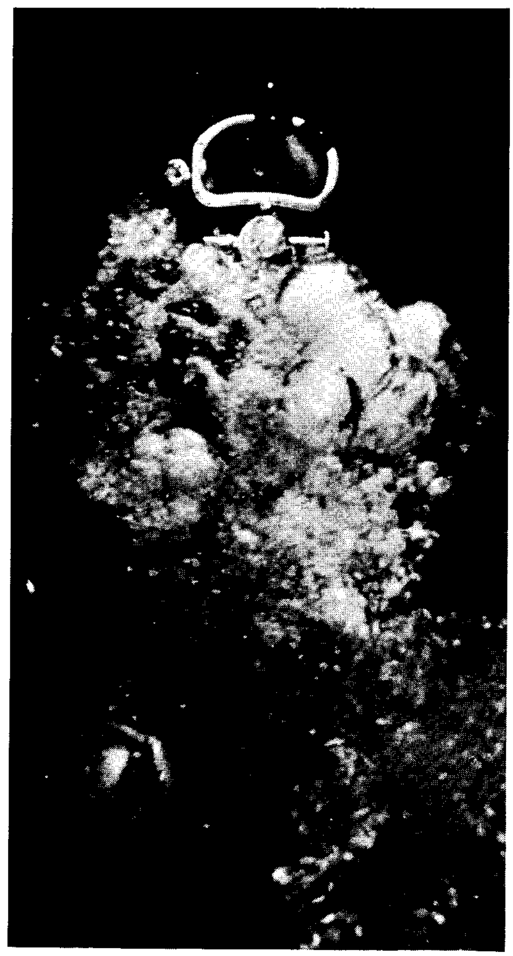
Page 16: Oxygen scuba rig of 1950's. Page 17, clockwise, right: Divers in NEDU/Duke dive, 1969; Mk 5 hat; old He-$O_2$ diving manifold; old Wash. Navy Yard hyperbaric complex; oxygen scuba tested at NEDU circa 1940. Lower right: Bandmask diver today.







helium-oxygen as a breathing mixture) and the sinking of two more submarines (the S-51 in 1925 and the S-4 in 1927) tragically demonstrated the need for adequate procedures, trained divers, and specialized equipment for rescue operations.

The first response to this need was the establishment of the Navy Experimental Diving Unit as a permanent activity in 1927. This centralized all Navy diving-related research and activity at the Navy Gun Factory in Washington, D.C. Soon afterward, the Naval School of Diving was activated adjacent to NEDU under a separate command. The school and its location were recommended by CAPT Ernest King (later Fleet Admiral) so that the diving technology developed by NEDU could be rapidly incorporated into the school's training procedures.

Submarine escape and rescue became the first objective of NEDU. CWO C. L. Tibbals (who had become the chief proponent of Navy diving when CWO Stillson retired) was joined by LT C. B. Momsen and LCDR A. R. McCann; and soon, submarine escape devices called the Momsen lung and McCann bell became available. These significantly improved the Navy's response capability.

Three Navy doctors (C. W. Schilling, A. A. Behnke, and O. E. Van der Aue) became the first medical staff at NEDU in the mid 1930's. These men, working with divers of the Unit, demonstrated the advantages of oxygen at 40 to 60 feet for treating the bends. They also developed surface decompression tables using air for submarine escapees who had overstayed their no-decompression times. It was this group, too, who proved conclusively that high pressure air reduces a diver's mental and physical capabilities compared with sea level performance. Because of this, a program was started in the late 1930's using helium mixed with oxygen as the breathing mixture during dives. This program adapted the experimental helium-oxygen breathing mixture, developed by CWO Tibbals years earlier, to deep sea diving. The extensive testing program during 1938 and 1939 produced helium-oxygen diving tables for decompression that included a shift to air on ascent to 150 feet and to oxygen at 66 feet.

All of these innovations were given the ultimate test during the SQUALUS salvage and rescue operation in 1939, the U.S. Navy's greatest diving rescue success. The equipment and procedures developed at NEDU during the preceding decade, including the McCann bell and the new tables, worked extremely well. All of the crew who survived the initial sinking were rescued; and the SQUALUS was salvaged and became the SAILFISH. During the diving operation, refinements were made in helium-oxygen diving, including surface decompression using oxygen.

United States participation in World War II was imminent in the late 1930's. However, no equipment was available for combat swimmers except for a closed-circuit oxygen scuba invented by a medical student named Christian Lambertsen. The Momsen lung was also adapted for scuba use; though the use of scuba was limited because of inadequate protection from the cold. (Scuba divers relied on a thick coat of grease or beeswax for insulation.)

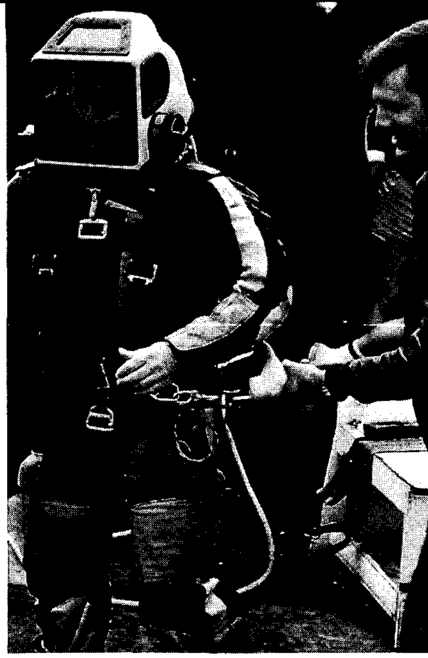
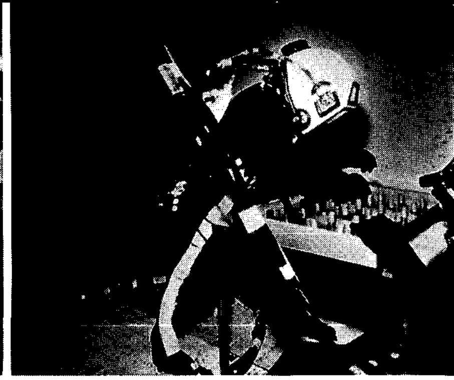
Experience with oxygen scuba emphasized the importance of oxygen toxicity. This was investigated at NEDU during the war years along with the subject of aviation physiology. Because of NEDU's experience with the use of oxygen and the causes and treatment of bends, the testing of pilots' pressure suits and breathing apparatus became an NEDU project. NEDU work also included salvage within the United States, evaluation of captured enemy diving equipment, and development of the Kapok life jacket. One of the greatest changes, however, was in personnel—women (WAVES) were assigned to NEDU.

When the war ended, money and personnel were again available to develop, test, and evaluate diving equipment and procedures. The most immediate problem was that of keeping divers warm. In the early 1950's, an aviator's exposure suit was brought to NEDU for testing. The suit, made of 1/2-inch neoprene foam, was to become an item of unparalleled importance to the free swimmer. NEDU continued experimentation with different thicknesses of neoprene and suit designs to achieve the best fit, coverage, and insulation.

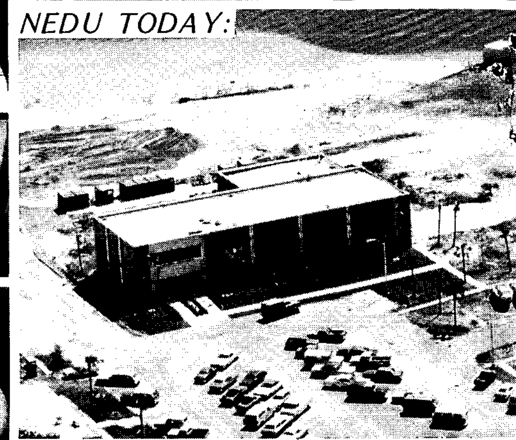
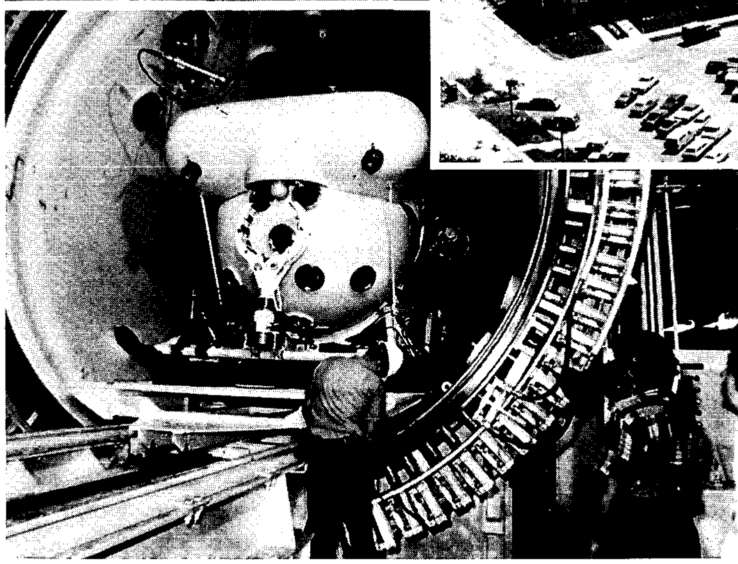
Encouraged by the success of surface decompression with oxygen following surface supplied helium-oxygen diving, NEDU proceeded to work on a surface decompression table using oxygen for surface supplied air diving. During the at-sea testing of these tables, the pneumofathometer was invented by Dr. O. E. Van der Aue of NEDU. (This work was conducted between 1944 and 1951.)

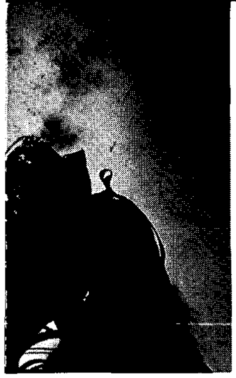
Perhaps the most revolutionary post-war development in diving technology was the proliferation of scuba. NEDU tested numerous devices, giving particular attention to the work of breathing and life support capability. The approval of scuba equipment for U.S. Navy use necessitated the production of the Oxygen Depth-Time Limits Table and the Nitrogen-Oxygen Scuba Table by NEDU in the mid-1950's.

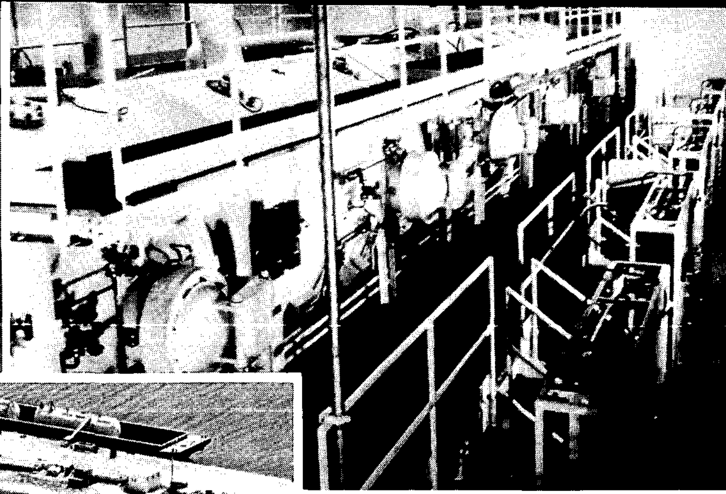
NEDU developed air dive procedures in 1956 that are now accepted as

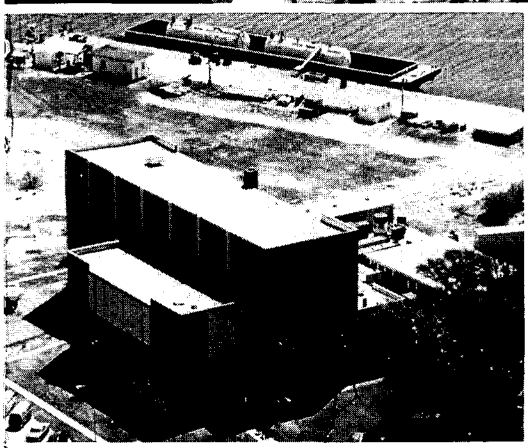



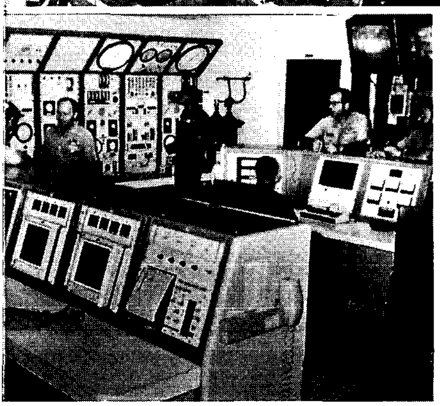
*NEDU TODAY:*







standard throughout the world. This work was the basis for the development of the Standard Air Decompression Tables, the Surface Decompression Table Using Air, and the Repetitive Air Dive Tables.

NEDU produced two important treatment tables in the mid 1960's, the Minimal Recompression Oxygen Breathing Method for Treatment of Decompression Sickness and Gas Embolism, better known as Table 5 and Table 6. These tables are in the *U.S. Navy Diving Manual* today and are the standards for treatment of bends or gas embolism.

Three Sealabs, which proved the concept of man-in-the-sea using saturation diving techniques, had been trained and supported by NEDU by 1969. In addition, saturation decompression tables were developed for the Mk 1 Deep Dive System. Also during the late 1960's, NEDU joined with Duke University to conduct two saturation dives. The first went to 1,000 feet; the second went to 600 feet. These were conducted to determine and evaluate the medical effects of saturation diving. From these beginnings, saturation diving progressed steadily at NEDU.

International cooperation has been a keynote of the NEDU story during the last decade. Representatives of the United States and Royal Navies met in 1968 to revitalize their information exchange program. A joint NEDU–AEDU saturation dive to 1,000 feet was conducted in 1971 at AEDU in Portsmouth, England.

The early 1970's were highlighted by a number of other accomplishments. These include the first all-Navy 1,000-foot dive, which proved conclusively that heat loss through a diver's respiratory tract can be dangerous even when the skin is warm. NEDU divers, using the facilities of Taylor Diving and Salvage Company in New Orleans, accomplished a 1,600-foot saturation dive in 1973, demonstrating that man could stay and work in water at extreme depths for long periods of time without adverse effects.

NEDU had outgrown its quarters in the Washington Navy Yard by the mid 1970's, and in 1975 it moved to its present location in Panama City, Florida. Personnel from NEDU made the first manned dive in the Ocean Simulation Facility in March 1975, shortly after completing the arduous process of certifying the facility for use.

NEDU was commissioned in July 1975 in Panama City and designated as a Command ashore reporting directly to the Commander Naval Sea Systems Command. Since then, personnel at the Unit have effectively used the Ocean Simulation Facility to test and evaluate significant items of diving equipment and procedures. These include the Mk 12 Surface Supported Diving System, the Mk 14 Closed-Circuit Saturation Diving System, the Swimmer Life Support System Mk 1 closed-circuit scuba, development of the 1,000 fsw Saturation Excursion Tables, portable recompression chamber testing, and validation of decompression models for use with a wrist-worn decompression computer (to be used with the SLSS Mk 1).

The men who have served at the U.S. Navy Experimental Diving Unit can look with pride on their record of 50 years of progress in diving technology. Their work has benefitted military and civilian divers throughout the world.

# MK 14 COMPLETES SUCCESSFUL 1100-FOOT MANNED DIVE

Mr. R. L. Bentz
Naval Coastal Systems Laboratory
EMC(DV) R. A. Vendetto
Navy Experimental Diving Unit

During the Navy Experimental Diving Unit's (NEDU) recently completed Deep Dive '77, which was a 1,500-foot saturation dive, the Mk 14 CCSDS was used successfully to its full operational diver depth of 1,100 feet. Over a period of 12 days of continuous diving, six saturation divers logged over 44 hours in 40°F water during 37 separate dives. No Mk 14 equipment problems occurred with the diver in the water; however, minor difficulties with the supply pump relief valve were encountered during the dive. The relief valve problem was readily corrected though, allowing the dive to proceed on schedule.

Four days of diving were conducted at each of the saturation depths of 200, 600, and 1,000 feet. At each saturation depth, 2 days of 33-foot upward excursions and 2 days of 100-foot downward excursions were made. Each diver's total bottom time consisted of performing work on a bicycle ergometer. Three of the divers rode a vertical bike and three rode a horizontal bike. During each dive, the ergometer resistance was increased incrementally until the diver reached his limit of exhaustion. The work cycle consisted of 6 minutes at work and 5 minutes at rest. At 200 and 600 feet, the maximum work levels were relatively consistent at approximately 175 watts; this figure was reduced to 150 watts at the 1,000-foot depth.

The divers were heated with an open-circuit hot water suit and a breathing gas heater. There was no apparent diver discomfort in the 40°F water when adequate hot water flow was maintained and all the testing indicated that a diver could complete a 4-hour mission comfortably.

With the completion of the 1,100-foot manned dive, the Mk 14 completes 4 years of development. This program began with the unmanned testing of three commercial systems by NEDU. All three systems evaluated fell short of the Navy's demanding specifications (as listed below). However, the testing was very important in establishing the design concept for the current Mk 14 model.

Table 1:
SYSTEM OPERATIONAL REQUIREMENTS

| | |
|---|---|
| Maximum PTC operating depth | 1,000 feet |
| Minimum operating temperature | 35°F |
| Depth excursion | 100 feet below the PTC to 33 feet above |
| Number of divers | 2 |
| Umbilical length | 250 feet |
| Diver breathing rate | 75 liters per minute |

The Mk 14 diving system is designed for saturation diving out of a personnel transfer capsule (PTC), such as those in the Navy's three Mk 2 deep dive systems. The system is closed-circuit, in that it takes the diver's supply gas from the PTC atmosphere, pumps (pushes) it to him through an umbilical hose, and returns (pulls) his exhaust gas to the PTC through a return umbilical hose. To perform this task, supply and return pumps are installed on the PTC. Also, an exhaust regulator is required at the diver's helmet to maintain the internal helmet pressure at essentially ambient seawater pressure. In conjunction with the exhaust regulator is a safety exhaust valve, which protects the diver from a "squeeze" that could result from an exhaust regulator failure. The normal atmosphere conditioning system in the PTC removes the carbon dioxide and maintains the proper oxygen level. The obvious advantage of the Mk 14 is the potential for a tremendous savings in helium gas during extended deep dive operations. The Mk 14 has an advantage over the other closed- and semi-closed-circuit underwater breathing apparatuses because of its basic simplicity, since the diver carries nothing on his back.

The system consists of four major subsystems: The pump package, the PTC control console, the umbilical, and the diver-worn equipment. The gas flow path of the Mk 14 system begins with the gas flowing from the PTC to the supply pump, where it is boosted in pressure and pushed through a volume tank and a filter in the PTC. It then flows through the umbilical to the diver, where it is heated. The warmed gas enters the helmet through a supply valve and muffler/diffuser. The gas leaves through a safety exhaust valve and exhaust regulator. The exhaust regulator functions as a back pressure regulator, maintaining a relatively fixed positive pressure in the helmet with the suction pumps maintaining suction of between 15 and 75 psig to the downstream side of the regulator.

The Mk 14 project has been a joint development by NEDU and the Naval Coastal Systems Laboratory (NCSL). The first 2 years of the project management were with NEDU; the last 2 years were with NCSL. During this 4-year period, a close working relationship has existed between the NCSL engineers and the NEDU divers. This has resulted in the design of equipment that, initially, has had a high degree of diver acceptance.

An extensive test program was completed before the first manned saturation dive. This consisted of testing each critical component under pressure. When satisfactory performance was established with the individual subsystem, it was installed into the complete Mk 14 system in the NCSL pressure chamber. These unmanned system tests were performed using a breathing machine and a mannequin to simulate a diver. Several series of tests were completed before a satisfactory system was established. The next step was to install the complete Mk 14 system in the Ocean Simulation Facility's (OSF) chambers and perform unmanned testing to the full operational diver depth of 1,100 feet. This testing was completed in June 1977.

During the unmanned testing, a thorough instrumentation package was developed. This consisted of monitoring system pressures at six locations and twelve temperatures. Also monitored was the pump motor electrical characteristics and helmet flow. The heart of these data collection systems was a computer. On command, the computer would read all instrumented data, process and print-out the reduced data, and store the data on magnetic tapes. Examples of the reduced data include corrected gas flow to the helmet, peak maximum and minimum pressures over a 3-second interval, and breathing signature traces printed on a plotter.

With a satisfactory unmanned test performance, manned testing was initiated. This began with extensive poolside diving in 15 feet of water. Upon completion of the shallow water manned diving, coupled with the unmanned test data, the system was given a "go" for a 200-foot saturation dive in August 1977.

During the initial 200-foot saturation dive, over 30 hours of diving were logged in 19 separate dives. (Figure 1 shows how the OSF test setup simulates Mk 14 open sea diving from a PTC.) There were no dive aborts because of any equipment malfunctioning of the Mk 14. All diving was performed in 40°F water, with each diver performing finger dexterity tests and work on a bicycle ergometer. Both a vertical and a horizontal ergometer were used.

This testing proved that the system was ready for diving to the full operational diver depth of 1,100 fsw (a PTC depth of 1,000 fsw plus a 100-fsw downward excursion).

The Mk 14 pumps exceeded system requirements in that they could be used for shallow water diving without modifications. The pumps were designed and manufactured by Westinghouse Electric Corporation, Oceanic Division, under a contract from the Mk 14 project. The pump assembly used for poolside training has had over 100 hours of trouble-free operation, and the one installed in the OSF chambers has over 110 hours of operational diving. This pump assembly had been thoroughly cleaned for oxygen service; all bearings have been repacked with an oxygen-compatible lubricant. The design is presently under way for the fabrication of three complete pump assemblies, which includes the pressure vessel, internal piping, and improved relief valves. The complete pump assembly will be engineered to be approximately the size of a Mk 2 DDS gas flask.

The NEDU divers who participated in the 1,500-foot dive were as follows: LCDR J.L. Zumrick, MC; HMCS(DV) D.J. Ball; BM1(DV) M.R. Hobbs; MM1(DV) N.R. Penn; EM1(DV) F.J. Donlon; and HT3(DV) D.P. Willette. The participants of the Mk 14 dive that was conducted in August in the Ocean Simulation Facility (this was the first manned Mk 14 dive and it went to a depth of 200 feet) were as follows: BMC(DV) D.B. Mc Neil, HT1(DV) J.A. Neal, EN1(DV) W.C. Cauley, MM1(DV) G.R. Corey, BM1(DV) D. Durman, and EM2(DV) T.R. Kelly.

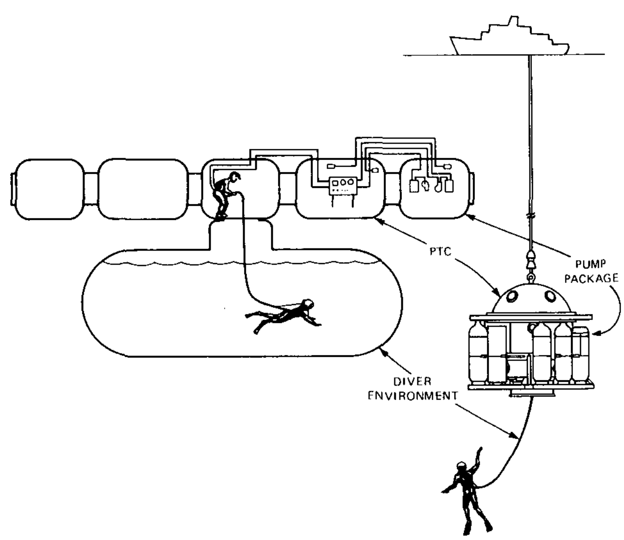
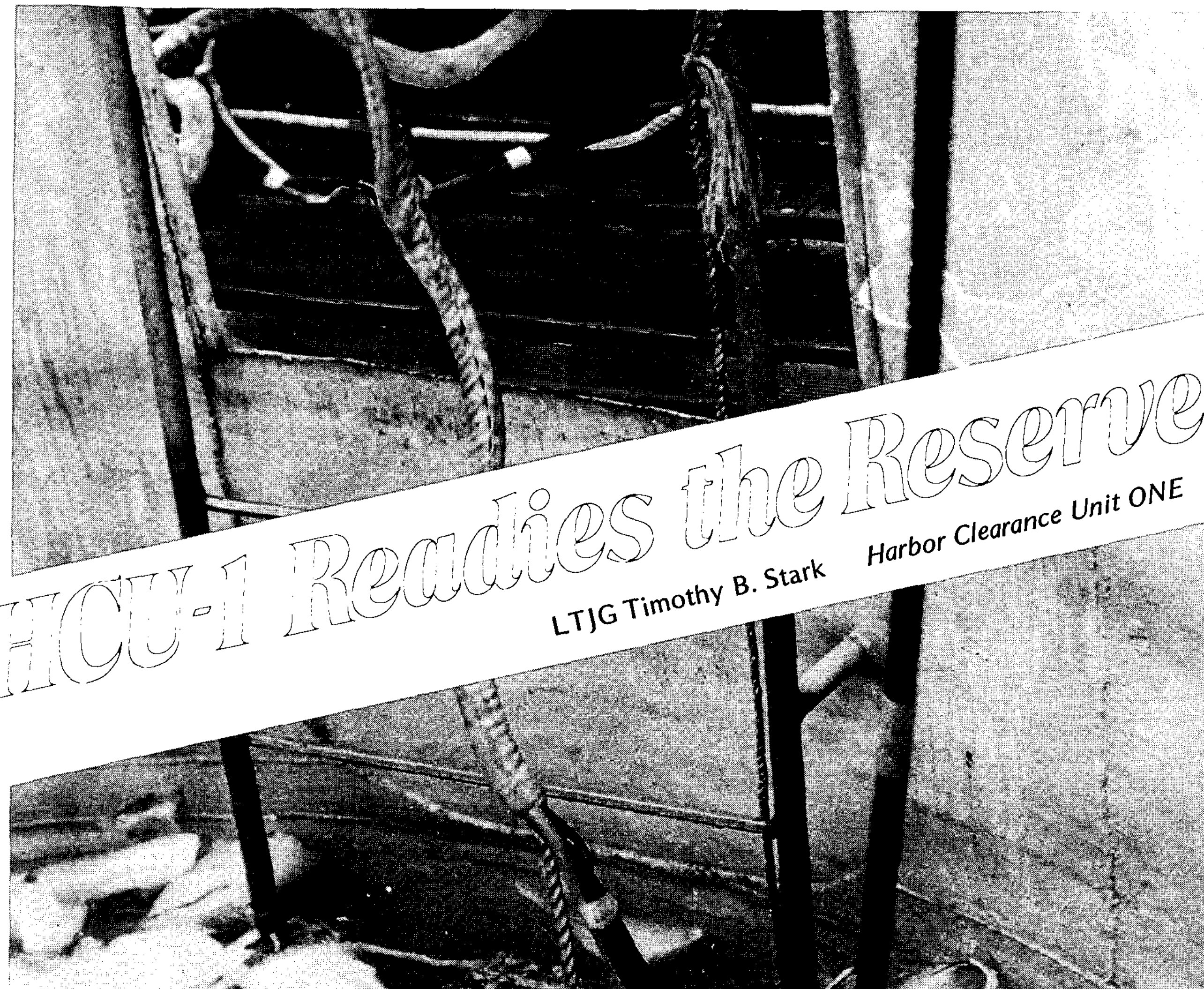



Figure 1: Hyperbaric Testing Simulating Operational Conditions.

# HCU-1 Readies the Reserves

LTJG Timothy B. Stark    *Harbor Clearance Unit ONE*



Harbor Clearance Unit ONE, Pearl Harbor, Hawaii, which is now under the command of LCDR Arthur R. Erwin, has been the main training activity in the areas of diving and salvage for the Reserve Harbor Clearance Units (RHCU) on the west coast since the summer of 1975. The purpose of the training is twofold. It is conducted primarily to improve the readiness posture of the RHCU's in diving and salvage. It also integrates the reserve salvors into the parent organization (in this case, HCU-1) to ensure that when the need arises, the RHCU's will be able to effectively mobilize into HCU-1's organization.

During the past summer, four of the six west coast RHCU's received training at HCU-1. The scenario of training was different for each detachment because of the different phase of training that each detachment had reached. However, each detachment did participate in some actual diving and salvage mission that HCU-1 was tasked to undertake, from salvaging a sunken pontoon to removing a ship propeller.

After an RHCU detachment arrives and before training commences at HCU-1, two important meetings are held. First, the RHCU's Commanding Officer and Executive Officer meet with HCU-1's Commanding Officer, Executive Officer, Diving/Salvage Officer, Master Diver, and Reserve Training Coordinator to discuss the planned 2-week training and to make any last minute adjustments to the schedule. After the training schedule is firm, a meeting of the aforementioned group, the entire RHCU detachment, and HCU-1's Department Heads is conducted. The purpose of the meeting is to present the training schedule to the RHCU detachment, introduce key HCU-1 personnel to the detachment and vice versa, and, most important of all, to project a feeling of welcome and comradeship.

HCU-1 established the job of Reserve Training Coordinator to ensure that reserve training would run smoothly. HCU-1's Reserve Training Coordinator is MMCS(DV) Paul A. Walker, USN. Senior Chief Walker's experience in diving and salvage and his organizational ability and "can do" spirit have made the reserve training highly successful. He works closely with each RHCU detachment, organizing each salvage exercise and ensuring that all equipment, material, and tools needed for the exercise are readily available. Generally, he acts as a "mother hen" for the detachment during their 2-week ACDUTRA.

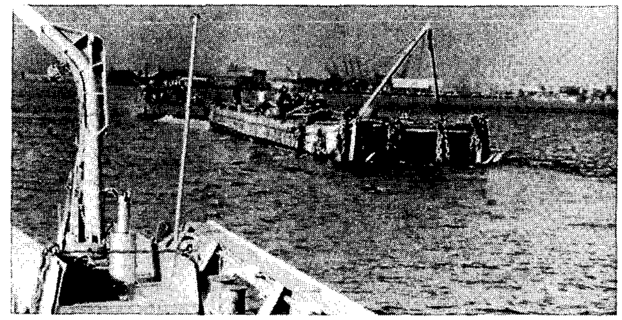
Training conducted during the past summer included underwater cutting and welding; underwater weld, patch and blow; emergency pumping; recovery of a submerged object; rescue and assistance/fire at sea; ship propeller removal; recompression chamber operation; diving

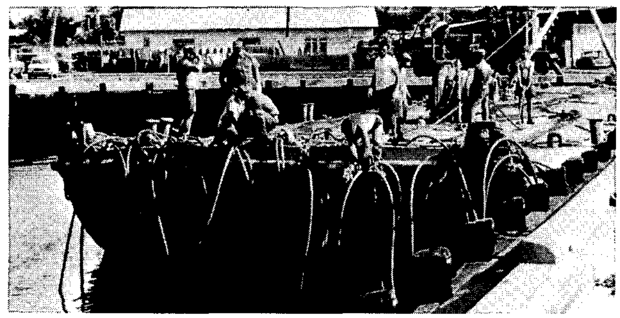
Photo left shows reserve diver wearing Mk 1 bandmask and hot water suit in ice water. Below: Reserve training with Mk 5 hard hat at sea.

medicine review; bouyant and free ascent training; demolition training; underwater damage assessment television system training; hydraulic tool package training; Mark 1 mask training; and U.S. Navy two-man open diving bell training. The RHCU detachments also participated in such diving and salvage operations as propeller removal and strut bearing underwater repair of an ARS and salvage of a submerged pontoon in Kaneohe Bay, Hawaii, using 1-ton lift bags. Recovery of a lost ATF anchor and chain, underwater survey of a marine railway, and assistance in the treatment of decompression sickness patients were other drills conducted. All things considered, the reserve salvors had a productive and meaningful summer training period.

At the end of the training period, the RHCU detachment meets once again with key personnel of HCU-1 to discuss the prior 2 weeks of drills. Each member of the detachment is called upon to voice his opinion of the training he received and his personal ideas on how the training could be improved and what he would like to see scheduled during the next year's ACDUTRA. This feedback is most helpful in assessing the individual needs of that particular detachment and in improving the overall quality and quantity of the training given.

The personnel at HCU-1 look forward to the RHCU training periods and strongly support the Reserve Harbor Clearance Unit Program in general. It is the Command's opinion that, when called upon, the Reserve Salvors will greatly solidify the overall salvage readiness of the U. S. Navy.





# HCU-1's Fly-Away Mixed Gas System

Harbor Clearance Unit ONE (HCU-1), located at Pearl Harbor, Hawaii, has designed, fabricated, and tested a portable mixed gas diving system called the "Fly-Away Mixed Gas System." The purpose of the system is to establish a mixed gas diving capability at HCU-1. The system's basic components consist of gas stowage containers, oxygen stowage containers, air storage containers, a gas distribution console, a two-man open diving bell, and the U. S. Navy Mk 1 diving outfit. It operates from any platform of opportunity that is equipped with a boom or crane with a minimum lifting rate of 4 tons. The system is not dependent upon the host platform for any services except for providing enough space.

The system is capable of supporting 18 dives to a depth of 300 feet of seawater with a maximum bottom time of 30 minutes without gas resupply. In the field, gas resupply can be accomplished with either pre-mix gas or raw gases mixed on-site. The system is configured such that two independent $He\text{-}O_2$ mixes, oxygen, and air are available to the console operator for supply to the divers.

The system has been operationally deployed 5,000 miles from its home base on a host platform to conduct $He\text{-}O_2$ dives to 195 fsw. Planned mobilization time for deployment is 24 hours; planned set-up time for diving from a host platform is 12 hours. The system is an ideal method for military or commercial organizations to attain a 300-foot surface supplied diving capability at minimum costs. As successful as it has been thus far, the full advantage of the Fly-Away Mixed Gas Diving System has not yet been completely realized. In essence, almost any ship, barge, or platform at any sea or land location in the world is a potential mixed gas diving facility.

# RHCU Training at HCU-2

LT Raymond S. McCord
*Harbor Clearance Unit TWO*

Harbor Clearance Unit TWO, Little Creek, Virginia, has taken an active interest in the training of reservists assigned to the Reserve Harbor Clearance Units under HCU-2's control. A total of eight units are now assigned to HCU-2 for training, these are as follows:

| HCU-2 DET | LOCATION | COMMANDING OFFICER |
|---|---|---|
| 101 | Portsmouth, NH | LCDR Hank Parker |
| 201* | Fall River, MA | LCDR Jim Clancey |
| 304 | Philadelphia, PA | LCDR Mike DiPuppo |
| 405* | Cleveland, OH | LCDR Bob Phillips |
| 506 | Little Creek, VA | LCDR John Haley |
| 608 | Jacksonville, FL | LCDR Ray Sage |
| 708* | Miami, FL | LCDR Stuart Sorg |
| 813 | Chicago, IL | LCDR Steve Chubb |

*formed 1 March 1977

For the past year, HCU-2 has been assisting in the training program held at RHCU locations during their monthly weekend drills. As part of this assistance, HCU-2 personnel have visited RHCU sites on drill weekends to help the units over some of the rough spots. Also, HCU-2 has been training their respective reserves on 2-week Active Duty for Training (ACDUTRA). The Naval School, Diving and Salvage, is responsible for conducting Diver Second Class phase training for enlisted personnel in all of the reserve units.

The first unit to report to Little Creek for ACDUTRA this year was HCU-2 Det 101. The unit, which came in January, received extensive training in diving under extremely adverse conditions. Little Creek Cove was frozen over with 6 inches of ice at the time, and it was necessary to break the ice each morning with one of HCU-2's LCM-8's. Det 101 was also given instruction in the use of the Mk 1 bandmask and the Mk V hard hat and received salvage training in the raising of a submerged weight.

The next unit to report aboard was Det 506, who, although homeported in Little Creek, still ended up traveling because they were sent out on an actual job that HCU-2 was undertaking. The severe weather along the Eastern Seaboard had created a myriad of salvage jobs for HCU-2 this past winter. One of these jobs was the salvaging of a 114-ton AMMI test barge used by the Naval Surface Weapons Laboratory (NSWL) at Dahlgren, Virginia, which had been moved by ice approximately

10 miles from its test site (see *FP*, Summer 1977). The AMMI barge was quite "holed" and required the rigging of two belly lift chains under the barge using HCU-2's YFNX-33 and a YC from NSWL Dahlgren. The barge had to be lifted and carried to a repair site.

HCU-2 was undertaking this job while Det 506 reported on ACDUTRA. The entire detachment was immediately shipped off to the salvage site. A great deal of "OJT" was the result, along with the successful accomplishment of the salvage operation.

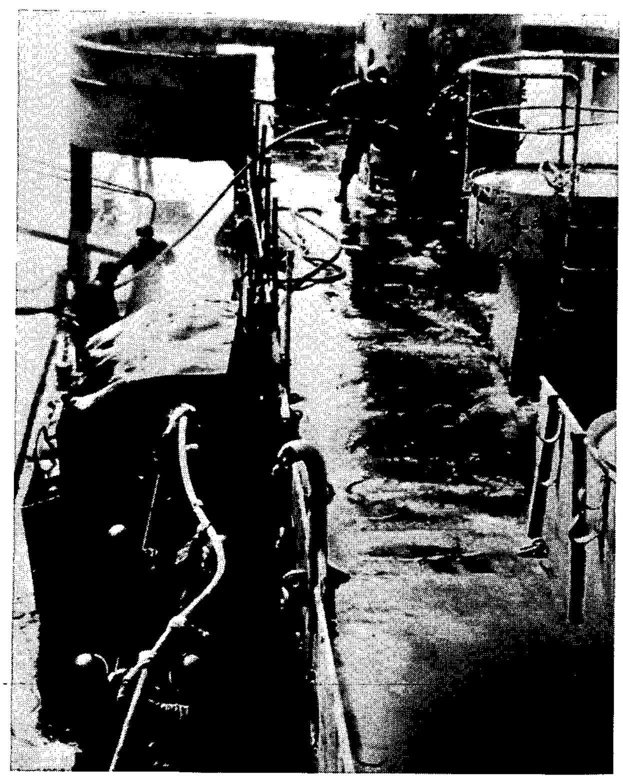
The next unit to report to Little Creek was Detachment 608 from Jacksonville, Florida, which also reported on ACDUTRA during a very opportunistic time. During their ACDUTRA they were able to survey a damaged aviation gunnery target in the Albermarle Sound of North Carolina. They also assisted in the cleaning of the shafts, struts, propellers, and rudders of the USS DWIGHT D. EISENHOWER (CVN-69) at Newport News Naval Shipyard. This job took 3 days of intensive shift work and Det 608 personnel were a great asset in accomplishing the job in a very short time. The unit was able to dive the Mk 1 band mask and operate off of the YFNX-33 (Light Lift Craft) successfully during the cleaning operation.

In August, HCU-2 was swamped by Det 708 and Det 304 both coming on ACDUTRA at the same time and also by conducting the USN Mk 1 band mask orientation class during their second week of ACDUTRA. Having both units at Little Creek at the same time however, proved to be very helpful, since Det 304 is one of the more established senior units and also is the largest RHCU. The new-comer (Det 708) could more readily envision the RHCU concept in action.

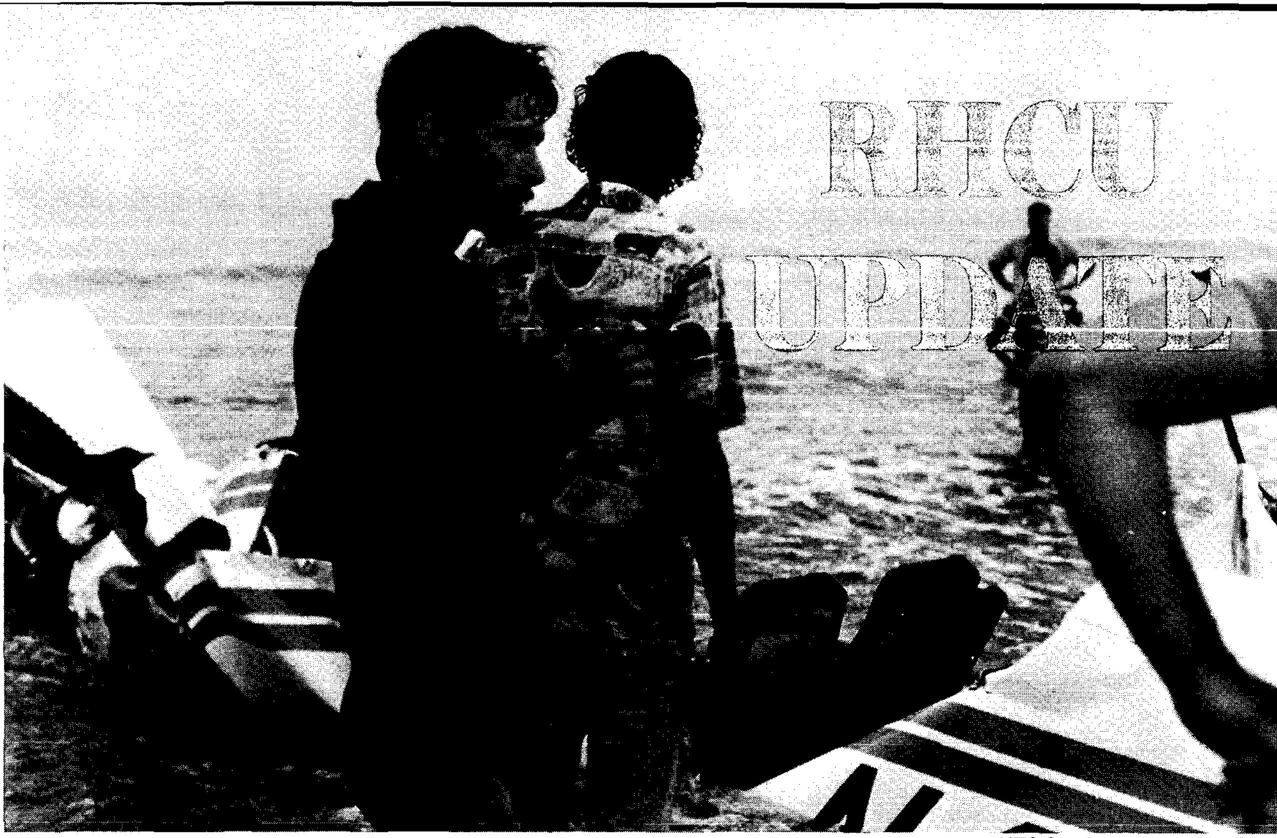
During their 2 weeks at HCU-2, Det 708 phase trainees were "buffed up" on their medicine and physics and given an introduction to Navy salvage. Det 304 personnel were able to observe salvage training being conducted on the USS PRESERVER (ARS-8) and the USS RECOVERY (ARS-43). Det 304 divers were also placed into the USN Mk 1 orientation class during their second week on ACDUTRA and were able to dive the rig in conjunction with operating an open bell. The diving was performed at the COMNAVSURFLANT Second Class Diving School and over the side of the YDT-16, both operated by HCU-2. Det 304 divers were put into the training tank to perform cutting and welding projects using the Mk 5. Personnel from Det 304 also assisted in readying the craft from HCU-2 to go in dry dock.

All in all, HCU-2 had an extremely close working relationship with our RHCU's, and continues to do so. All hands, both reserve and active, feel that the benefits gained through the training being conducted at HCU-2 is well worth the hard work.

Above: Reserves operate off the YFNX-33 during ACDUTRA.
Below: Fire-at-sea training.



# RHCU UPDATE



HT2 Stanley surveys wreckage.

During a routine training weekend in Atlantic City, New Jersey on July 8-10, 1977, Naval Reserve Harbor Clearance Unit Two Detachment 304 was called on to assist in the recovery of two civilian light aircraft that had crashed nearby off the New Jersey coast during a period of dense fog. HCU-2 Det 304, based in Philadelphia, Pennsylvania, was conducting its "weekend-away" drill at the Atlantic City, New Jersey Coast Guard Station when the two separate accidents occurred.

At 10:00 a.m., approximately 1 hour after the regularly scheduled work had begun, the Coast Guard requested diving assistance in the recovery of a downed aircraft. Det 304's Executive Officer and four divers departed immediately for the crash site, which was located off the beach at North Carolina Avenue in Atlantic City's resort area. Information concerning the crash was spotty, and the remaining men readied back-up equipment in case it was needed.

Upon arrival at the scene, two divers boarded one of the lifeguard boats and headed toward the downed aircraft. Before any divers could enter the water, however, several large breakers pushed the wreckage into shallower water where it could be reached from shore. (The pilot had been rescued before Det 304 divers had arrived.) Though the unit did not actually recover the plane, the incident did illustrate their ability to carry out emergency mobilization assignments when called upon.

Just as the reserve divers were preparing to begin their afternoon duties at the Coast Guard Station, they again were requested to lend diving assistance for another downed civilian aircraft. As in the first call, one diving team was deployed while one remained on base to continue assigned tasks. The unit's divers, Coast Guard, and local rescue units located the wreckage approximately 300 yards off the beach at Ocean City. Unable after 5 hours of effort to free the pilot from the wreckage, which was stuck in the sand bottom, they attached flotation gear to the aircraft and towed it to the beach. This concluded their part in the recovery, and they secured their gear and headed back to the station.

Though interrupted twice during their 2-day drill to assist in the two recoveries, the reserve unit also performed their regular assignments with excellent results. These tasks included a hull survey on the Coast Guard Cutter CAPE STAR, a survey of the marine railway, and the removal of debris from pierside at the Coast Guard Station. To accomplish as much as possible and to attain maximum diving experience, the divers were divided into two teams and were assigned specific areas of operation. Team One, consisting of five divers, was tasked to survey the marine railway. Team Two, consisting of six divers and one non-diver, was scheduled to inspect both the hull of the 90-foot CAPE STAR and the steel sheeting on the bulkheads around the Coast Guard Station. The marine railway survey was needed

by the Coast Guard to determine whether they should replace or repair the structure. The investigation by Det 304 will save the Coast Guard both time and money in this study. Also, thousands of pounds of debris were removed from an area in which a Coast Guard boat had recently bottomed out at low tide. A total of 21 dives consuming 16 hours and 38 minutes were made by HCU-2 Det 304 divers at a water depth of 15 feet, with a 1-foot visibility, zero current, and 67° water temperature. Personnel involved in the weekend drill are as follows: WO F.J. Cornell, Commanding Officer of the Coast Guard Station; LCDR M.T. DiPuppo, USNR-R, Commanding Officer of HCU-2 Det. 304; LT D.I. Peterson, USNR, Executive Officer of DET 304; BMC J.A. Kendall, USNR-R; HTC G.R. Boyer, USNR-R; HT1 A.K. Bucknam, USNR-R; MM1 E.F. O'Neill, USNR-R; HT2 D.F. Stanley, USNR-R; EM2 B. Kruger, USNR-R; EM2 K. Santucci, USNR-R; EN2 H.J. Sicker, USNR-R; BT3 C.P. Castro, USNR-R; and QM3 W.D. McCauley, USNR-R.

In their report, the reserve unit praised the personnel at both the Coast Guard Station and the adjacent Naval Reserve Center for their "outstanding cooperation" in making the weekend one of the most beneficial training sessions as far as the betterment of the unit.

In a Letter of Commendation, RADM A.H. Murray, Jr., Commander Naval Reserve Readiness Command Region Four, commended Det 304 for their participation in the rescue/salvage efforts concerning the two aircraft crashes. "The experience and skill of . . . unit members in responding to emergency situations such as occurred on 9 July 1977, further indicate a degree of mobilization readiness that continues to enhance the image of the Naval Reserve and its mission." Though this Letter of Commendation deservedly goes to an individual unit for its performance, it also reflects the success of the Reserve Harbor Clearance Unit Program in general. The dedicated personnel involved and the excellent training programs have made the RHCU's valuable diving and salvage assets.

Above: HTC Boyer inspects flotation gear attached to wreckage. Below: Wreckage in shallow surf.


# ESSM Assets Relocated

Mr. Earl Baker
*Office of the Supervisor of Salvage*

A study in 1976 determined the most cost effective composition and management of the Emergency Ship Salvage Material (ESSM) System. The conclusion was that the mission of the ESSM System can be accomplished more efficiently from a fewer number of ESSM bases than those presently in existence, with an accompanying substantial savings in cost. Thus, it was decided to relocate the assets to four basic locations.

A single U.S. east coast base has been established at Cheatham Annex, Williamsburg, Virginia. A west coast base now exists at the Naval Communications Station in Stockton, California. The space limitations at the previous site at Oakland, California, led to the more recent move of assets to Stockton, where two warehouses provide approximately 224,000 square feet of covered storage space (in addition to 12,000 square feet of open storage space). Cheatham Annex offers one warehouse with 160,000 square feet of covered storage space.

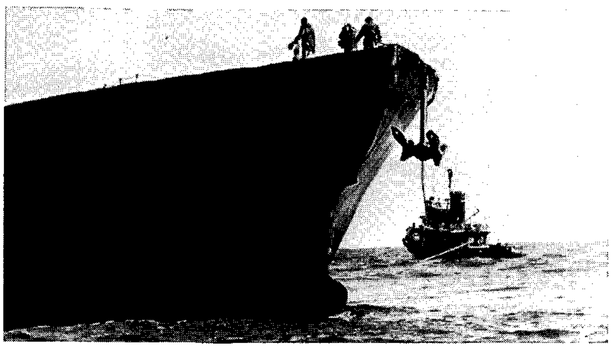
Specified material, equipment, and services at these U.S. Bases will be provided by the U.S. Government under "Host-Tenant" agreements with the Naval Communications Station in Stockton and the Naval Supply Center in Williamsburg. These bases will contain a wide range of Navy-owned salvage, submarine salvage, and pollution control equipment.

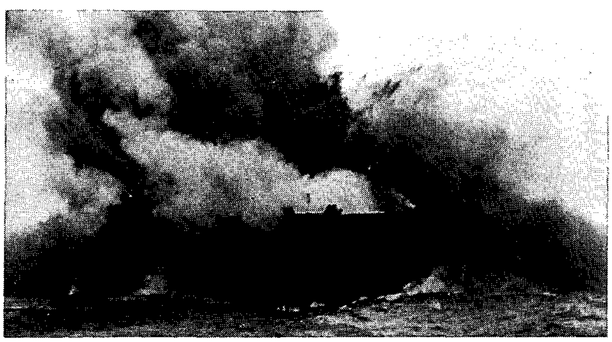
Two overseas equipment complexes have also been established at the following U.S. Navy activities: The U.S. Navy Office in Singapore and the U.S. Army Eighth Logistical Command at Camp Darby, Livorno, Italy. The host activity supporting each of these two complexes provides storage, equipment handling, shipping, receiving, and related functions.

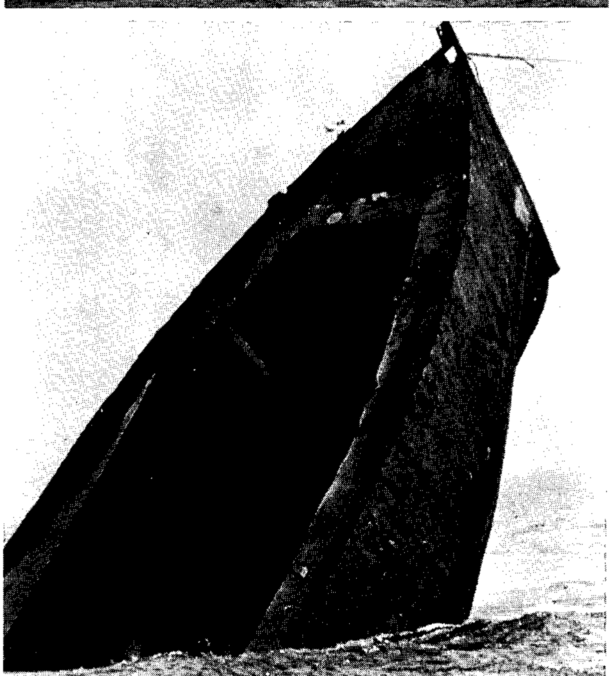
As *Faceplate* went to press, proposals were being evaluated for contractor manning and maintenance of salvage, oil pollution, and submarine salvage equipment. Contractor personnel will be permanently stationed at Cheatham Annex and at Stockton; but, they will travel to the two overseas complexes every 6 months for the inspection, testing, and repair of equipment to ensure its operational readiness. The basic staff at each of the two CONUS Bases consists of a foreman, a senior mechanic, an operator/mechanic, and a warehouseman. The contractor is also responsible (through task assignments) for responding to and operating the appropriate equipment in the event of an oil spill. This applies only to oil spills and not to salvage operations. All eight CONUS Base personnel will be available on a 24-hour per day basis to support SUPSALV requirements. ments.

The consolidation of all equipment has been completed. All the oil pollution assets are currently at the Cheatham Annex and Stockton Bases. After minor modifications are made to selected items of the oil pollution equipment, they will be shipped to the complexes at Livorno and Singapore. Submarine salvage equipment will not be stocked at Livorno or Singapore.

# Salvage in Reverse at HCU-2







LT P. E. Cincotta, USN
LT R. S. McCord, USN
*Harbor Clearance Unit TWO*

Continuing the long-standing policy of rendering assistance when needed, Harbor Clearance Unit TWO (HCU-2), Little Creek, Virginia, aided the Virginia Marine Resource Commission (VMRC) by sinking the ex-EDGAR CLARK. The ex-EDGAR CLARK was the last of a series of six liberty ships that were sunk to create artificial reefs. Since 1974, HCU-2 has been helping VMRC place stripped hulks on the ocean bottom to create artificial habitats for reef fish.

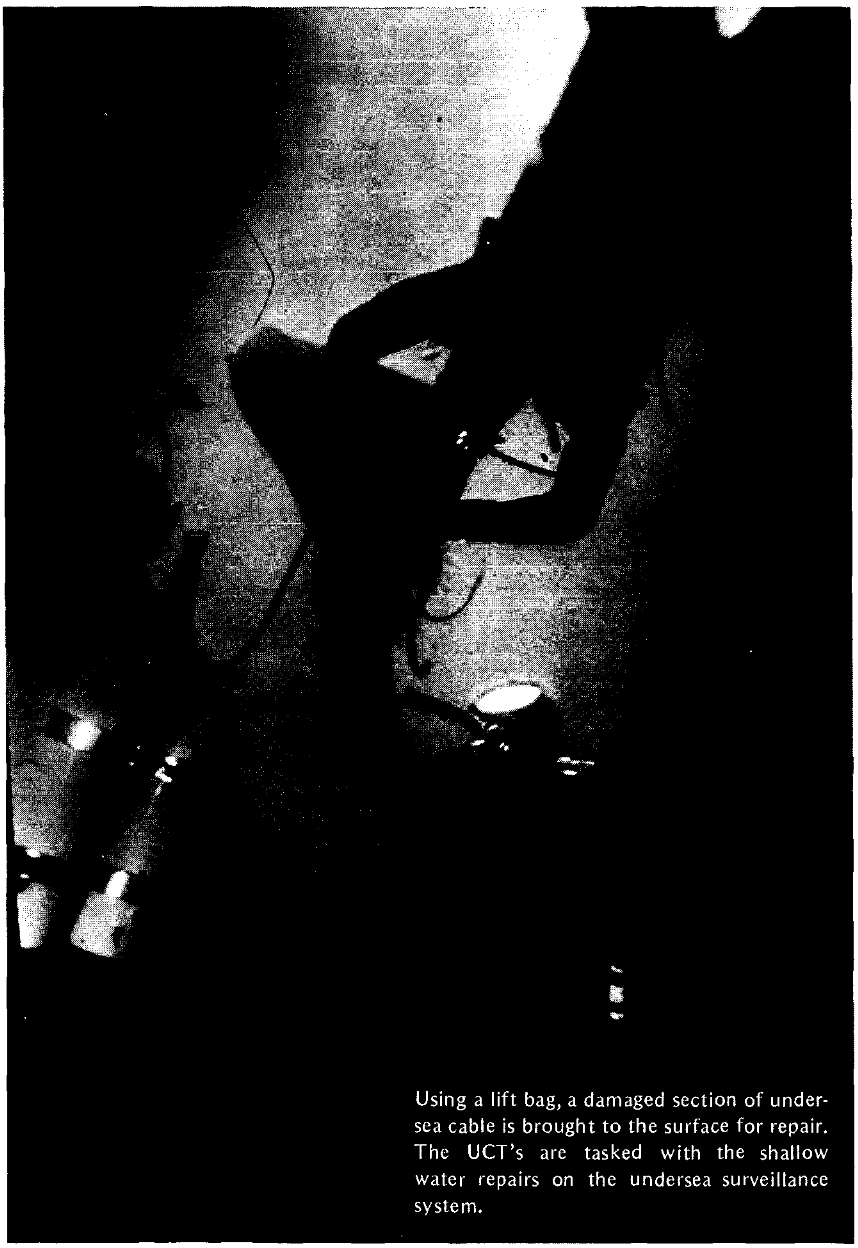
After being delayed by bad weather for 3 days, the "SINKEX" commenced on May 12. The total effort took 2 days, beginning with the off-loading of plastic explosives from YRST-2 to one of HCU-2's Mike 8 boats. A short transit along local water-ways lead to Jacob's Salvage Yard, where the old ship, already stripped and prepared for sinking, was located. The demolition team was lead by HTCS(DV) A. Connor, USN, and CPO C.J. Ballinger, RN, and consisted of ENC(DV) R.L. Hardy, USN; HMC(DV) M.L. Darius, USN; EM1 (DV) D. Gallagher, USN; BM2(DV) A.W. Moon, USN; MN2(DV) D.C. Lands, USN; SN P.L. Gallina, USN; and FN P.J. Reilly, USN. Explosives were placed in strategic locations on board the ex-EDGAR CLARK. One Bangalor Torpedo Kit (ten to a kit) and 22 haversacks of C-4 were used; the charges were connected by 4,000 feet of detonation cord. Two main lines with two electric blasting caps each and double trunklines connecting the charges to both main lines were used to ensure positive detonation. The charges were placed such that the stern and midship compartments would rupture and flood, but the bow compartment would remain intact. Thus, the stern would sink first and when the weight of water was great enough to break through the bulkhead to the forward compartment, the entire hull would be flooded. This method would allow the hulk's heading to be maintained.

The next morning, the team rendezvoused with the tug used for towing the ex-EDGAR CLARK near the Triangle Reef area off Norfolk, Virginia. After the hulk was steadied on the desired heading by a stern anchor and the towing hawser from the tug, a boarding party made a final check of the explosives and detonation cord. The firing line was floated to the head boat, aboard which the team was embarked, and then connected to the hell box.

Four minutes and 19 seconds later, the ex-EDGAR CLARK was on its way to a watery grave. This "reverse" salvage job was carried out faultlessly and without incident despite the old nemesis of the day on which it was completed, "Friday the thirteenth."

# SEABEE UCT's Are Valuable Fleet Assets

LT T.K. Pyles, CEC, USN
*Naval Facilities Engineering Command*



Using a lift bag, a damaged section of undersea cable is brought to the surface for repair. The UCT's are tasked with the shallow water repairs on the undersea surveillance system.

Seabee construction diving began during World War II in conjunction with the building of the numerous advanced bases in the Pacific. Operations consisted primarily of underwater pipeline installation, blasting coral reefs, and the inshore work necessary to provide channels and mooring facilities for shipping. Most of the diving was done by specially trained divers assigned to the Naval Construction Battalions; but, some small semi-independent units were formed for the purposes of limited construction, demolition, and harbor clearance salvage projects. Among these units were the original Underwater Demolition Teams (UDT), which were composed of Seabee divers.

Between WW II and the mid-1960's, the role of the Seabee diver was an uncertain one. He often found himself at sea, completely removed from the construction field for which he had been trained. With the advent of renewed interest in ocean engineering and the underwater construction field in the mid-1960's, the need for specially trained and experienced construction divers became apparent. In 1969, a team of Seabee divers was formed from throughout the Seabee community on a temporary duty basis for the purpose of launching and implanting the TEKTITE I undersea habitat in the Caribbean. The operation was successful and resulted in Seabees being tasked with additional underwater construction projects.

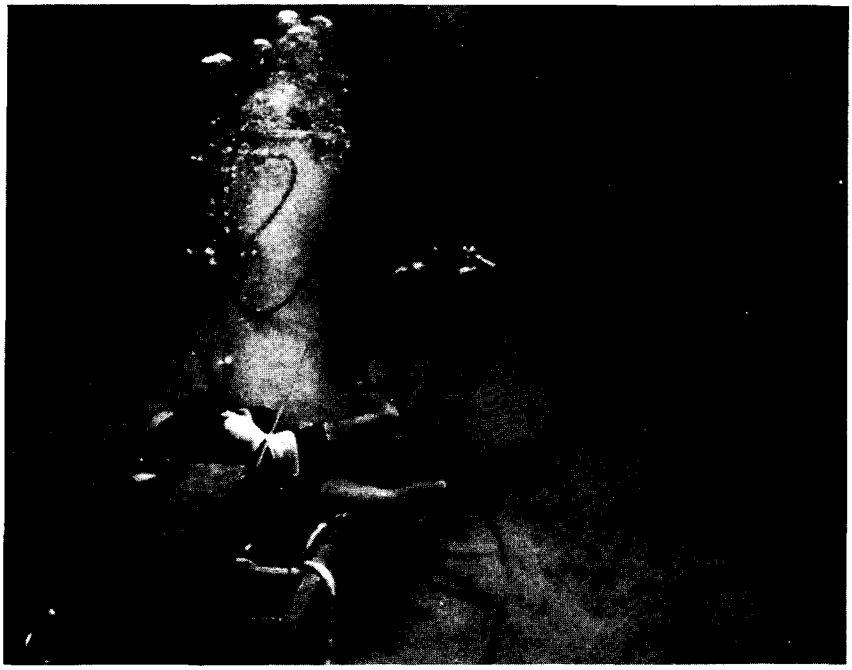
Recognizing that employing Seabees in underwater construction work was a logical extension of their land construction capability, the Chief of Naval Operations authorized in 1970 the formation of specially trained Seabee detachments for the engineering, construction, inspection, and repair of underwater and waterfront facilities. These detachments became known as Underwater Construction Teams (UCT).

Two of these special detachments (UCT's) were formed in early 1971 as components of the Twenty-first and Thirty-first Naval Construction Regiments, homeported respectively at the Construction Battalion Center, Davisville, Rhode Island, and at the Construction Battalion Center, Port Heuneme, California. UCT ONE has since moved from Davisville to the Naval Amphibious Base, Little Creek, Virginia. In addition, the Chief of Naval Operations in November 1973 established the UCT's as independent units of the Naval Construction Force (NCF) under the operational and administrative control of COMCBLANT and COMCBPAC.

At their present level of manning, each Underwater Construction Team consists of two Civil Engineer Corps officers, 29 Seabee-rating underwater construction technicians (divers), one Corpsman (diver), and five support personnel with other ratings. This manning includes 14 First Class and 15 Second Class divers. Four of the First Class diver billets are shore duty; all other diver billets are sea duty. Diving billets within the UCT's have been identified with the primary NEC's of Basic Underwater Construction Technician (5932) and Advanced Underwater Construction Technician (5931).

Each UCT can be deployed as an independent unit. Usually, however, the unit is broken up in two or three detachments with a Petty Officer in charge of each. Deployments are generally from 1 to 4 months in length and are project-oriented rather than site-oriented. Because deployments are generally scheduled to take advantage of seasonal weather conditions or to meet a schedule imposed by other factors of a project, no routine deployment pattern has been established. The UCT workload has grown to require numerous deployments that generally cover 9 to 11 months per year. However, every effort is made to allow at least 1/3 of each year in homeport for every team member on sea duty.

A typical deployment may include such tasks as an initial bottom survey for selection of a site; bottom preparation, using drilling, blasting, and rubble removal techniques; the implantment or placement of a facility or of equipment, such as an electronic array or a tower, and/or the laying and stabi-



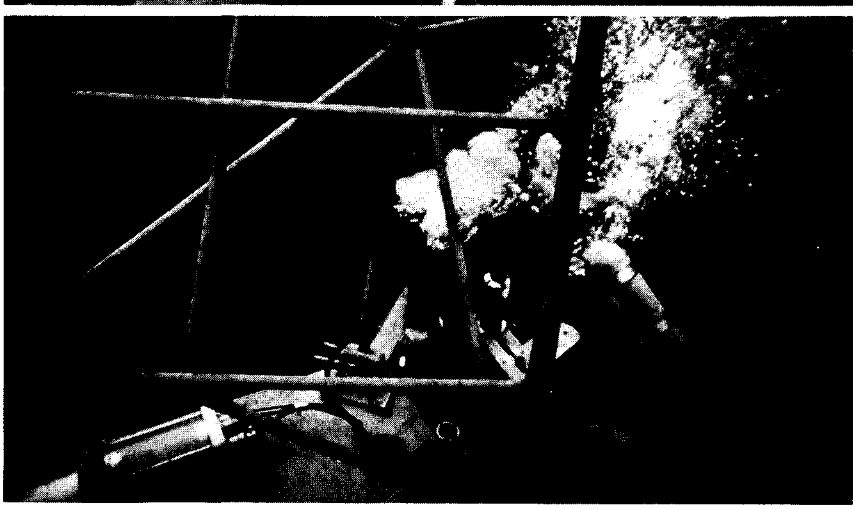
UCT-ONE Underwater Construction Technicians install a bottom mounted magnetometer offshore of St. Croix. This instrument can detect the presence of a ship because of the mass of steel it contains.

UCT-2 Seabees' bolt cast iron, split pipe over an undersea electrical cable. This heavy pipe provides weight for stabilization and physical protection from chafing and dragging anchors.

lization of deep sea electrical cables for support of these or similar facilities or equipment. Many detachments have been deployed to inspect underwater cables, moorings, piers, offshore towers, and other ocean facilities. The findings of these inspections have often lead to repair projects on future deployments.

In the past 6 years, UCT detachments have been deployed to sites ranging from the Antarctic to the Arctic Circle. Some of the more interesting projects, which are too numerous to include here, will be highlighted in future articles.

Each UCT is outfitted to be self-sufficient in performing underwater construction tasks. This includes construction and weight handling equipment, small boats, underwater and terrestrial construction tools, diving equipment, safety equipment, communication equipment, and standard allowance of infantry gear. Each UCT also has a certified transportable recompression chamber. In addition, a 30-day supply of consumables is maintained for operations at isolated sites. Should the need arise for specialized ocean construction equipment not in the team's assets, equipment is available from the Ocean Construction Equipment Inventory. This inventory was established by Naval Facilities Engineering Command (NAVFACENGCOM) and is managed by the Ocean Engineering and Construction Project Office at NAVFACENGCOM's Chesapeake Division.



Steel floats are attached to a 2500 foot POL pipeline to be sunk in place along the lagoon floor at Diego Garcia in the Indian Ocean. Two of these pipelines and an explosive embedment anchor mooring were installed for tanker offloading.

Seabee underwater construction divers unfold the arms to a hydrophone array prior to lowering it 3000 feet to the seafloor. This array and six others were installed at the Atlantic Fleet Weapons Training Facility's Underwater Tracking Range.

Seabees are trained in various construction trades both in formal schools and on the job. These skills and the philosophy of producing quality construction are essential to successful underwater construction operations. Seabees report to the UCT's after gaining some construction experience and completing formal diving training. Training in the use of special underwater construction tools and techniques is provided after reporting aboard. This training consists of on-the-job training and specialized formal training provided through the Basic and Advanced Underwater Construction Technician courses given by the Naval Construction Training Center at Port Heuneme, California. Graduates of these specialized courses are eligible to receive Underwater Construction Technician NEC's of 5931 or 5932.

The UCT's have proven to be valuable assets to the Atlantic and Pacific Fleets. Their facility construction, maintenance, inspection, and repair services continue to be in great demand. Their response to fleet projects on undersea surveillance facilities, underwater tracking ranges, and other ocean related facilities will continue to have a substantial impact on fleet readiness.

# NEDU REPORTS

*Editor's Note: In the past,* Faceplate *has published NEDU Report abstracts in a sequential order from the master file. Because of the number of reports, only those from up through mid-1974 have thus far been printed. In order to provide a more up-to-date listing each issue, there will be a mix of those reports not yet printed but still valid from the past (to continue the "catch-up" process) and various current-year reports of a more timely interest to today's diving community. This NEDU Report page reflects this new policy.*

**Navy Experimental Diving Unit Report 11-74.** *Evaluation of the Draeger LAR III Pure Oxygen Scuba.* LT T. L. Hawkins, USN; EMCS (DV) T. C. King, USN.

*Abstract:* The Draeger LAR III scuba is a pure oxygen breathing apparatus designed and manufactured in the Federal Republic of Germany. The scuba is completely closed-circuit and incorporates a demand type oxygen supply. Gas purification is accomplished by means of a refillable $CO_2$ absorbent canister. The LAR III works on pure oxygen and is, therefore, depth/time limited as defined in the *U.S. Navy Diving Manual.* A maximum diving time of 3 hours can be expected, depending on the oxygen consumption and work rate of the individual diver.

This evaluation was conducted to determine safe operational capabilities and limitations of the LAR III with respect to instructional and training use by Naval special warfare divers. It was found that the LAR III is equal in many respects to the U.S. Navy Emerson scuba, although the Draeger incorporates many inherent design features that make a somewhat more desirable apparatus. It is recommended that the Draeger LAR III be approved for limited use by U.S. Navy underwater demolition and SEAL teams.

Tests were conducted by the Navy Experimental Diving Unit and the Naval Inshore Warfare Command Atlantic, Operational Testing Department, during the period 15 October 1973 through 1 April 1974. Tests were conducted at the Navy Experimental Diving Unit Headquarters, Washington, D.C., and at the Naval Station, Roosevelt Roads, Puerto Rico. LT Thomas L. Hawkins, USN, and EMCS (DV) Thomas C. King, USN, of the NAVXDIVINGU, were the Project Directors. BMCM (DV) Cornelius J. Leyden, USN, was the NAVINSWARLANT Project Officer. Operations were conducted using services of Commanding Officer, Underwater Demolition Team TWENTY-ONE; Commanding Officer, SEAL Team TWO; Commanding Officer, Explosive Ordnance Disposal Group TWO; Commanding Officer, Explosive Ordnance Disposal Facility; and Officer-in-Charge, Naval Inshore Warfare Task Unit—Caribbean.

**Navy Experimental Diving Unit Report 17-74.** *Test and Evaluation of UCT-1 Diving Equipment.* LT M. T. Hadbavny, CEC, USN; BM1 (DV) R. L. Bowdish, USN; Mr. T. W. Cetta.

*Abstract:* The Navy Experimental Diving Unit performed a test and evaluation of diving equipment used during a diving accident involving Underwater Construction Team One in the Azore Islands on 11 June 1974. No major discrepancies were found.

**Navy Experimental Diving Unit Report 13-76.** *Effect of Cold Gas Inhalation on Cardiac Rate in Man at Depth; A Preliminary Study.* E. T. Flynn; J. M. Alexander; B. Hoke; D. L. Jackson.

*Abstract:* Two Navy divers breathed first warm and then cold helium-oxygen mixtures while performing graded exercise on a bicycle ergometer at simulated depths of 0, 200, 400, 600, 800, 850, and 1,000 feet of seawater. In all cases, heart rate increased in proportion to the increase in oxygen consumption with exercise. When compared with warm gas control values, no consistent changes in heart rate were apparent in either subject during cold gas inhalation through a depth of 800 feet. At 850 and 1,000 feet, however, both subjects demonstrated a significant reduction in exercising heart rate on cold gas. The potential mechanisms underlying these changes in cardiac rate and their impact in terms of cardiovascular performance and exercise tolerance are discussed.

**Navy Experimental Diving Unit Report 14-76.** *Swimmer Life Support System (SLSS MK 1) Technical Evaluation.* LTJG H. N. Paulsen, USN.

*Abstract:* Technical evaluation of the Swimmer Life Support System (SLSS Mk 1) including unmanned, manned, and open sea testing. Compares required technical and operational characteristics with TECHEVAL results. Concludes the system is ready for Operational Evaluation.

**These research reports have been issued by the Navy Experimental Diving Unit, Panama City, FLA. Non-DOD facilities desiring copies of reports should address their requests to National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. DOD facilities can obtain copies from the Defense Documentation Center (DDC), Attn: DDC-TSR-I, Cameron Station, Alexandria, VA 22314. Prices vary according to the individual report.**

# The Old Master Says...

Re: Changes to the *U.S. Navy Diving Manual*, Volume 1, Change 2:

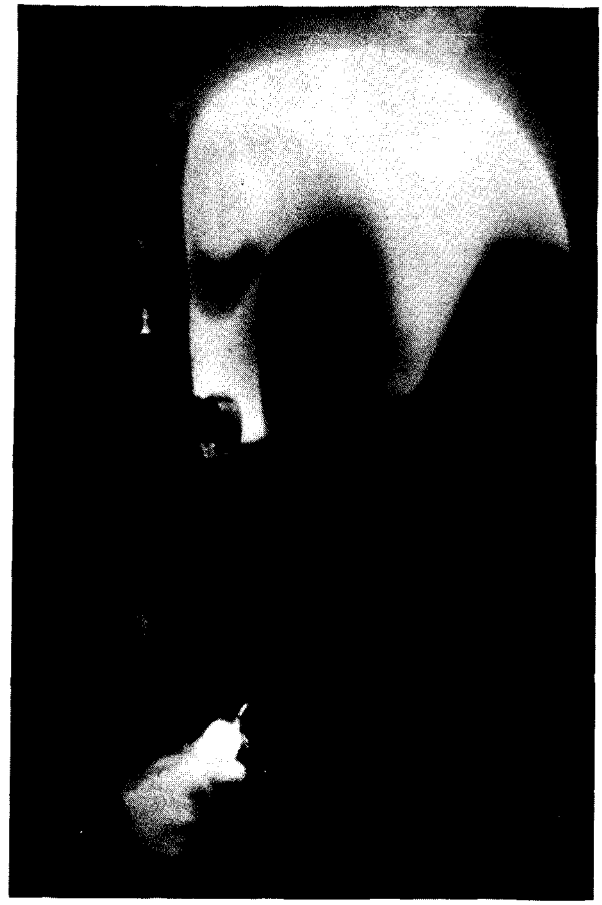
I've been working closely with SUPDIVE on changing Volume 1 of the *U.S. Navy Diving Manual*. We're not completely finished yet, but there have been some significant changes that you should make a note of. Briefly, these changes are as follows:

a. Treatment Table 5A has been deleted.
b. Determining which treatment table to use has been simplified. Gas embolism is treated only with Table 6A. (It is harder to get into a Table 4.)
c. Chapter Six has been completely revamped, with a new section on Mk 12 SSDS, simplified gas formulas, and a new section on tethered Mk 1 mask scuba.
d. Ventilation requirements for chambers have been reduced.
e. New thermal discussions are presented.
f. There is now an appendix on Arctic diving.
g. The use of a submersible pressure gauge is mandatory with scuba.
h. Variable volume suit guidance has been improved.
i. The manning levels for scuba have been updated. I hope to have my work finished by December and reviewed with SUPDIVE in January after a page-by-page check.
j. Buoyancy compensator is interchangeable with life jackets for scuba operations.

New Topic: The first Master Diver meeting this past September was a resounding success. I have included some of your inputs in my work on the *Diving Manual*. Also, I have been working closely with SUPDIVE to promulgate the minutes from that conference. KEEP PASSING ME YOUR QUESTIONS, SUGGESTIONS, AND IDEAS!

You can reach me at:
AVN: 436-4351
Comm: (904) 234-4351

BMCM(MDV) J. Tolley, USN
"The Old Master"



DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
WASHINGTON, D C 20362

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
DEPARTMENT OF THE NAVY
DoD-316

U.S.MAIL

POTOMAC RESEARCH INC 5-016-1287
1706 LISENBY AVE 5
PANAMA CITY FLA 32401