FACEPLATE

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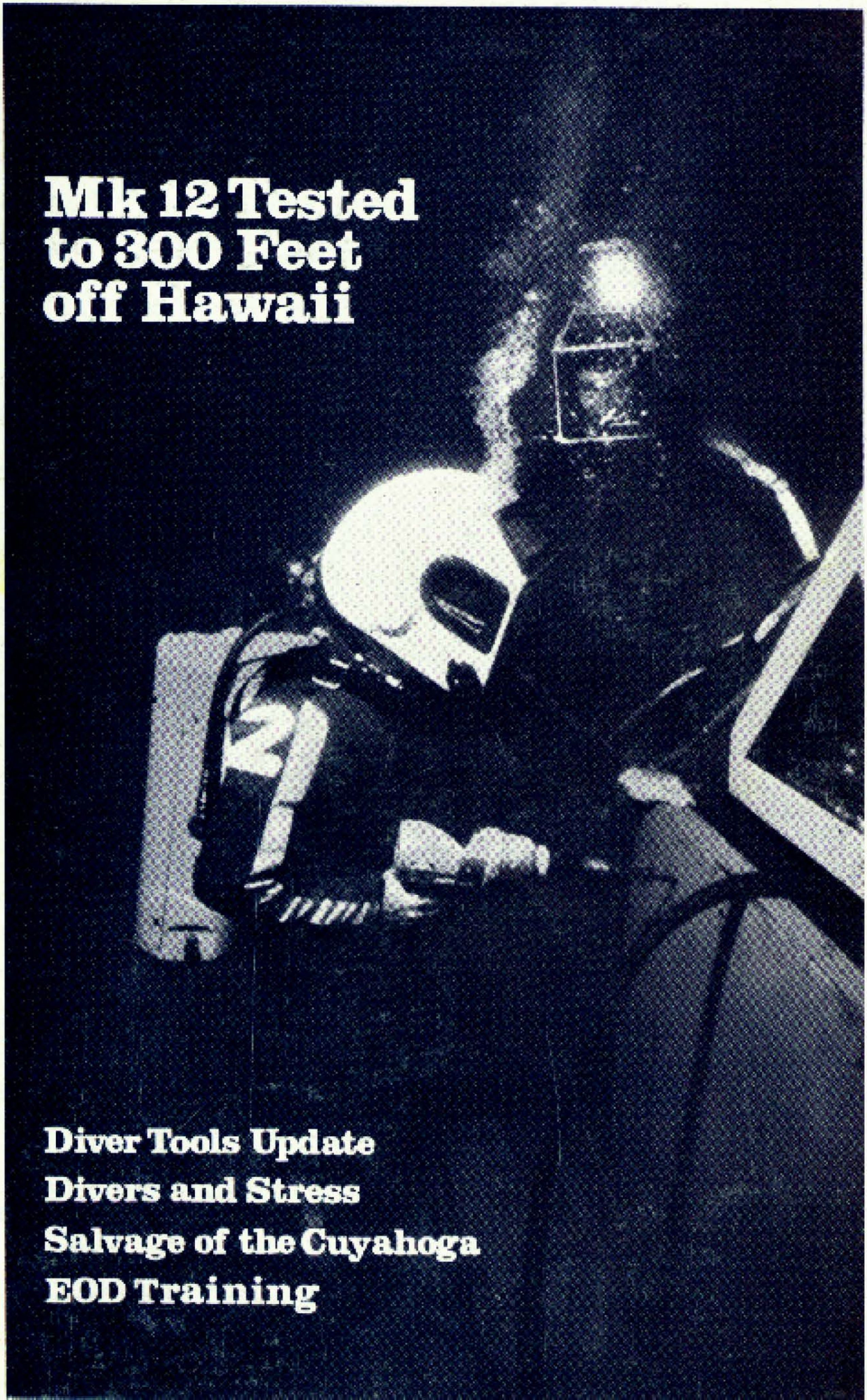


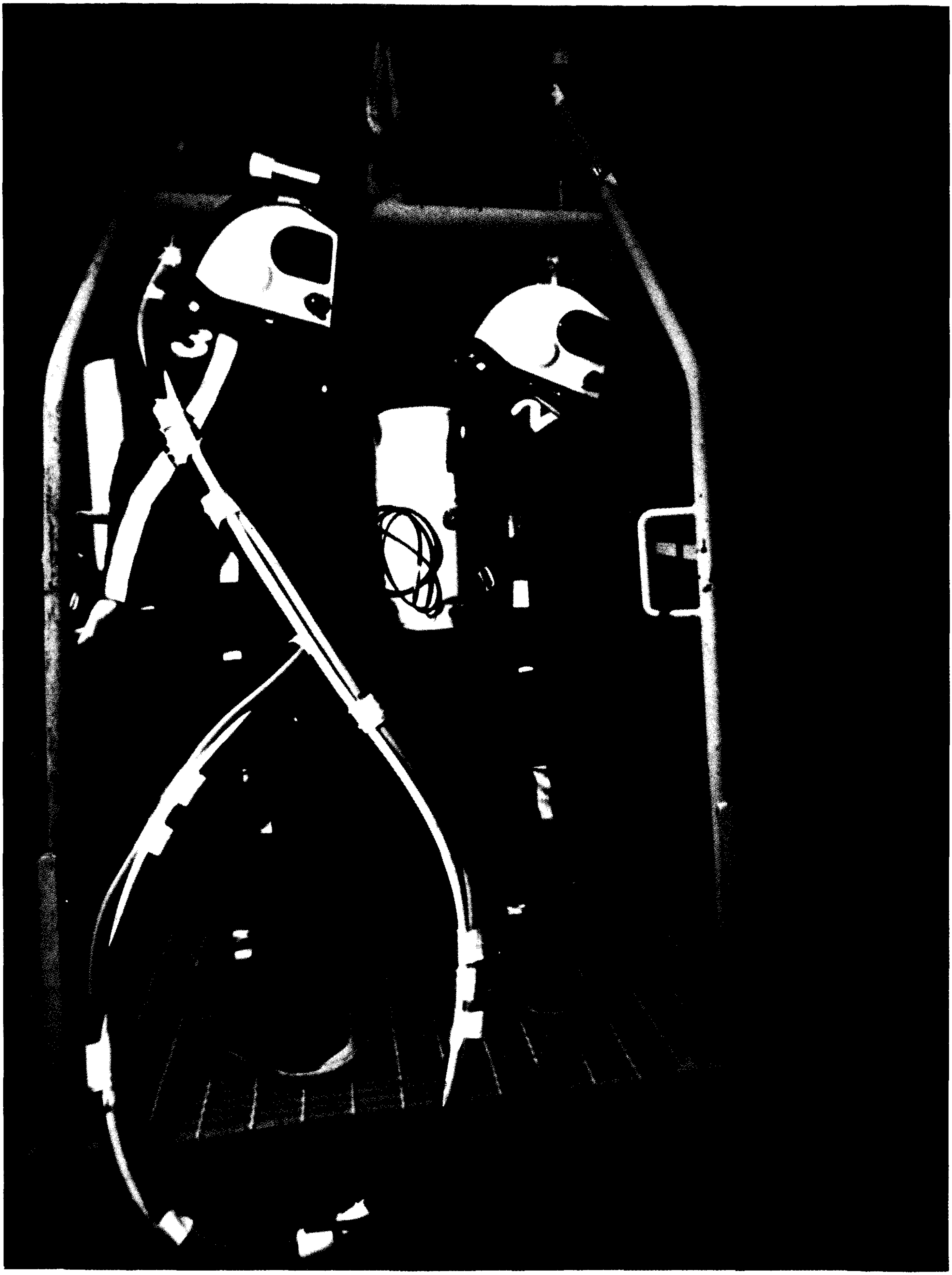
Mk 12 Tested to 300 Feet off Hawaii

Diver Tools Update

Divers and Stress

Salvage of the Cuyahoga

EOD Training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FACEPLATE

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

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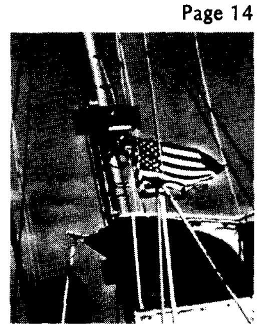

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FRONT COVER, BACK COVER AND INSIDE FRONT COVER show scenes from the Technical Evaluation of the Navy's new Mk 12 Surface-Supported Diving System (mixed-gas configuration) conducted off Hawaii in October.

SOUNDINGS

DRUGS AND DIVING – THE ALARMING FACTS

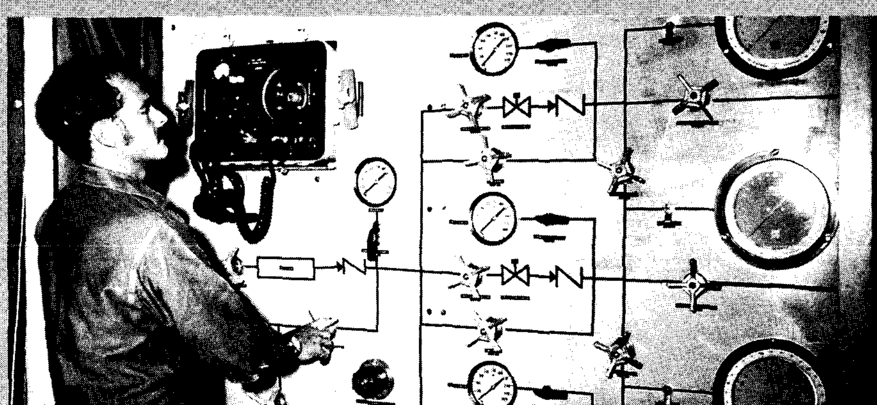
Because the body's physiological make-up is different under compression, the effects produced by drugs taken by divers will not be the same at depth as on the surface. Whether the drug is aspirin or alcohol, nasal spray or nicotine, the behavior effects it produces change under pressure, sometimes very significantly. Marijuana has especially unpredictable effects at depth. Divers, who need their wits about them at all times, should therefore avoid taking drugs before a dive. These are among the conclusions reached by Dr. J. Michael Walsh, a behavioral pharmacologist at the Naval Medical Research Institute. Walsh presented a summary of his research on drugs and the undersea environment at the seventh annual Inward to the Sea conference at the George Washington University on November 4. Other Navy speakers at the conference were NMRI's Dr. Michael Curley, LT, MSC, USN, who spoke on psychological stress in divers (see article, page 11), and Dr. Paul Weathersby, LT, MSC, USN, whose investigations into decompression theory will be featured in *Faceplate* at a later date.

USS SAFEGARD ASSISTS ARMY TUG

USS Safeguard (ARS-25) executed an at-sea recovery of an adrift U.S. Army tug near the island of Nihoa in the northern Hawaiian chain last August. The tug was one of three 100-foot-long harbor tugs under tow from Okinawa to Pearl Harbor. Poor weather and heavy seas had caused the towline to part, and prevented it from being reconnected. Following notification of the Coast Guard, Safeguard was dispatched and arrived on scene after a 27-hour transit. Her personnel quickly boarded the distressed tug and rigged it for tow, completing the hazardous operation within three hours. Safeguard and the Army tug arrived safely in Pearl Harbor on August 11 after a 300-mile transit from Nihoa. Safeguard is assigned to the towing and salvage force of the Third Fleet, which maintains an emergency salvage and towing capability on a 24-hour basis.

IMPROVED DRY SUIT CLOSURES AND SEALS

As part of a seven-month study for the Naval Coastal Systems Center, Panama City, Florida, Battelle Columbus Laboratories researchers are designing and constructing new entry closure locations and neck and wrist seals for dry diving suits. The suits are used by Navy and commercial salvage divers to perform the deepest diving and most strenuous swimming tasks. According to Battelle's David C. Doerschuk, the components of the suits will reduce the possibilities of leaks, provide improved comfort, durability, ease in dressing, and increased resistance to sand and dirt. Also, there will be reduced requirements for applying lubricators and corrosion inhibitors during regular use of the suits. In designing the seals and closures, researchers will consider physiological, material, and mechanical aspects that may affect divers. Examined, for instance, will



EN1(DV) David Lay at the control panel of NCSC's portable surface-supported diving system.

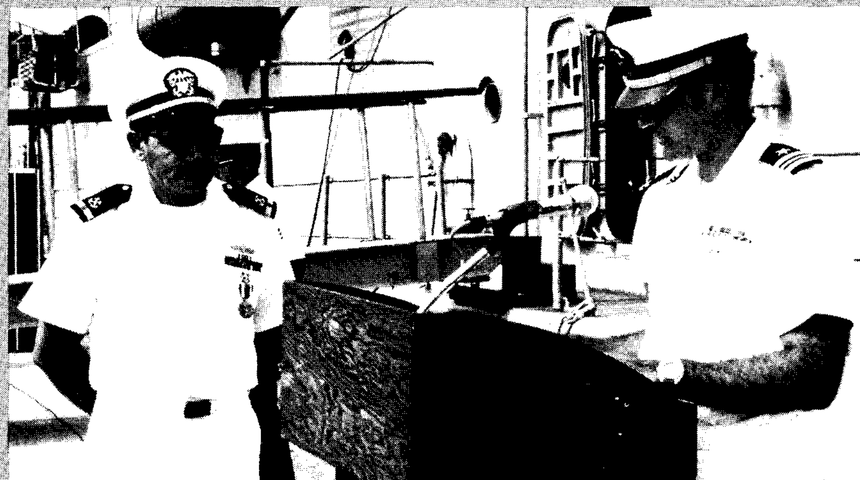
NCSC'S PORTABLE DIVING SYSTEM CERTIFIED

The Naval Coastal Systems Center's Portable Surface-Supported Diving System (PSSDS) late last summer was certified by the NAVSEA Certification Board. The PSSDS provides breathing air at pressures and flow rates adequate to support two divers and a standby diver at depths to 130 feet. The system's three major components (compressor, emergency flasks, and control panel) can be quickly transported to ships or shore-based work sites and put into operation without external support equipment. Specifications for the PSSDS were given to NCSC mechanical engineers Bruce Dzadek and David Bon, who then designed the system. Project Leader Wally Jenkins praised Clarence Blevens, Garland Dunn, and Walter Herndon for their outstanding work in assembling the PSSDS. BMCS (MDV) William Austin of NCSC's diving locker also provided design input for the system and is in charge of its operation. The PSSDS is being used for pier maintenance diving operations, training dives and various at-sea projects.

be how designs affect skin contact pressure, since increased pressure slows blood flow and results in thermal body imbalances that reduce a diver's physical performance.

CWO4 RYDER RETIRES

On August 1, 1978, CWO4 Leon E. Ryder retired from the Navy at Harbor Clearance Unit Two, Little Creek, Va. His service spanned 30 years and included continuous service under Commander, Service Squadron Eight, since 1957. Recognized as one of the most successful and most experienced diving Bos'ns in the Navy, Bos'n Ryder was always quick to point out that "There's no such word as can't" and "We're burning daylight." His record of success earned for him a Meritorious Service Medal upon retirement. CWO4 Ryder has left a legacy of excellence to follow. His dedication, professional knowledge, and concern for his men will be sorely missed at HCU-2.



CW04 Leon E. Ryder (left) receiving Meritorious Service Medal from HCU-2's Commanding Officer LCDR Robert Wells upon retirement from naval service last August.

LETTERS

FROM AUSTRALIA: CALL FOR DIVING PAPERS

I found the article in the Spring 1977 issue of *Faceplate* entitled "The Aging Diver: Do the Older Become Bolder?" very interesting, and would like to reprint it in our publication at a later date. It is supposed that in Table 1 (page 21) a minor printing error has occured, the sixth line correctly reading "Dives/Yr. below 50 fsw".

Should these or other authors in your ambit have papers of general interest (e.g., anything to do with diving, outside the mechanics of salvage but including the personal problems of the diver, would be appropriate, such as cold or decompression sickness), I would like to hear from them.

The basic intent I hold as Editor of the SPUMS Journal is to spread information of every aspect of diving, the belief being that a catholic approach will best serve to improve interest and understanding of diving safety and help indicate the areas where our knowledge is less adequate than the "accepted wisdom" holds.

DR. DOUGLAS G. WALKER
EDITOR
JOURNAL OF THE SOUTH PACIFIC UNDERWATER MEDICINE SOCIETY
1423 PITTWATER RD.
NARRABEEN
NEW SOUTH WALES, AUSTRALIA

PRAISE FOR NAVAL RESERVE DIVERS

I would like to express a belated Thanks for the very well written Fall 1977 *Faceplate* RHCU Update article which described the reaction of my unit personnel to the downed civilian aircraft off the Ocean City, N.J., coast in July, 1977.

Your article accurately described the events which transpired during our "routine" weekend-away and emphasizes the achievements, expertise and preparedness of the Naval Reserve divers.

I am very proud of the divers in my unit and I am grateful that the diving community has such an excellent publication available for the exchange of all important diving dialogue.

Please keep up the great work.

M. T. DI PUPPO
COMMANDING OFFICER
HARBOR CLEARANCE UNIT TWO, DET 304
PHILADELPHIA, PA.

Letters intended for publication should be addressed to Letters to the Editor, Faceplate, Supervisor of Diving, Naval Sea Systems Command, Washington, D.C. 20362. Because of space limitations, those published are subject to abridgment.

NEDU Reports

Navy Experimental Diving Unit Report 8-78. *Part I. Unmanned Evaluation of the USN MK 1 Mod 0 Mask in Umbilical and Emergency Modes.* James R. Middleton. *Part II. Manned Human Engineering Evaluation of USN MK 1 Mod 0 Mask in Tethered Scuba Configuration.* LT John I. Brady.

Abstract: Part I. NEDU conducted a series of unmanned comparative tests using the USN MK 1 Mod 0 mask in various bailout mode configurations. The purpose of these tests was to determine if the MK 1 Mod 0 mask could be used safely with a diver-carried scuba air supply. This mode of operation would potentially be used only by activities not having a sufficient air source to maintain 135 psig overbottom pressures during diving operations. In this configuration the tether would be retained for communications. The mask was first tested in the normal umbilical-supplied mode to provide a basis for comparison. The MK 1 Mod 0 was then set up in bailout or emergency mode using first a Scubapro MK V first stage and second a U.S. Divers Conshelf XII first stage. Both first stage regulators were set to factory specifica tions for intermediate pressure. The standard MK 1 Mod 0 second stage was used throughout the test series. Results of the Scubapro MK V and U.S. Divers Conshelf XII comparison showed that the Conshelf XII significantly outperformed the MK V. Further tests were conducted using the Conshelf XII at varying intermediate pressures and bailout configurations. Tests were run with the Conshelf XII supplying pressure to the sideblock emergency port at pressures varying from 135 to 180 psig overbottom. A special adapter was constructed and the same tests were run with the first stage supplying the umbilical port. Test results showed that mask performance in the bailout mode was comparable to that achieved in normal umbilical mode at depths over 60 fsw only when intermediate pressures to the bailout port approached 180 psig overbottom. When the first stage regulator was attached to the umbilical port with a special adapter, mask performance was almost identical to that of normal umbilical mode at supply pressures of only 135 overbottom. However, because of the additional expense and logistic requirements of using a special adapter for connecting the first stage hose to the umbilical port, it is recommended that the USN MK 1 Mod 0 mask be used with scuba in the bailout supply mode. Further, it should be used only in conjunction with a U.S. Divers Conshelf XII regulator with an intermediate pressure setting of 180 psig overbottom. If diving depths are limited to a maximum of 66 fsw, the 135-psig overbottom intermediate supply pressure from the first stage to the bailout port is adequate.

Part II. A human engineering and safety evaluation of the MK 1 Mod 0 in tethered scuba configuration was undertaken at NEDU. The philosophy underlying this evaluation was that the configuration was, for practical purposes, only an extension of normal scuba diving. Thus a determination was sought as to whether the MK 1 Mod 0 or any associated equipment would conflict with the necessary safety procedures involved in the use of scuba. The compatibility of the MK 1 Mod 0 in tethered scuba configuration with a variety of diving suits (i.e., swimsuit, wetsuit, drysuit (Unisuit), and MK 16 hot water suit) was also investigated. The observed findings are described and discussed. It was concluded that MK 1 Mod 0 tethered scuba is a viable, safe diving configuration with demonstrated flexibility regarding the diving suits with which it can be used.

Navy Experimental Diving Unit Report 7-78. *Comparison Tests of the USN MK 1 Mod 0 Mask in Standard Configuration and the USN MK 1 Mod 0 Mask with Scubapro Pilot Second Stage at Varying Supply Pressure.* James R. Middleton.

Abstract: The USN MK 1 Mod 0 mask in standard configuration was tested unmanned at varying air supply pressures to determine the minimum acceptable overbottom supply pressure. These tests were run in an effort to duplicate and verify results achieved in an NEDU manned test. Various breathing rates and tidal volumes were tested at varying depths until breathing resistances similar to those achieved by working divers were attained. This combination of breathing rate and tidal volume was then used for the duration of the tests. This test is significant in that it is the first attempt to exactly duplicate manned test results in an unmanned test situation. That results were almost identical lends credibility to unmanned test simulations and their place in equipment evaluations. A minimum of overbottom air supply pressure of 135 psig must be maintained at the diving console to prevent excessive inhalation resistance in heavy work conditions. In addition, the MK 1 Mod 0 mask was modified to accept a Scubapro pilot second stage and tested under the same conditions as the standard configuration. No significant improvement in mask performance was observed when using the pilot second stage in place of the MK 1 Mod 0 regulator. A minimum of 135 psig overbottom was still required to prevent excessive breathing resistance under heavy work conditions. Further investigations into adapting the Scubapro pilot to the MK 1 Mod 0 mask is not recommended.

Navy Experimental Diving Unit Report 13-78. *Manned Evaluation of the MK 14 Closed-Circuit Saturation Diving System.* LCDR J. L. Zumrick.

Abstract: the MK 14 Closed-Circuit Saturation Diving System was evaluated over a depth range of 167 fsw to 1100 fsw to test its ability to support a diver performing heavy work. During graded exercise, helmet CO_2, differential pressure, inspired gas temperature, and diver heart rate were measured. Analysis of the data indicates that the MK 14 can support a diver performing heavy work (3.0 LPM O_2 consumption), and has successfully met its design objectives.

HOW TO ORDER:

These research reports have been issued by the Navy Experimental Diving Unit, Panama City, FL. Non-DOD facilities desiring copies of reports should address their request 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.

YOUNGBLOOD Dons Diving Rig for his Own "Shipping Under"

Ginger Crabtree
Ship Repair Facility, Guam

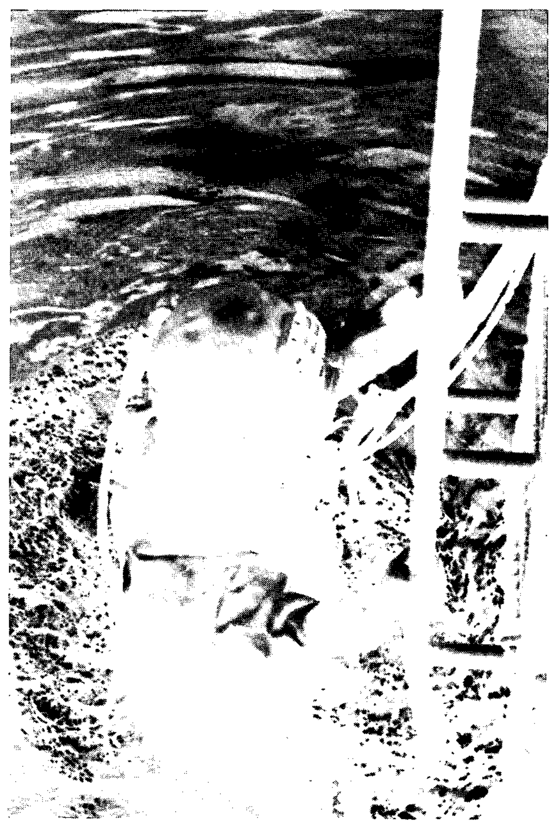
Chief Boatswain's Mate (DV) Joseph J. Youngblood, chief diver at the Ship Repair Facility diving locker in Guam, spends most of his workday underwater. When the time came for him to reenlist, he chose to do it in the atmosphere that suits him best. He took his oath on the bottom of Apra Harbor in SRF's first "shipping under" ceremony.

Youngblood dressed for the occasion in deep-sea diving gear weighing 200 pounds. It may be one of the last times the traditional Mk V diving dress will be used on Guam.

The heavy round helmet, bulky canvas suit, weighted belt, and the lead shoes, used by divers for years, are being phased out in favor of the modern Mk 12 Surface Supported Diving System. Yet, as Youngblood was assisted into the suit by his fellow divers, even Davy Jones would agree it was the perfect outfit for an underwater swearing-in ceremony.

Captain Leland G. Mitchell, commanding officer of SRF, donned the latest in Navy dive masks, the Mark I. Wearing sneakers, full uniform, and a weighted vest, he decended to the harbor floor with Youngblood; it was his first underwater reenlistment. Equipped with a waterproof copy of the oath, he would communicate with Youngblood via radio-phone connected to their headgear and relayed from the diving boat.

Alongside the pier, the divers from SRF and USS Proteus tended the airhoses under the supervision of a Proteus master diver, Senior Chief Machinist's Mate Ralph Hernandez. Fifteen feet below, with a few astonished fish as witnesses, Youngblood "shipped under" for six more years in the Navy.

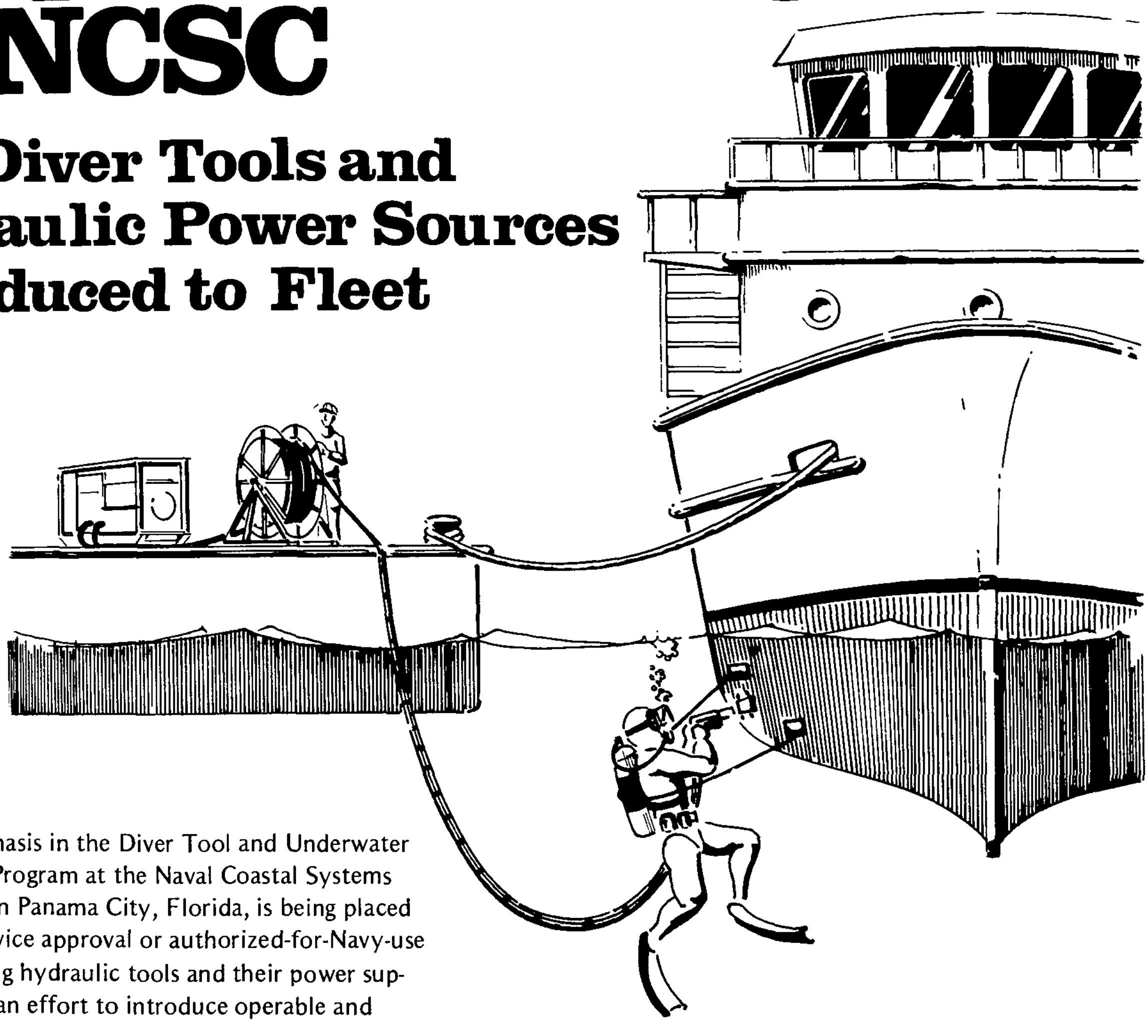


BMC(DV) Joseph Youngblood descends to bottom of Apra Harbor, Guam, in Mk V diving dress for his reenlistment ceremony.

If you have news of an unusual enlistment or reenlistment by a Navy diver, send the information and any photographs to *Faceplate*, Supervisor of Diving, NAVSEA, Washington, D.C. 20362.

Update: The Diver Tool and Inspection Program at NCSC

New Diver Tools and Hydraulic Power Sources Introduced to Fleet



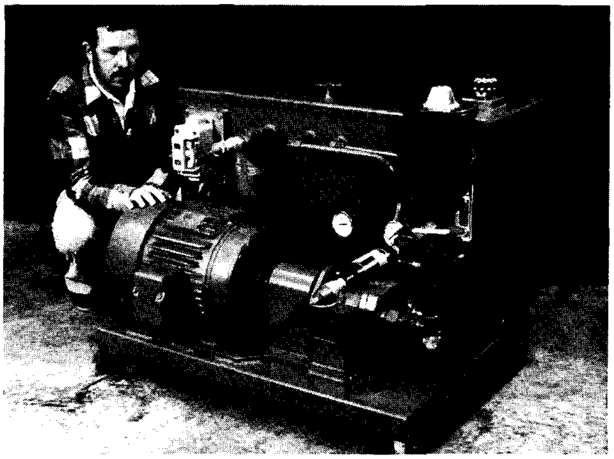
Current emphasis in the Diver Tool and Underwater Inspection Program at the Naval Coastal Systems Center (NCSC) in Panama City, Florida, is being placed on obtaining service approval or authorized-for-Navy-use status for existing hydraulic tools and their power supplies. This is in an effort to introduce operable and maintainable equipment to the Fleet as soon as possible.

Diver Tools

The following diver tools are currently authorized for Navy use (reference NAVSEA Instruction 9597.1 and NAVSEA AIG 239 Message, FY 77-14,040430Z, January 1977):

Diver-Operated Pump, Enerpac/NCSC, P80 Modified
Hydraulic Grinder, Stanley Model GR24
Hydraulic Impact Wrench, Stanley Model IW06
Hydraulic Impact Wrench, Stanley Model IW13
Sump/Jetting Pump, Stanley Model 225OH, OC
Barstock Cutter, H. K. Porter Model 36274
Wire Rope Cutter, H. K. Porter Model 36262
Portable Bandsaw, CEL design
Hand-Held Hydraulic Rock Drill, CEL Design
Synflex Hose, 3/4", 3R80 Series

Testing of the Hurst Rescue Tool, a hydraulic tool having two arms which exert a maximum pull or push force of 12,000 pounds, is planned for the near future. It is expected that this tool will be authorized for Navy use.



NCSC's Marty Sheehan with Electro-Hydraulic Power Unit.

Hydraulic Power Supplies

The skid-mounted Diesel Hydraulic Power Unit (NAVSEA Model 2) is currently undergoing service Approval tests. Such tests will commence soon for the Electro-Hydraulic Power Unit (NAVSEA Model 4). The Lightweight Diesel Hydraulic Power Unit (NAVSEA Model 5) is under development. These power supplies are described below:

NAVSEA Model 2, Diesel Hydraulic Power Unit. The Model 2 is a self-contained, skid-mounted diesel power unit capable of supporting all power requirements of tools presently authorized for service use, as well as those tools presently being considered for authorization. The Model 2 power unit is capable of supplying variable hydraulic flow from 1 to 15 gallons per minute (gpm) with variable pressures ranging from 150 psi to 2,000 psi.

NAVSEA Model 4, Electro-Hydraulic Power Unit. The Model 4 power unit is designed to have the same operating parameters as the Model 2 . The principal difference is the prime mover; the Model 4 is powered by a 20-HP 220/440 volt electric motor.

NAVSEA Model 5, Lightweight Diesel Hydraulic Power Unit. The Model 5 is a lightweight (approximately 450 lbs) power source configured on two rubber wheels capable of being pushed around by one person. The lightweight unit has a varying flow capability of up to 8 gpm with varying pressures ranging from 150 to 2,000 psi.

Service approval for the Model 2 and 4 hydraulic power supplies will probably be completed in FY 1979, with the approval for the Model 5 in FY 1980.

Environmental Testing Scheduled

In order to satisfy service approval requirements, the hydraulic power supplies will soon undergo environmental testing. The two environmental tests of particular interest to Fleet users will be hot and cold tests.

Operating experience presently exists in the area of high temperature operation. This has resulted in reconfiguring NAVSHIPS Model 1 Diesel Hydraulic Power Units to NAVSEA Model 2 units to resolve hydraulic heating problems. The NAVSHIPS Model 1 configuration is not on the list to be service approved and should be converted to the Model 2 configuration (see NCSC Message dated R 251725Z MAR 76).

Very little actual experience exists in the area of low temperature operation. Required cold weather testing should produce some good operating tips in such areas as cold weather start-up operation, and recommended hydraulic oil viscosity. Cold weather operation information should be available by May.

Further information concerning diver tools may be obtained from John Quirk or Marty Sheehan, Code 715, Naval Coastal Systems Center, Panama City, Florida 32407. Telephone 904-234-4388/4389.

TOOL AND POWER SUPPLY TECHNICAL MANUALS AVAILABLE

The long-awaited operation and maintenance technical manuals are now becoming available to Fleet users of tool kits. Manual numbers and titles are as listed below:

NAVSEA Technical Manual 0994-LP-018-0010, "Hydraulic Diver Tools."

NAVCOASTSYSCEN Technical Manual, "Salvage Hot Tap Kit."

NAVSHIPS Technical Manual 0994-013-1010, "Diesel-Hydraulic Power Unit, NAVSHIPS Model 1."

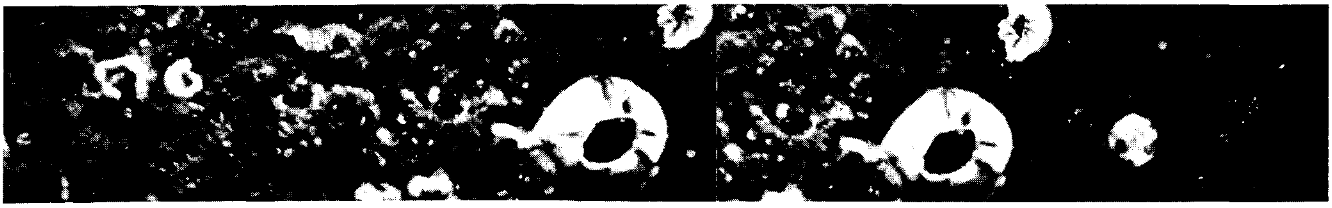
NAVSEA Technical Manual 0994-LP-017-9010, "Diesel-Hydraulic Power Unit, NAVSEA Model 2."

NAVSEA Technical Manual 0994-LP-018-2010, "Portable Diesel Hydraulic Power Unit, NAVSEA Model 3."

NAVSEA Technical Manual SS 500-AB-MMI-010/MOD4, "Electro-Hydraulic Power Unit, NAVSEA Model 4."

NAVSEA Technical Manual SS 500-AB-MMI-010/MOD5, "Lightweight Diesel Hydraulic Power Unit, NAVSEA Model 5."(In preparation)

Order from: Navy Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120 (*Civilians should add:* Attn: Customer Service).



Advanced Ship Hull Inspection Techniques Being Developed

Last year, NCSC initiated investigations into various ship hull inspection techniques and established a program involving basic hardware development and adaptation in three areas: still photography (stereo), ultrasonic thickness gaging and flaw detection, and magnetic particle inspection. Significant progress was made in each area, and some prototype systems have been field-tested in cooperation with the Naval Sea Systems Command (Code 00C). A continuation of laboratory work and the cooperative field testing is proposed, with a limited number of hardware devices to be built for selected Fleet or shipyard diving activities.

During fiscal year 1978, the following progress was made:

- A prototype stereo camera apparatus was designed, built and tested. This device uses a single Nikonos camera and Sub Sea Strobe. Field tests, performed in cooperation with Mr. Clark Mallder of NAVSEA, included photography of USS Lexington (CVT-16) in Pensacola, and USS Kennedy (CVA-67) in Norfolk. The stereo photography apparatus is currently being modified.

Stereographic photos of marine fouling on hull of USS Lexington (above) appear three-dimensional when inspected under a stereographic viewer. Right: A fouled hull during the cleaning process

- An ultrasonic test instrument (NORTEC 131-D) was procured and used in conjunction with laboratory and field tests. An audible feedback system was developed, built, and tested, as was a transducer housing which allows sensitive immersion transducers to be used. A study of ultrasonics, applied to underwater ship husbandry, was performed for NCSC by Professor D. Wyman, and a draft of his report has been received. Field testing has included thickness gaging on the NCSC waterfront pilings (in cooperation with Mr. Blackie Keane of NAVSEA), and thickness gaging at the Charleston Naval Shipyard (in cooperation with Mr. Stamey, Code 972, CNSY). On the latter job, the ultrasonic data were automatically recorded on a small digital computer.

- A worldwide survey of the state-of-the-art in magnetic particle inspection was completed. Basic investigations in magnetic particle inspections have begun, comparing three types of magnetic particle carriers and two types of magnetic sources. Several extremely promising combinations have been identified and prototype hardware developed to permit their use by divers. A dual-purpose, 100-watt underwater light (ultraviolet for magnetic particle inspection and mercury vapor for diver visual inspection) has been designed and a prototype built.

Further information concerning underwater inspection information may be obtained from John Mittleman, Code 715, Naval Coastal Systems Center, Panama City, Florida 32407. Telephone 904-234-4388/4389.

PSYCHOLOGICAL STRESS IN DIVING

LT Michael D. Curley, MSC, USN
Naval Medical Research Institute

U.S. Navy divers are often called upon to perform strenuous work under difficult diving conditions to insure that mission objectives are met. Each diver must therefore be both physically and mentally capable of responding to emergencies quickly and correctly. The often-heard term "mental toughness" refers to the ability of the Navy diver to cope successfully with circumstances that, if left unchecked, can lead to a psychological stress state.

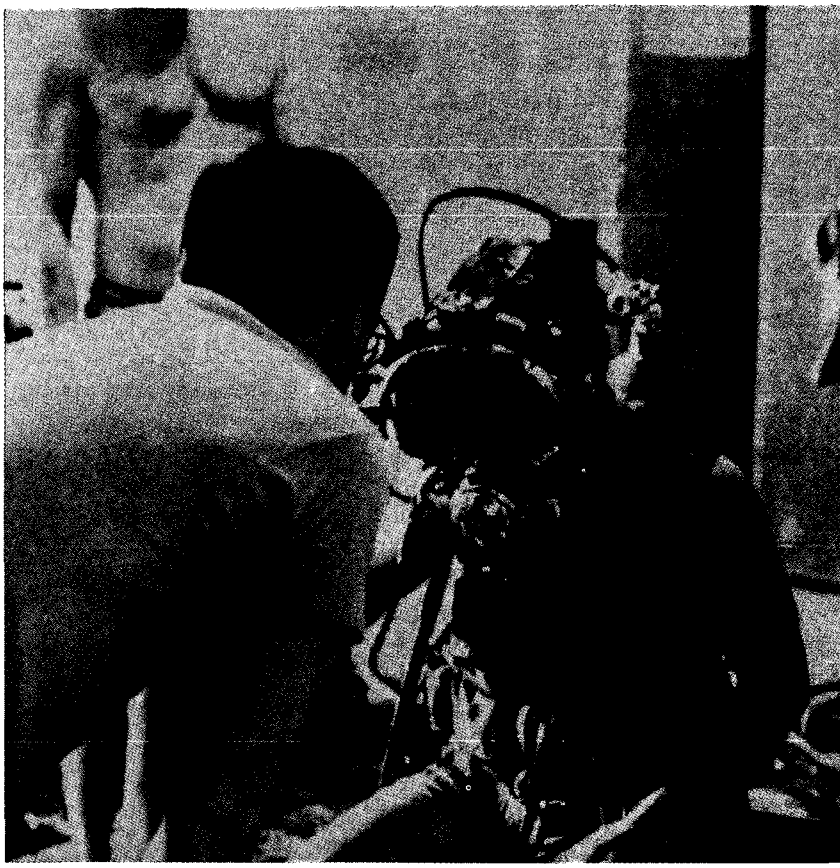
"Why do some divers remain calm and collected in the presence of [danger], yet others display extreme agitation?"

The formation and pattern of psychological stress among Navy divers is under investigation at the Naval Medical Research Institute, Bethesda, Maryland. The effects of water temperature, exercise, breathing gas, pressure, and the like on diver performance have been the subject of extensive research by diving physiologists, but it is only within the last decade that the psychological factors which enter into the formation of diver stress have been systematically investigated. Subareas that fall under the general topic of psychological stress include apprehension, fear, panic, and anxiety.

Stress traditionally has been defined as *a state of bodily upset or imbalance.*[4] It is a disturbance of the body's normal state of functioning and can be measured by various psychological and physiological tests. Familiar examples of stimuli that can trigger a stress state are the appearance of a great white shark or the sudden development of a 5-knot current. Moreover, even the *thought* of being approached by a hungry great white while in the water can be stressful to the individual. It should be pointed out, however, that stress is not always a negative state. Under certain conditions stress may relieve boredom and serve as a mobilizing force for future strain. An example of the latter would be the physiological state of test pilot Scott Crossfield, whose heart rate peaked at 185 beats per minute just before take-off in the X-15 experimental plane.[1]

Psychological stress results from varying conditions that disrupt or endanger well-established values; such conditions may or may not affect physiological survival and well-being. Thus, a cognitive component is added to the traditional definition of stress. The psychological term "threat" seems ideally suited to express the condition of the diver when he is confronted with a stimulus that he perceives as endangering important values and goals.[6] Threat implies a cognitive interpretation by the diver about the harmful significance of the situation (e.g., deciding in the midst of a 150-foot dive that his reasoning is becoming affected by nitrogen narcosis) as compared to direct tissue assault (stress/shock induced by a shark bite).

Changes in mood and personality may occur as the dive approaches. Above, author Curley thoughtfully awaits the start of his first hardhat dive.



Tenders must be alert for signs of diver stress.

Psychological threat to the diver can take many forms, including a perceived attack on the diver's status, orientation, comfort, values, and standards. This threat may lead to the development of a diver stress state that is as debilitating as that arising from direct tissue assault.

". . . divers or tenders may notice an increased hostility and/or irritability in the affected diver. 'Gallows humor' may be present."

An example of psychological threat familiar to many Navy divers occurs during the harassment portion of Navy scuba training. Although this harassment takes place in shallow depths with minimal physical discomfort, it is the formation of a psychological stress state which makes this phase of training one of the most difficult for many diver candidates. For, not only must the diver be physically capable of handling emergencies, but he must also be able to cope successfully with the psychological threat of losing his air, equipment, and dive buddy, as well as the apprehension he feels at the prospect of drowning.

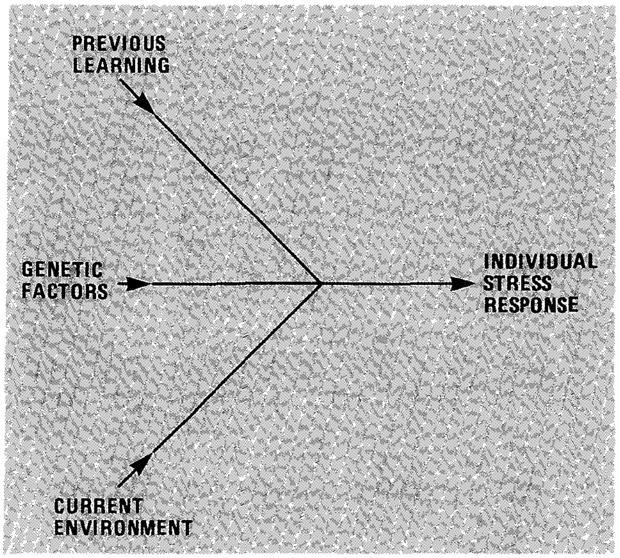
Most Navy divers are intuitively aware of individual differences in reactions to stressful diving situations. Why do some divers remain calm and collected in the presence of dangerous marine life, yet others display extreme agitation? Psychologists believe that the behavior displayed by a diver is determined by that diver's previous learning history, biological temperament, and the particular environmental setting in which the diver finds himself. In other words, there is an interaction of learned, genetic, and cultural factors.[1] Stress must be defined in terms of an interaction between the diver and the situation--not either alone. Any stimulus may be stressful in a given situation for a particular individual. And, except for extreme and life-threatening situations, no one stimulus is stressful to all divers exposed to it. To alter a popular phrase, "Stress is in the eye of the perceiver."

Now that we have defined psychological stress and its individual nature, let us turn to the problem of recognizing it in the diver. Behavioral indicators take many forms. Often the diver will verbally indicate his stress prior to the dive, or just before entering the water. A diver may complain of various physical ailments such as headache, nausea, insomnia, or gastrointestinal distress. Other divers or tenders may notice an increased hostility and/or irritability in the affected diver. "Gallows humor" may be present, a phrase referring to the practice of joking about the possibility of severe injury or death in the water.[2] Anxious divers may verbalize strong concern over relatively routine matters or problems easily corrected.[1]

Physically, manifestations of diver stress may include profuse perspiration, pupil dilation, and tremor (shakes). The psychologically stressed diver may fumble inefficiently with his gear and seem "all thumbs." Changes in mood are often present: the normally out-going, life-of-the-party diver suddenly may be withdrawn and quiet. Similar changes may be apparent in normally quiet individuals who become extremely active. Once in the water, a diver who is experiencing stress may display jerky, abortive movements, as well as frequent glancing at the surface, equipment adjustments, and communication checks. Increases in air consumption and heart rate may also occur.[5]

"Divers who can cope with psychological stress have a basic trust in themselves and possess a basic optimism about life."

Divers who cope successfully with psychological stress generally display most of the following characteristics.[3] They possess an accurate perspective of the risks and benefits attendant to diving and actively seek out the latest information regarding diver equipment, training, and safety. These divers are able to express freely both positive and negative feelings and can tolerate frustration. When faced with a difficult problem, these men break down the problem into manageable bits and work through them one bit at a time; they accept assistance from others and show flexibility and willingness to change. Successful divers are in tune with their physical state, can pace themselves, and are able to recognize the onset of fatigue and the accompanying tendencies toward disorganization. Finally, divers who can cope with psychological stress have a basic trust in themselves and possess a basic optimism about life. Valid trust in one's ability as a diver to cope with stress is arrived at through hard work and intensive preparation. Successful experience in coping with stressors during Navy diving training is a good insurance policy.



Stress results from the interaction of many factors.

There are several "direct-action" tendencies that may be utilized in coping with stress.[6] A diver may take actions aimed at strengthening his resources against harm, such as proper physical conditioning, advanced training, and preventive equipment maintenance. Some divers may become aggressive and attack the source of stress. Aggression may be verbal or physical, subtle or obvious. Many Navy divers are known for their "can-do" attitude in tackling difficult situations. Another manner of coping with psychological stress is to prevent contact with or avoid the agent of harm. This coping behavior may take the form of cognitive action (i.e., *not* thinking about something) or physically avoiding the area (e.g., not diving in an area where sharks are present). "Joking" may also be used as an avoidance device. Lastly, a diver may resort to inaction--doing nothing at all--when stressed. For example, a diver may be totally resigned that there are no direct ways of preventing harm. Reports from near-drowning victims indicate that there is no panic when all exits are closed.

Current Navy research into psychological diving stress involves the psychological and physiological testing of men involved in extended saturation dives. A better understanding of the nature of psychological diving stress will assist Navy divers and their supervisors in safely carrying out the Navy diving mission.

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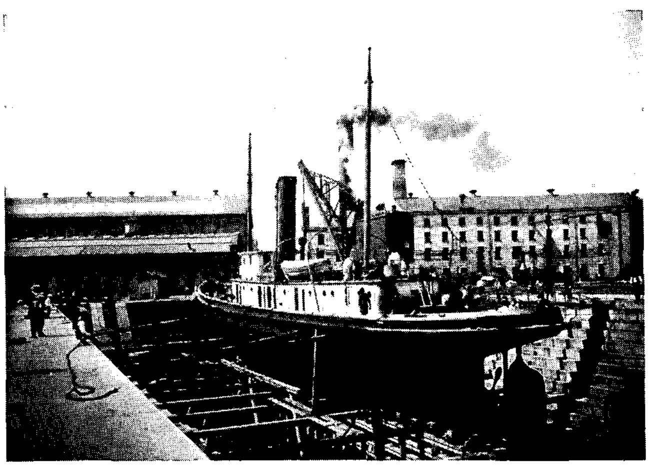
Divers Find USS Nina At 15 Fathoms

"... naval records still describe the Nina's disappearance as 'one of the continuing mysteries of the sea.' Now, 68 years later, the mystery is over."



Salvage ship USS Nina is shown in drydock in this undated photo, believed taken before 1900. (National Archieves)

Ray Mathieson displays anchor, diving gear salvaged from USS Nina.

Neil Henry

It was dark and windy in Norfolk harbor on February 6, 1910, as the ship, 10-foot waves washing over its decks, steamed out to sea.

But the USS Nina, bound for Boston that morning with 32 sailors aboard, had seen many such days. A 420-ton salvage ship built in the last few months of the Civil War, the Nina had worked as a tug, tender, and torpedo boat at dozens of Navy yards on the Atlantic seaboard.

She never reached Boston, however, and was never found. Scores of ships searched for her from Maine to the Carolinas, and naval records still describe the Nina's disappearance as "one of the continuing mysteries of the sea."

Now, 68 years later, the mystery is over.

"We found her under 90 feet of water, 11 miles north-northeast of Ocean City," said Michael Freeman, owner of American Watersports Company in Oxon Hill, and a 30-year veteran of salvage expeditions around the world. "She's sitting upright on the bottom, and her stern's partially buried in the sand."

Freeman, Bowie oyster diver Ray Mathieson, and several Ocean City divers have been salvaging bits and pieces from the Nina since the beginning of the year. So far they have hoisted the anchor, six brass portholes, the ship's 250-pound brass bell with the words "USS Nina" etched on its side, and several glass skylights that worked as prisms to distribute light below the Nina's deck.

Freeman, 54, has also found numerous personal effects of the ship crew, including a gold pocketwatch and turn-of-the-century diving gear, such as lead helmets and 30-pound diving boots.

"We also got a leather wallet that was beautifully preserved underwater," he said. "We brought it up and put it in a bucket of water on my boat, but a cabin boy thought it was junk and tossed it overboard."

The disappearance of and search for the Nina 68 years ago was told on the front of pages of countless

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Eastern newspapers. With the increasing use of wireless telegraphs at sea at the turn of the century, stories of daring rescues and oceanic disasters often were told side by side.

The Nina had a wireless on board, according to naval records, but no one had received distress signals from her. Weather records say southeasterly, gale-force winds whipped the Atlantic that February day from Virginia to Massachusetts, and the Nina was ordered to proceed to Boston within sight of coastal lighthouses.

Washington relatives of the Nina's crew, who were interviewed in newspapers, said they hoped that the Nina had found refuge in some coastal inlet during the storm. If the ship were wrecked, they speculated that the crewmen might have been picked up by a passing steamer that, without a wireless, was unable to tell of the rescue.

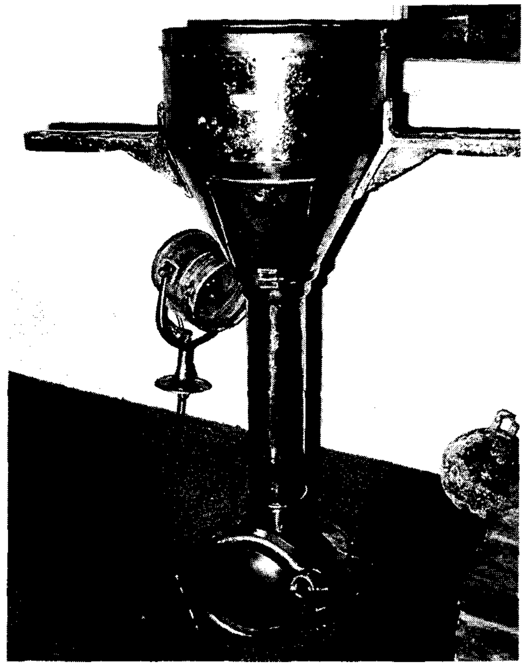
As hours became days, however, The Washington Post reported that "hope is turning to despair," and that "Navy officials are convinced that the Nina has made a trip to Davy Jones' locker."

The Nina was a steel-hulled vessel that would have sunk quickly if capsized. But she was specifically constructed to survive even the worst weather conditions.

"My theory is that she was broadsided by another ship during the storm," said Freeman. "If the Nina had simply capsized, she would probably have gone straight down to the bottom. But we found pieces of the ship and its contents strewn across the ocean floor like she was suddenly hit by something.

"Plus," he said, "there's a huge lump in the sand that could very well be another vessel."

Freeman, who has illustrated or written 20 books and produced numerous television documentaries on treasure diving, said he and Mathieson will donate most of their findings to the U.S. Navy Museum.



Relics brought up by divers from wreckage of USS Nina include binnacle (above), and leather diving boots, telephone and shoe horn (below). Ship's bell was also found. (Photos by Joe Heiberger – *The Washington Post*)

"So many of the things we're bringing up are simply invaluable collectors' items, though," he said. "One of the local divers discovered the ship's bell, which is the best find of any salvage operation. He was offered $1,000 for it by some private collector, but the kid just laughed in his face. It's not something you could give up easily."

Freeman's 65-foot salvage boat, the Buccaneer, also hoisted the Nina's 3-ton, solid brass heat exchanger that was used to convert steam back to water.

"It's the most beautiful piece of craftmanship you'll ever see," he said. "An octopus liked it so much he was living in it. He wasn't too happy to have his home disturbed."

Freeman credits Ocean City clam boats for the actual discovery of the Nina.

"They've got special electronic instruments that are used to detect obstructions on the floor of the ocean," he said. "All we do is find out what blips they've got, then do some diving and investigating on our own. The clammers have got about 20 other obstructions in the area that I haven't even looked into yet."

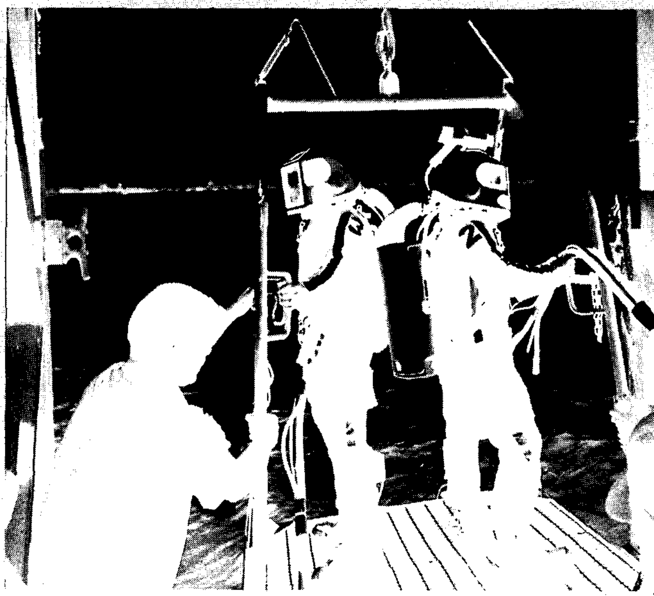
The U.S. Navy has never abandoned USS Nina. She and all her equipage legally remain the property of the U.S. Government according to maritime and salvage law.

MK 12 MIXED-GAS TESTS CONDUCTED IN HAWAII

Successful Month-Long Technical Evaluation Clears Way for Final Test Series in 1979, Then Production and Distribution to the Fleet

Tenders suit-up Mk 12 diver at start of one of the 218 mixed-gas missions off Pokai Bay.

What may prove to be the most significant development in Navy deep-sea diving gear in 45 years seems well on the way to the production stage. The Mk 12 Surface Supported Diving System (SSDS), designed to serve as a complete life support unit for divers performing heavy underwater work at depths requiring helium-oxygen breathing mixtures, underwent mixed-gas Technical Evaluation (TECHEVAL) at sea off Pokai Bay, Oahu, Hawaii, September 27 through October 30, 1978. Technical and operational evaluation in the air mode were successfully completed in 1976. Mk 12 Project Officer Lieutenant M. A. Coulombe reports that the basic operational requirements of the Mk 12 mixed-gas portion of the system have now been met.



Up to eight dive sets were conducted daily, six days a week, at depths of 100, 200, 250, and 300 feet.

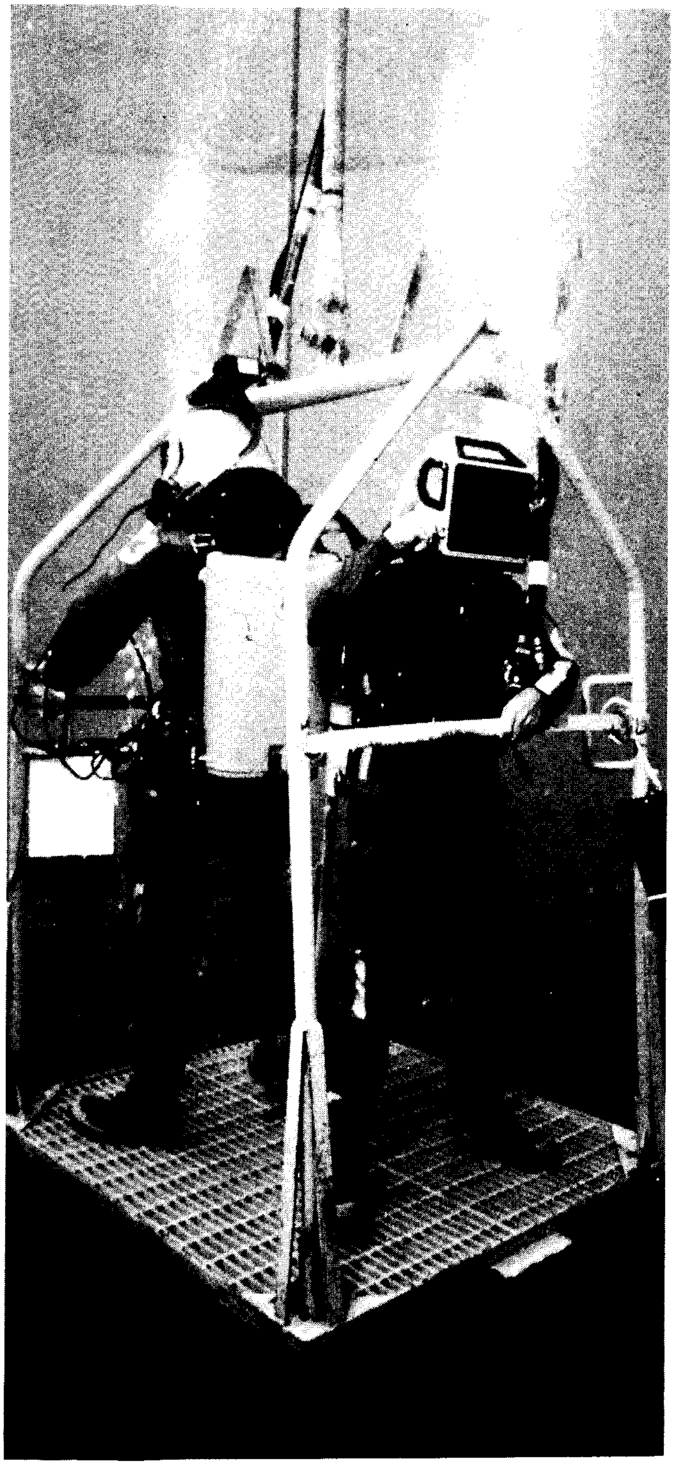
Background

Many months of rigorous design modification preceded this evaluation, utilizing different configurations of recirculators, assorted hardware, canister sizes, heating devices, and backpack modelings. Also prior to the open-sea portion of the TECHEVAL conducted at Pokai Bay, a series of manned and unmanned open pool and OSF testing at NEDU demonstrated that the required mixed-gas characteristics of the Mk 12 SSDS system could be successfully achieved in the determined hardware design. Next, an available diving platform with certified mixed-gas capability had to be identified. YRST-1, headquarters for Harbor Clearance Unit One (HCU-1) was used. With the flyaway mixed-gas system on board, YRST-1 interfaced with Mk 12 SSDS with no problems.

Team Effort

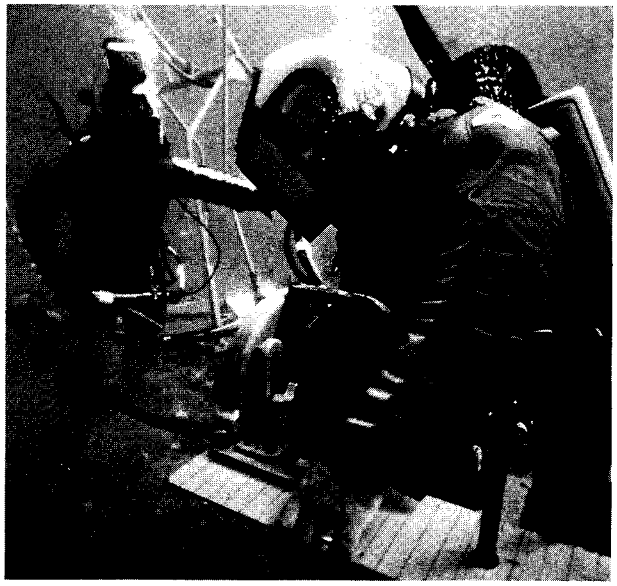
A team comprised of 33 divers assembled at HCU-1 to conduct the TECHEVAL: 24 Fleet divers from HCU-1, USS Beaufort (ATS-2), USS Brunswick (ATS-3), and USS Safeguard (ARS-25), one instructor from NSDS, Washington, D.C., one hydraulic tools representative from NCSC Diving Locker, Panama City, Florida, and five Mk 12 NEDU project personnel. Included in this total are three Diving Officers and three Master Divers who also made dives when time and circumstance permitted. The close work and exhaustive schedule (up to eight dive sets daily, six days a week) necessitated the high degree of cooperation and professionalism exhibited by all supporting crew members.

Two weeks of orientation awaited the divers in Hawaii, one week of classroom preparation followed by a week of training dives. These consisted of 53 mixed-gas pool dives and 61 air dives from the stern of YRST-1, then located pierside at Pearl Harbor.



At-Sea Tests

YRST-1 was later secured in a 5-point moor approximately 1-½ nautical miles off the entrance to Pokai Bay on the Waianae side of Oahu. A brief period back in port was called for when Hurricane Susan threatened; the storm was a "no show," however, and dives continued after only a few days' interruption.



Dive activities, including hydraulic tools work, were monitored by head-mounted underwater television.

Dive days 1 through 8 were spent moored at 100 fsw, days 9 through 14 at 200 fsw, days 15 through 18 at 250 fsw, and days 19 through 23 at 300 fsw. The divers used underwater hydraulic tools, head-mounted television, and conducted communications word-list tests in the 218 at-sea, mixed-gas missions made in support of the evaluation.

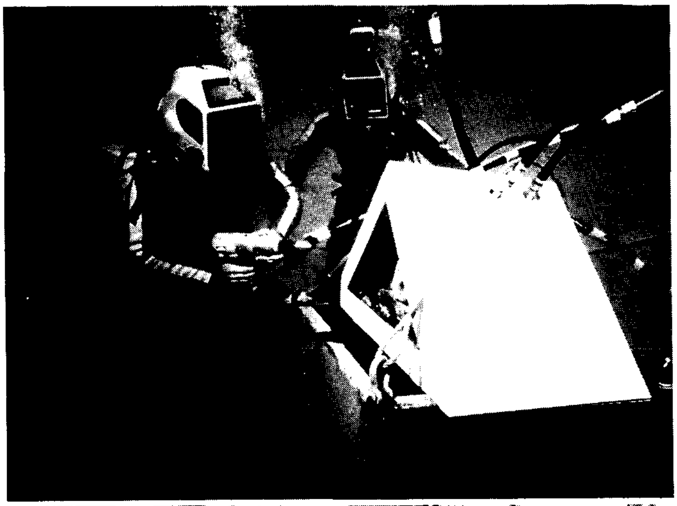
Though a typical dive day was long and Hawaii's shores beckoned on the coastal horizon, work progressed steadily. Health of the divers was kept in constant check by Commander F. L. Kavanaugh, submarine medical officer for the mission. Each diver reported to sick bay upon accomplishment of a dive for a bubble count to guard against decompression sickness. The relative ease in doffing the Mk 12 SSDS was cited by Kavanaugh as greatly reducing this risk.

Future Testing

The successful results of TECHEVAL set the course for the next and final Test and Evaluation milestone, the upcoming Operational Evaluation of the Mk 12 SSDS to be conducted in 1979. Preparation for this next step is already underway and will be detailed in future *Faceplate* updates.

PARTICIPATING PERSONNEL, MK 12 MIXED-GAS TECHNICAL EVALUATION

Name	Duty Station
Commanding Officer/LCDR A. Erwin	HCU-1
Medical Officer/CDR F. L. Kavanaugh	HCU-1
Diving Officer/LTJG K. R. Bassett	HCU-1
Diving Officer/LTJG R. Rogers	USS Brunswick
Project Officer/LT M. A. Coulombe (N) CF	NEDU
Master Diver/ENCM(MDV) W. H. Loudermilk	HCU-1
Project Master/MMCS(MDV) W. E. Yarley	NEDU
Master Diver/MMCS(MDV) M. J. Anderson	HCU-1
ENC(DV) E. Garcia	HCU-1
BM1(DV) J. Sheadel	HCU-1
ENC(DV) G. D. Penn	HCU-1
MMC(DV) W. D. Tass	HCU-1
HM3(DV) E. T. Brennan	HCU-1
MMC(DV) W. A. Stephens	HCU-1
SM1(DV) D. K. Rogers	HCU-1
MMCS(DV) A. L. Lachance	HCU-1
BM1(DV) D. K. Minter	HCU-1
HMCS(DV) J. M. Wilson	HCU-1
BM1(DV) J. W. Nance	HCU-1
BM1(DV) P. B. Currivan	HCU-1
HM2(DV) C. M. Ross	HCU-1
HTC(DV) G. H. Moser	HCU-1
EN1(DV) D. J. Roberts	USS Brunswick
BM1(DV) H. V. Spalding	USS Brunswick
HT2(DV) D. C. Houser	USS Beaufort
BU2(DV) R. J. Polley	USS Beaufort
SW1(DV) R. L. Hurt	USS Beaufort
QM2(DV) R. S. Holman	Nav Sta PH
BM2(DV) J. R. Dunagan	USS Safeguard
GMGC(DV) R. J. Angle	USS Safegaurd
GMG1(DV) W. B. Joslyn	NSDS
BM1(DV) P. Rash	NCSC
ENC(DV) R. Tardy	NEDU
SW1(DV) C. Goerlich	NEDU
BMC(DV) M. Hobbs	NEDU

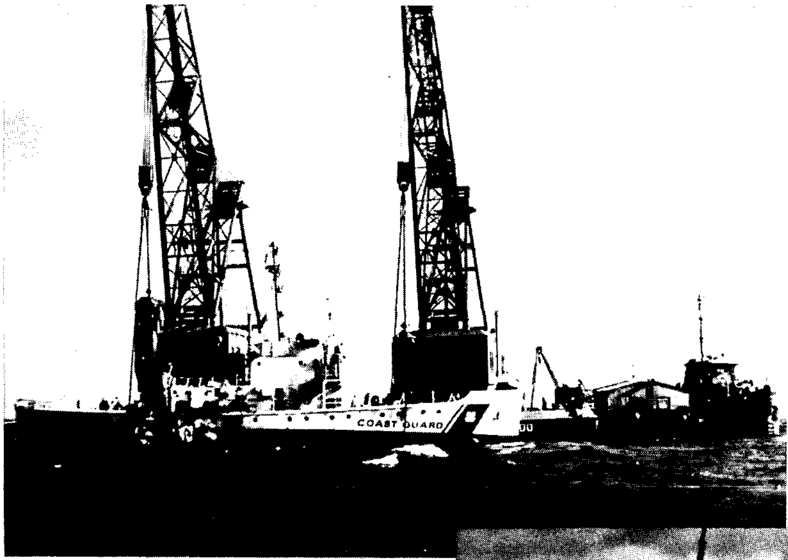


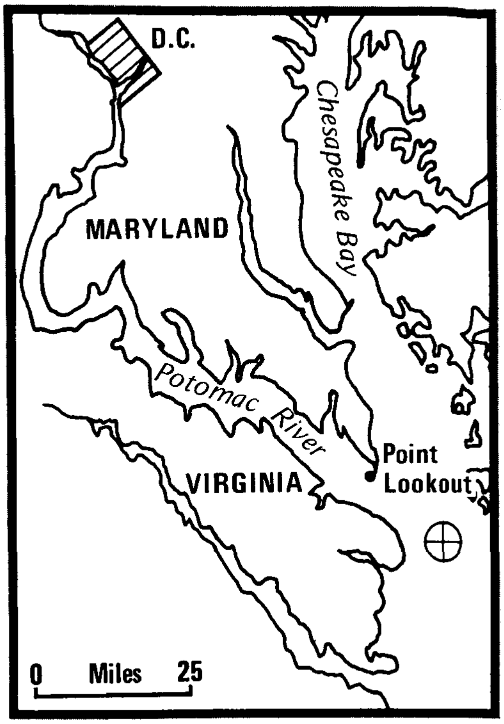
L–R standing: LTJG Bassett, CDR Bartholomew, ENC(DV) Tardy, HM3(DV) Brennan, MMC(DV) Tass, BM1(DV) Minter, BM1(DV) Rash, GMGC(DV) Angle, QM2(DV) Holman, GMG1(DV) Joslyn, HMCS(DV) Wilson, BM1(DV) Currivan, MMC(DV) Stephens, BM2(DV) Dunagan, BM1(DV) Spalding, ENC(DV) Garcia, ENC(DV) Penn, LTJG Rogers, LT Coulombe, William Gray (PRI), LCDR Erwin. L–R kneeling: HT2(DV) Houser, MMCS(DV) Lachance, SM1(DV) Rogers, ENCM(DV) Laudermilk, MMCS(MDV) Yarley, BM1(DV) Nance, BU2(DV) Polley, BM1(DV) Sheadel, EN1(DV) Roberts, SW1(DV) Goerlich, SW1(DV) Hurt.

HCU-2 Raises Cutter CUYAHOGA from Chesapeake Bay

When the superstructure broke the surface during the successful lift, Cuyahoga's ensign flew at half mast in tribute to the 11 crewmen who died in the collision 10 days earlier.

U.S. Coast Guard Cutter Cuyahoga sank in Chesapeake Bay after collision with Santa Cruz II.





HCU-2 received assistance from the Coast Guard and nearby naval activities in raising the 125-foot vessel.

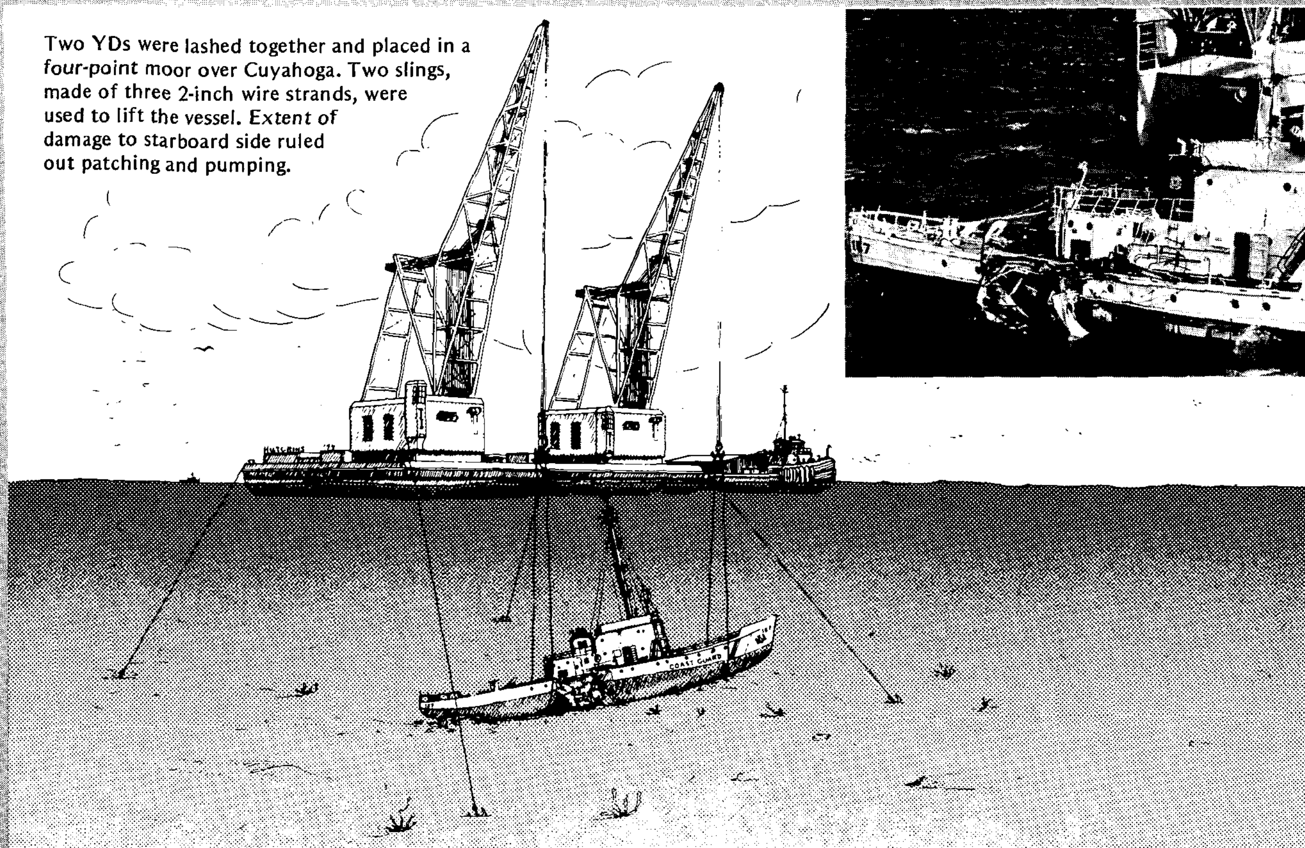
LCDR Stephen W. Delaplane, USNR
Harbor Clearance Unit Two

On Friday, October 20, 1978, the U.S. Coast Guard Cutter Cuyahoga collided with the coal collier Santa Cruz II in the Chesapeake Bay near the mouth of the Potomac River. The 125-foot Cuyahaoga sank quickly thereafter, trapping eleven of her twenty-nine crewmen inside.

The next day, a diving team from Harbor Clearance Unit Two, Little Creek, Virginia, arrived on the scene to begin the initial task of body recovery and making salvage preparations. An initial external survey of the 260-ton Cuyahoga by Coast Guard divers had determined that there were apparently no crewmembers surviving in air pockets inside the hull.

Diving stations were set up on the Coast Guard Buoy Tender Red Cedar. By Saturday afternoon, the ship was placed in a three-point moor over Cuyahoga and diving operations were begun to recover the trapped crewmen and survey the sunken vessel. Reference buoys were placed on the bow and the stern of the vessel, and it was determined that Cuyahoga was resting on a hard mud-sand bottom, about 15 degrees to port. There was a large hole in the starboard quarter

Two YDs were lashed together and placed in a four-point moor over Cuyahoga. Two slings, made of three 2-inch wire strands, were used to lift the vessel. Extent of damage to starboard side ruled out patching and pumping.



which penetrated the after crew's messing area as well as the engineroom.

Based on the survey information, a salvage plan was formulated and additional personnel and salvage assets were mobilized. The YD-229 and YTB-801 from the Norfolk Naval Station and the YD-200 and YTB-824 from the Naval Amphibious Base as well as the HCU-2 lift craft were loaded out and made ready for transit to the salvage site early Monday morning, October 23.

Diving operations continued throughout Saturday night and into Sunday afternoon, and two bodies were recovered. At first light on Monday, an internal survey of the vessel was conducted using a Mk 12 system borrowed from the Naval School, Diving and Salvage. In view of the fallen bulkheads, bunks and other debris severely restricting access to the ship's passageways and compartments (which on this 51-year-old vessel were small by modern standards), the Mk 12 system proved to be instrumental in conducting this phase of the diving operations. Four more bodies were recovered at the conclusion of diving operations Monday night.

The weather up to this time had been ideal, but at about 2230, shortly after the arrival of the YDs and YTBs, the wind freshened suddenly to in excess of 45 knots. Soon, six-foot seas were battering the salvage site. This weather continued throughout most of the night, and almost every mooring line available was expended in keeping the salvage "flotilla" safely in position.

Tuesday morning witnessed a let-up in the weather but conditions were still too rough for diving. During this time, additional mooring lines and supplies were recieved from Norfolk. By Wednesday afternoon, October 25, the weather relented sufficiently to permit remooring the Red Ceder and continuing diving operations.

By Thursday morning, the entire inside of the vessel had been surveyed and a total of nine bodies had been recovered (the bodies of the remaining two crewmen were subsequently recovered approximately one half mile from the wreck).

Weather again postponed operations until Friday afternoon, when the next phase of the salvage was initiated. Following the mooring plan, YD-200 and YD-224 were maneuvered into a four-point moor. Two separate legs of the moor were laid from each YD and the two YDs were then lashed together. The moor was completed by late Saturday afternoon.

Diving operations then commenced in order to rig the messengers which would be used to render the main lifting slings into position. These slings, made of three two-inch wire strands which wound together, were positioned at balance points predetermined to minimize hull stress. Preventers were rigged by 1600 Sunday, October 29, and a strain was taken by the YDs to set the wires. This lift brought Cuyahoga into an almost upright attitude.

Due to the size and extent of the damage, patching the hole was ruled out. The salvage plan therefore called for placing Cuyahoga onto a barge fitted with keel blocks. With the arrival of the barge and YTB 791 from Norfolk Naval Station, the operations were secured early Sunday evening.

Although delayed some two hours by five-foot seas, lifting operations commenced at 1215 Monday, October 30. Just ten minutes later, Cuyahoga was at the water's surface and dewatering started. Dewatering was continued throughout the afternoon, and at 1700 Cuyahoga was lifted out of the water. The barge was then maneuvered under Cuyahoga and the vessel was placed in the keel blocks. After being properly secured by wire and turnbuckle preventers, she was transited to Norfolk. The YDs and YTBs then broke and recovered their moorings and also returned to Norfolk, arriving Tuesday afternoon, October 31.

This operation was from the outset one of team work and unqualified cooperation. In spite of the intense interest in and high visibility of this effort, Navy, Coast Guard and civilian personnel worked side-by-side to make this a very successful and satisfying experience.

The incident, although tragic, provided unique and excellent experience for all divers involved. The diving inside the cutter was tedious and nerve-racking, but in the final analysis, it developed new levels of confidence and expertise in those men who conducted the operations. Salvage seamanship was another talent which was both learned and tested in this operation. It should be noted that the average age of the Navy salvors was about 25 years and that this operation has had obvious benefit to the future salvors of the Navy.

HCU-2 is assigned to Commander, Service Squadron Eight and is homeported at the Naval Amphibious Base, Norfolk, Virginia. The unit is commanded by LCDR Robert R. Wells.

After the lift, Cuyahoga was dewatered, then placed aboard a barge (above) for transport to Norfolk.

Participating Personnel

LCDR Robert R. Wells
LCDR John E. Driver
LCDR Stephen W. Delaplane
CWO3 George P. Yatsko
BMCS(DV) Michael D. Reynolds
HMC(DV) Robert W. Matthews
BMC(DV) Forrester S. Morrison
BMC(DV) Charles W. Virgil
GMGC(DV) Dan "K" Vanderford
SKC Stanley D. Hicks
EN1(DV) Stephen J. Hagenhoff
BM1(DV) Thomas W. Miles
MS1(DV) Larry L. Wariner
EN1(DV) Sam T. Varnado
YN1 William L. McClure
HT2(DV) James J. Renner
MM2(DV) Harold Z. Hunt
MM3(DV) Scott R. Wilmot
HT3(DV) Keith R. Baker
BM3 Rodney J. Bentley

FLYAWAY AIR DIVING SYSTEM CERTIFIED

Submarine Development Group One designs and tests FADS II, a quick-response, air-transportable diving system that will support emergency diving operations to depths of 190 feet.

LCDR R. Garrahan, USN
Submarine Development Group One
San Diego, California

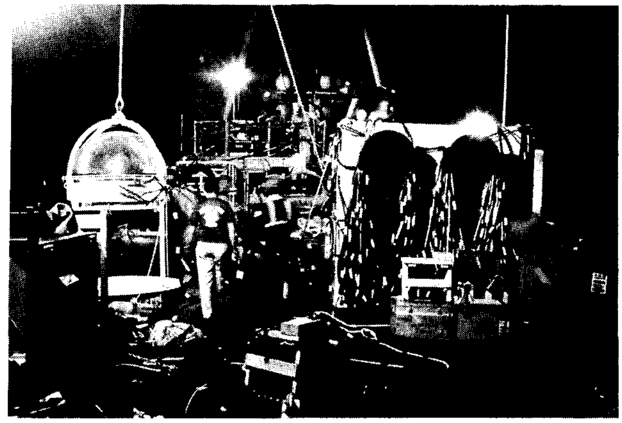
Photos by PH1(DV) Mosley, USN

On the basis of the problems encountered and experience gained during the Johnson Sea Link Rescue Operation, Commander Submarine Development Group One in early 1974 proposed a concept to improve the Fleet's ability to respond to emergency diving operations. Under this concept, the hardware necessary to support emergency diving operations would be assembled at a single location to provide a self-supporting, air-transportable diving system capable of being loaded aboard and operated from a ship of opportunity on a worldwide basis. In the interest of minimizing logistic support, and since the majority of working dives are on air, it was decided to concentrate on acquiring a transportable air diving system with a depth capability of 190 feet.

The Flyaway Air Diving System (FADS II) is comprised of components which have been designed, or chosen from existing equipment, to support a scenario of 190-foot dives of 40 minute's bottom time to be conducted on a 12-hour daily schedule for 14 days.

During August 1978, the COMSUBDEVGRU ONE Mobile Dive Team (consisting of 18 divers and a diving officer) evaluated, for certification purposes, the staging, packaging, air transportability and operating capabilities of FADS II.

A Flyaway exercise was conducted in which the total system (64,000 pounds of cargo), was flown in two C-130 aircrafts to a remote area of operations and was operated from USS Abnaki (ATF-96). Dives to 190 feet for 40 minute's bottom time were performed during which all equipments of FADS II and all seven mission configurations outlined in the scope of certification were utilized.



Top: Night diving operation from fantail of USS Abnaki. Above: GMGC(DV) George Powell conducts pre-dive checkoff on BM1 (DV) Marsh.

Upon successful completion of the flyaway exercise and the fleet evaluation, the Naval Sea Systems Command System Certification Authority reported that all the requirements for system certification had been completed and recommended that a two-year certification be granted for the Flyaway Air Diving System.

The choice of existing equipment and the design of new equipment were dictated by the following parameters:

- Maximum weight for each packaged unit to be 4,400 pounds
- Components be assembled to achieve the minimum number of packaged units
- Packaged units to be transportable by a CH-46D/F helicopter
- Total system to be transportable by two C-130 or one C-141 aircraft.

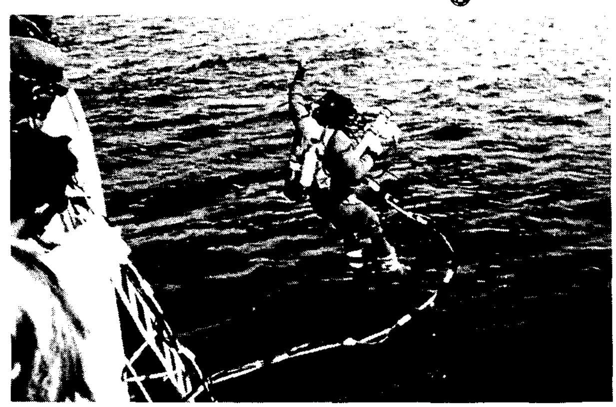
The basic components of the FADS II include:

- Four sets of MK 1 Mod 0 lightweight diving outfit
- Two Quincy W5120 skid-mounted, diesel-driven, 250-psi, 97-SCFM, low-pressure air compressors
- One Ingersoll-Rand 10T2X15 skid-mounted, diesel-driven, 3000-psi, 15-SCFM, high-pressure air compressor
- Skid-mounted filter/console designed for use with the low-pressure air compressors and/or the high-pressure air banks and the high-pressure air compressor
- Two-lock aluminum recompression chamber, 202 cubic-foot, 100 psi
- Two sets of eight standard 3,500-psi compressed air cylinders utilized with a maximum operating pressure of 3,000 psi
- One set of eight standard 3,500-psi compressed oxygen cylinders utilized with a maximum operating pressure of 3,000 psi
- Acrylic dome two-man open diving bell with surface-supplied air and communications
- Five-kw diesel-driven Onan generators to provide power for communications, recompression chamber lights and ancillary equipment
- Five-kw diesel-driven Onan light towers to provide eight 500-watt flood lights for topside use and two Burns and Sawyer underwater work lights
- Diesel-driven hydraulic tool package comprised of underwater drills, impact wrench, grinder, jacks, sump pump, etc.
- Diesel-driven 400-amp underwater welding and cutting machine
- Inflatable boat, 18-ft Zodiac, with 35-H.P. Johnson outboard motor
- Underwater damage assessment television system (UDATS) and monitor
- Four conex containers, one modified as a main control console. The other three modified with a workbench and shelving as necessary to properly stow FADS II equipment.

The primary air source for FADS II, one Quincy W5120 low-pressure air compressor, provides breathing air for two divers and a standby diver to 190 feet and air for the open bell. The secondary air sources are:

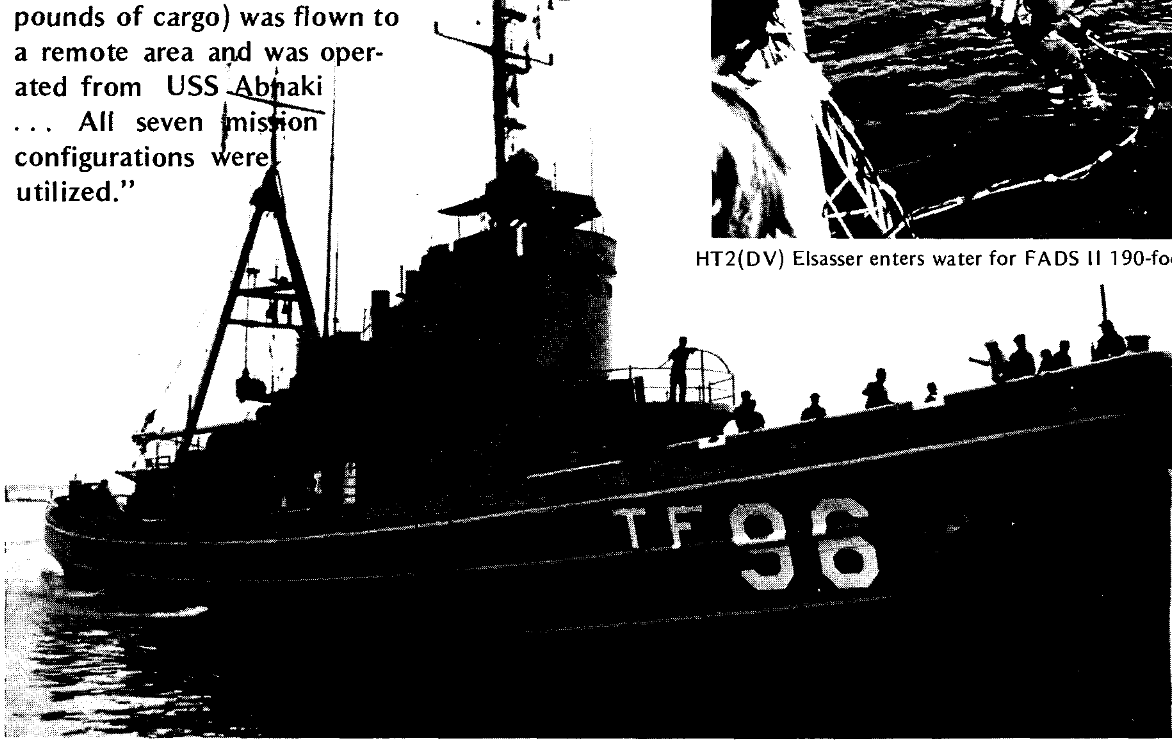
- The alternate Quincy W5120 low-pressure air compressor
- The high-pressure air banks (4587 SCF usable)
- The Ingersoll-Rand 10T2X15 high-pressure air compressor.

The air sources are designed to also support the two-lock aluminum recompression chamber while treating two patients and one tender. The high-pressure air banks are capable of four chamber pressurizations to 165 feet. Oxygen is provided to the chamber in support of treatments or surface decompression. The oxygen bank contains sufficient oxygen (2427 SCF usable) to support three complete treatment tables 6 or 6A.



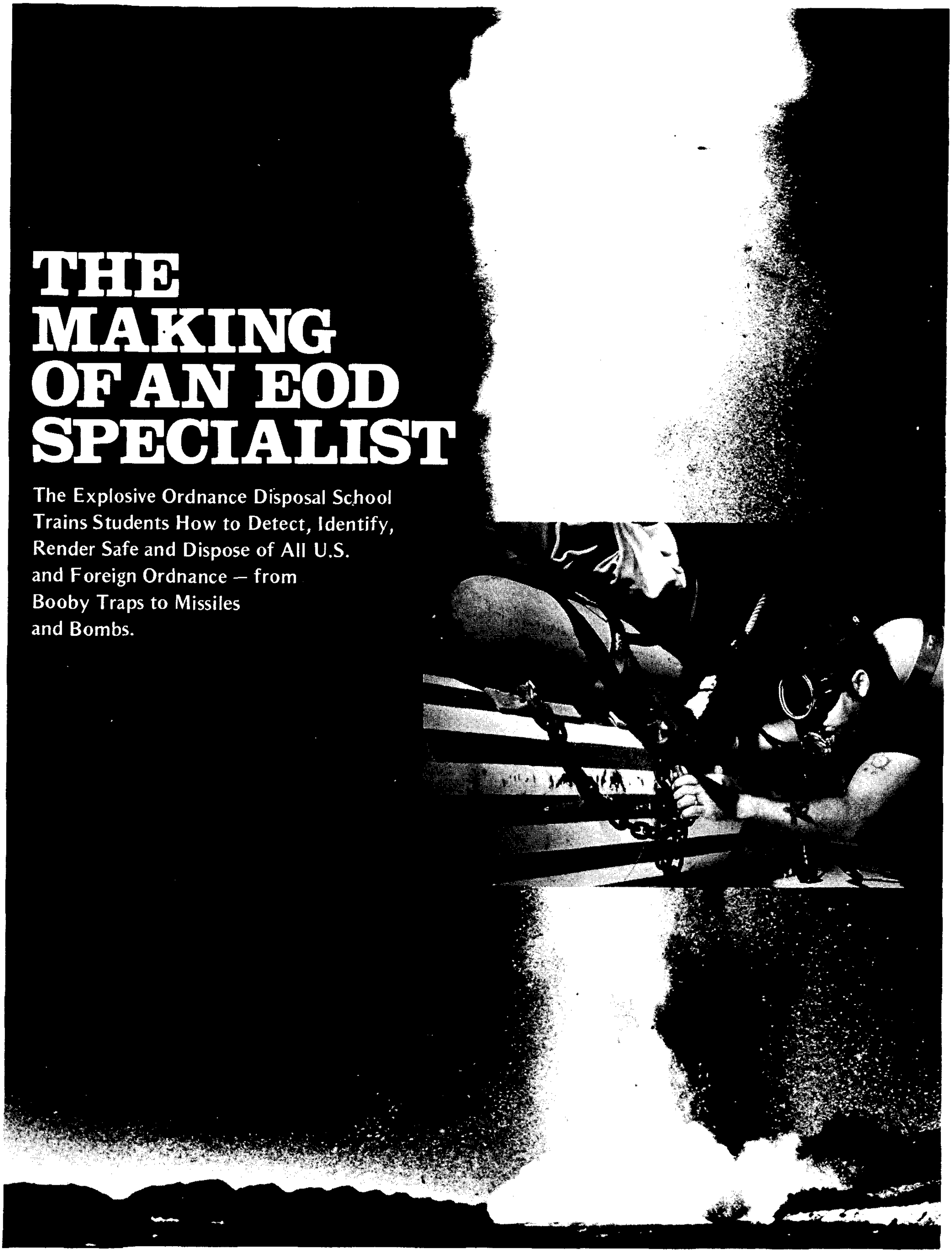
HT2(DV) Elsasser enters water for FADS II 190-foot certification.

". . . the total system (64,000 pounds of cargo) was flown to a remote area and was operated from USS *Abnaki* . . . All seven mission configurations were utilized."



THE MAKING OF AN EOD SPECIALIST

The Explosive Ordnance Disposal School Trains Students How to Detect, Identify, Render Safe and Dispose of All U.S. and Foreign Ordnance – from Booby Traps to Missiles and Bombs.



PH1 Michael P. Wood, USN
Naval Technical Training Command

The serenity was deceptive, for beads of sweat dripped from the sailor's brow as he approached the half-buried metallic object.

"Is it magnetically influenced, or are the seconds silently ticking away? What are the identifying features? What publication do I consult?" Hordes of questions raced through the Explosive Ordnance Disposal (EOD) student's mind while he performed a close-up reconnaissance of the explosive device.

The slightest miscalculation at this point could result in the biggest mistake he ever made.

Suddenly, with a thundering blast, the serenity is disturbed when the startled student violates a safety precaution while disarming the training bomb. The blast, though a safe distance away, is a realistic reminder to the student that he has made a potentially deadly error. It also reminds him of the EOD motto: "In EOD, there are but two degrees of effectiveness—success and failure."

" . . . questions raced through his mind as he performed a close-up reconnaissance of the explosive device. The slightest miscalculation could result in the biggest mistake he ever made."

Below: ICC John Nunes receives EOD refresher training in the Mk V deep-sea diving dress.

Located 30 miles from Washington, D. C., the Navy's Explosive Ordnance Disposal School at Indian Head, Maryland, is a joint-service training facility. Though managed by the Navy, it is responsible for the training of officers and enlisted personnel from the other U.S. military services, plus students from various federal agencies and 37 foreign nations. The commanding officer of this multi-service school is Commander Joseph T. Kennedy.

The mission of the school is to train students how to detect, identify, render safe and dispose of all U. S. and foreign explosive ordnance. The types of ordnance range from simple booby traps to technically sophisticated missiles and bombs.

"We want to educate them, pin the crab on them and send them out to the Fleet," said Assistant Training Officer Chief Warrant Officer Paul Stone. The "crab" is the EOD insigne that students look forward to wearing upon completion of the nine-month training period.

The first phase of earning the coveted crab begins at the Redstone Arsenal in Alabama. There, the students go through three weeks of intense physical training and screening designed to prepare them for the diving phase. All students also go through two weeks of training in chemical and biological warfare.

After completion of training at Redstone, the students report to the Naval Ordnance Station in Indian Head, where training is molded to fit the particular mission of each service.

At Indian Head, students first acquire a basic foundation in explosive ordnance disposal. For 14 days, they learn the rudiments of EOD teamwork, studying ordnance publications, general safety precautions, tools of the trade, and applied physics principles.

With this important foundation laid, the students go on to learn basic demolition operations, handling, and safety. During this eight-day phase, the students are able to break from the confines of the classroom, go into the field and put into practice what they have learned.

" 'Fire in the hole!' The water burst 30 feet into the air, spraying the student. This basic demolition phase involves practical work as well as theory."

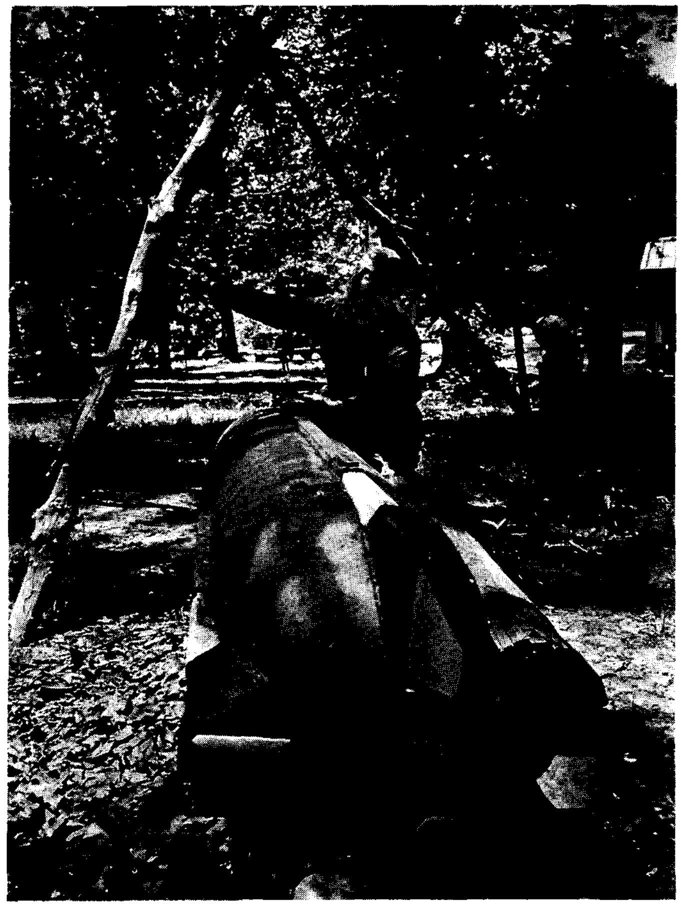
"Fire in the hole!" The alarm echoed throughout the trees after one student purposely detonated his half-pound of TNT. The resulting spray of water from the explosion burst 30 feet into the air, causing little damage, and spraying the student with water. The next student stepped up to set his charge under the watchful eye of his instructor. This basic demolition phase involves practical work as well as theory, and the work is loud.

The next training phase is specialized; Navy students begin their diving training, while Army, Air Force and Marines Corps students receive ground ordnance training.

The diving phase is demanding and is divided into three training blocks which are scheduled intermittently with ground ordnance and air ordnance training phases. The 3-1/2-week basic scuba course is the Navy student's first encounter with the EOD diving world. This training includes study of diving tables, scuba equipment and repair, and diving physics and medicine. The students become well acquainted with the 24-foot-deep pool and the diving pressure pod. The pod is a water-filled pressure chamber where the scuba student dives to simulated depths of 130 feet.

"There is one big difference between diving to 130 feet in the ocean and going there in the pod," one of the divers said. "The water isn't near as chilly in the pod!"

Moving into the 15-day Ground Ordnance Phase, the students learn the proper way to approach a suspected ordnance area, locate and identify any ordnance, and render the area safe. At times, a distant explosion can be heard when a student trips an unobserved booby trap while working. It is easy to trigger one of these instructor-set warnings, but at this point in training the students must learn to detect and disarm all types of ground ordnance.



Because flexibility is important in EOD work, students must learn to rig makeshift devices to complete their work. Above, Chief Warrant Officer Reider improvises to defuse a torpedo from a safe distance.

The Navy students return to the diving tank where for 15 days they become acquainted with the Mark VI mixed-gas breathing apparatus. This diving system is non-magnetic and has obvious advantages when a diver must disarm a magnetically influenced underwater explosive.

The Air Ordnance Phase, 25 days in length, is an extensive study of the many types of air ordnance, including bombs, rockets, guided missiles, and even pilot ejection seat explosive devices. This phase is followed by the five-day Demolition II Course, where students learn to "sweep" ordnance ranges, and dispose of any unexploded ordnance.

Training is molded to fit the particular mission of each service. Navy students learn basic scuba, the non-magnetic Mk VI mixed-gas UBA, the Mk V deep-sea diving rig, the USN Mk 1 mask, and the new Mk 12 SSDS.

The 22-day Underwater Ordnance Course is the third portion of the Navy diving phases. Student divers learn the Mk V deep-sea diving rig, the diver's mask USN Mk 1, and the new Mk 12 SSDS. During this phase, they learn to identify and render safe all known U.S. and foreign underwater ordnance.

All the diving training is put to practical use when the Navy EOD students travel to the Patuxent River for 20 days of intensive diving. It is here that the newly learned skills are refined. Techniques, identification, recovery, and safety are all practiced again and again. The Navy EOD students are qualified divers now, and their safety is totally dependent upon their skills as divers and EOD technicians. With the Patuxent River trip under their belts, the students begin to feel a sense of accomplishment when they see theories put into actual practice.

The final stage of EOD training is the Nuclear Weapons phase. For 27 days students undergo familiarization training learning about the various types of nuclear weapons. At completion of the training, a few Navy students are selected to go to Fort Benning, Georgia, or Lakehurst, New Jersey, to become parachute-qualified EOD specialists authorized to wear jump wings.

During the nuclear weapons phase of EOD training, students sweep area for radioactive hot spots. At left is Air Force Staff Sergeant Gary Dibble.

UCT-2 COMPLETES SURVEY OF PACIFIC WATERFRONT INSTALLATIONS

More Than 800 Dives Logged Over 40,000-Square-Mile Area

UTC(DV) A. C. Calvert, USN

Members of Underwater Construction Team Two (UCT-2) figuratively went underwater in January 1977 and didn't surface again until last June.

The 18-month period of submarine activities was a result of the Commander in Chief, Pacific Fleet (CINCPACFLT) requesting the unit to inspect all Navy waterfront activities in the Pacific Ocean area to determine the present condition of piers, wharves, bulkheads and small craft berthing.

The lengthy survey will enable Pacific Fleet officials to project costs for replacement or repair of installations that the Seabee divers discovered to be deteriorating.

The program started at Apra Harbor in Guam, where considerable harbor damage had been caused by Typhoon Pamela. UCT-2 members were supervised by UTC(DV) A. C. Calvert. At Apra, standards of inspection methods and operations were established.

Next, the team undertook their most extended inspection at Pearl Harbor, Hawaii. Led at this site by CEC(DV) D. M. Handley, the underwater survey of the naval complex required three months. This contrasted with a three-day survey later conducted at Alameda, California.

Inspection of quaywalls, concrete and wooden pilings and steel sheet piles was considerably aided by assistance from the Civil Engineering Laboratory (CEL), Port Hueneme, California. Two devices, an ultra-sonic tester and an underwater voltmeter, recommended by CEL, were invaluable in measuring thickness of steel and sheet piles. Wooden piles, however, required core samples to ascertain integrity.

The area covered by UCT-2 diver constructionmen embraced an area of 40,000 square miles and required over 800 separate dives with 960 underwater hours logged. The extensive survey also included team inspections at Yokosuka, Iwakuni and Sasebo, Japan; Okinawa; Republic of the Philippines; Midway Island; and the sprawling naval harbor of San Diego.

Overall inspection results indicate that steel and concrete pilings were generally in better condition than anticipated. As expected, wood pilings and bulkheads have suffered the most damage.

The inspection data have been forwarded to the Pacific Division, Naval Facilities Engineering Command, at Pearl Harbor for correlation with that agency's appraisal of waterfront structures above the waterline.

CEC(DV) D. M. Handley, enters the waters of Subic Bay for pier inspection. Standing by is CM2(DV) R. F. Pockrus (center) and CE2(DV) B. W. Rogers (bottom).

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THE OLD MASTER

Reflections on 1978 and a Glimpse at 1979

Well, another year has come to an end. There were a lot of things happening in '78. Some good and some bad. We lost more of our salvage and rescue ships to the moth ball fleet and foreign navies. I don't see any new ships in sight. The manning level of divers is down to below 70%. Evidently, we are not doing a good job of recruiting. If you want your diving locker manned to 100%, then start sending good people to school. Most of you feel, I'm sure, that your OPTAR isn't enough to operate with. We'll just have to take another notch up on our belt and do with what we have. The future doesn't look any brighter unless you respond.

Some of the things that happened for the better – the Mk 12 gas mode completed TECHEVAL. The OPEVAL will take place in '79. Change 2 to Volume One of the Diving Manual was distributed. Change 2 to Volume Two is being updated now and should go to press in '79. The Mk 15 completed OPEVAL and should be approved for Fleet use by the time of this publication. The Mk 14 is ready to go to TECHEVAL. This should occur in the spring/ summer time frame of '80. The 1140 Community was established. This should allow our good officers to stay within the diving community.

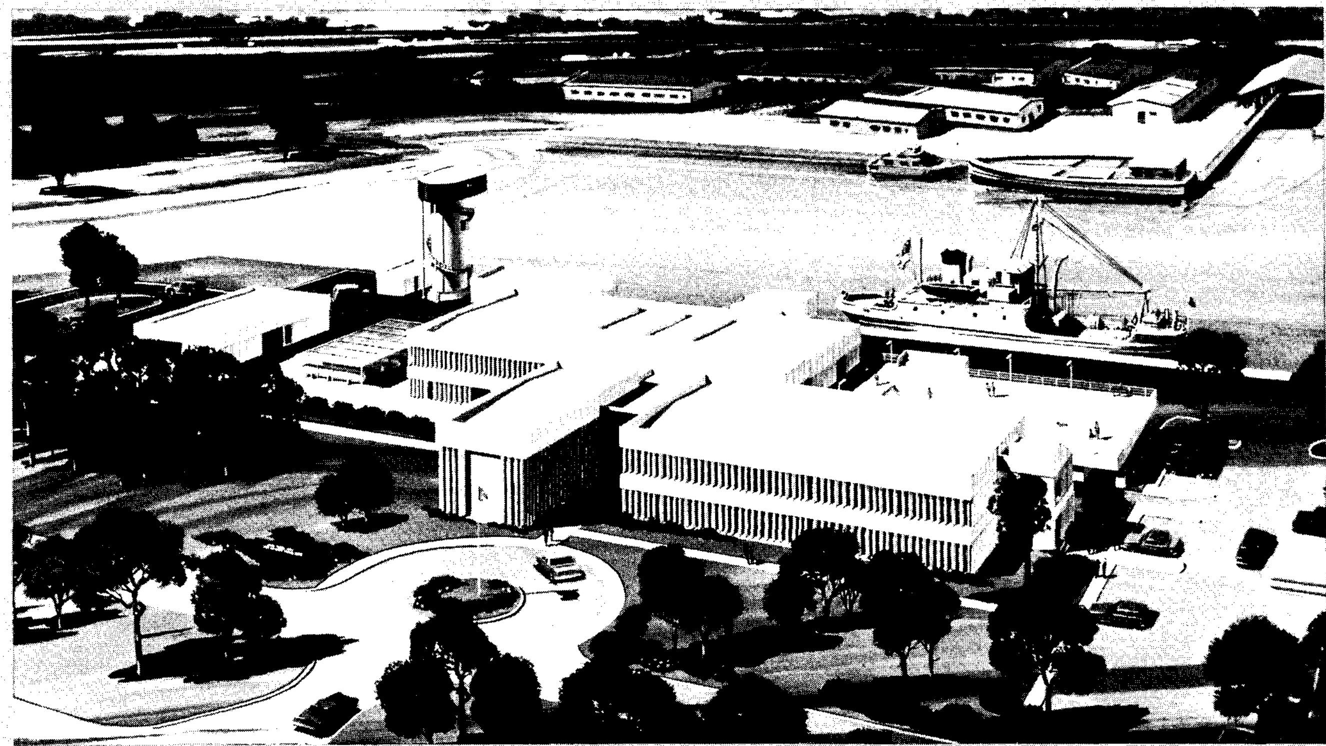
Look for some changes in the BuPers Manual in regards to qualification and requalification of divers.

In January 1979, NEDU will conduct a 1000-foot dive to test the TDCS (Tethered Divers Communication System). The idea is to have one communication system compatible with every piece of diving equipment we use. So far, it looks promising.

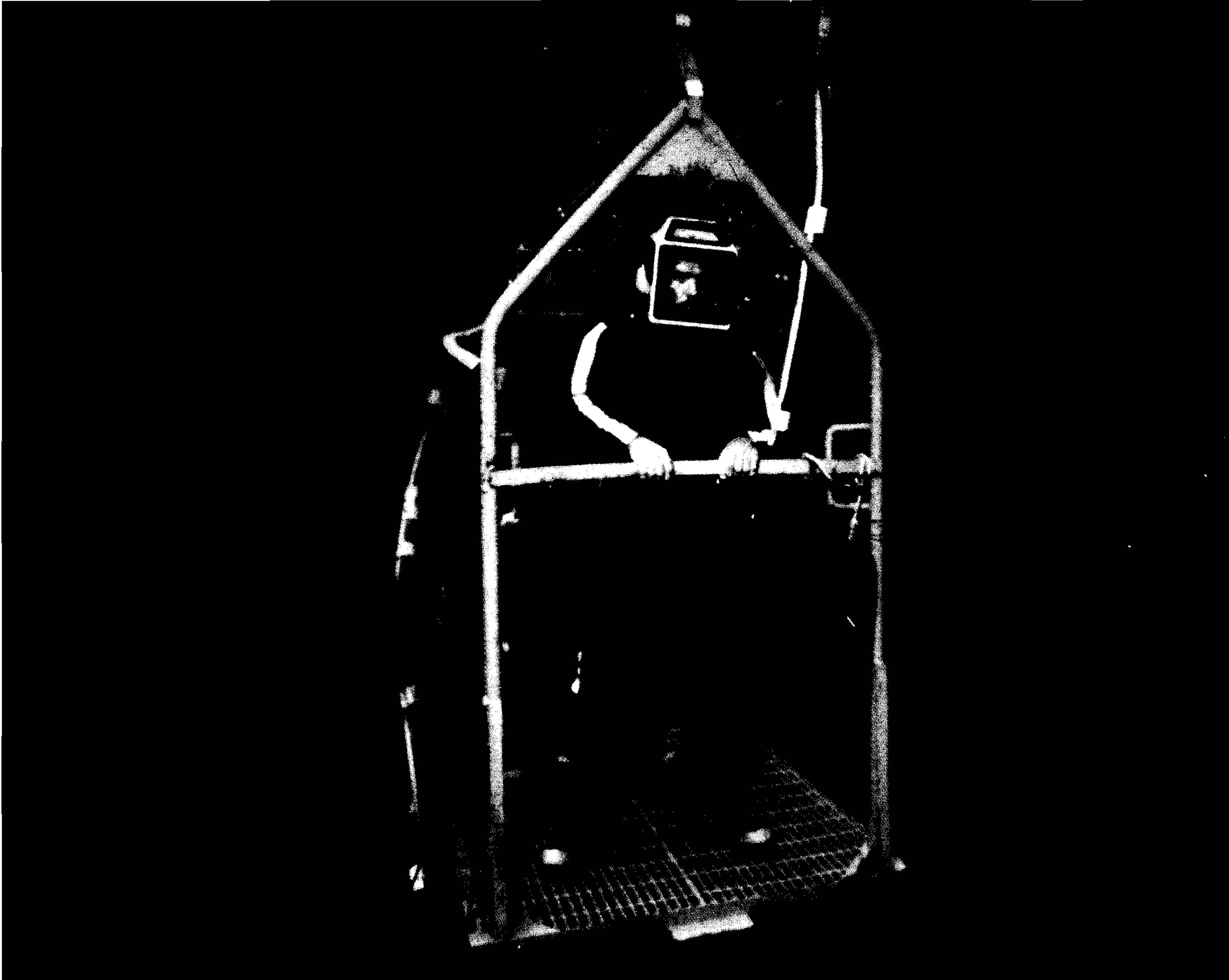
The construction of the new Diving School is going well. Can you imagine not having to break the ice in December, January, or February to get in the water?! The visibility here in this Florida water is unbelievable. All things must change, and I believe this one is for the best. I haven't figured out how we will get the "Green Derby" down here though.

Keep up the good work out there and keep it safe. If you know of anything going on, let *Faceplate* know.

BMCM (MDV) James L. Tolley
Senior Master Diver, USN
Navy Experimental Diving Unit



Artist's conception, U.S. Naval Diving and Salvage Training Center, Panama City, Florida.



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