FACEPLATE

FALL 1979

FACEPLATE

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

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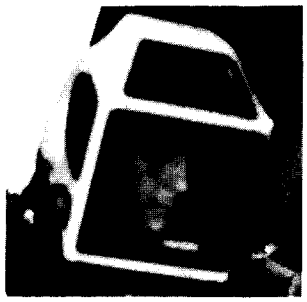
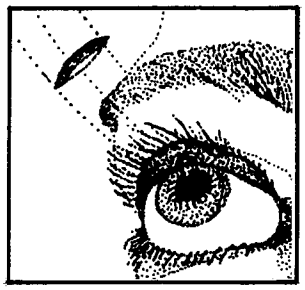
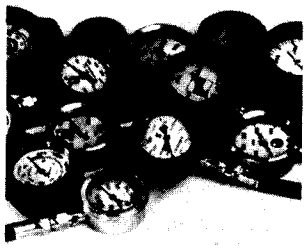


Page 13



Page 14



Page 16

Page 22

Page 24

COVER: Tenders prepare MM2(DV) Charles Greer for a 65-foot dive with the Mk I mask and open bell from NSDS's YDT-14 on the Potomac River off NSWC, Dahlgren, Virginia (see page 20).

INSIDE FRONT COVER: Free-ascent training tank is lowered into position at the Navy's new diving and salvage training center in Panama City, Florida, after completing trip by barge from its former location in Key West.

BACK COVER: Five *Squalus* survivors and one of the divers who helped rescue them 40 years ago descend from the *Squalus/Sailfish* memorial at the Portsmouth Naval Shipyard (see page 18).

LETTERS

FROM A SQUALUS SURVIVOR

Thank you for the copies of *Faceplate.* I'm enclosing some newsprint that was collected by family and friends while I was being checked out at the hospital and working at the *Squalus* salvage area. Hope you can use some of it. Hello to all the old timers..

LEONARD de MEDEIROS
FAIRHAVEN, MASSACHUSETTS

Some of the photographs generously sent by Mr. de Medeiros appear with the Squalus survivors' reunion story on page 18.

Ed.

FROM A SCOTTISH DIVER

The article "Should Divers Use Drugs?" by J.M. Walsh (*FP,* Spring '79) is of importance and I feel that reprinting the text of it in the magazine of the Scottish Sub-Aqua Club may be of considerable value to amateur divers in Scotland.

ADAM CURTIS
EDITOR
Scottish Diver
GLASGOW

FROM A BRITISH DIVER

Thank you for sending copies of your excellent magazine, *Faceplate.* It has proved very interesting and popular amongst my diving team. I have just returned from M/V *Seaforth Clansman* and LCDR Cwiklinski's article (*FP,* Spring '79) was well received onboard.

GRENVILLE P. JOHNSON
LIEUTENANT, ROYAL NAVY
HMS Vernon

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.*

NOW YOU KNOW

The cover of the Fall '78 issue of *Faceplate* depicted some old salts undergoing diving training. They are a group of Royal Navy divers and the caption of the picture is "Royal Navy Divers Qualifying—1867." I have the original picture. During my time as Superintendent of Diving, Royal Navy, I presented a copy of this picture to Captain Gene Mitchell, the then-Supervisor of Salvage, U.S. Navy, and my opposite number. A copy of it must have found its way into the hands of the diver who was given credit for the picture. The hard hat gear, it can be seen, is the British Siebe-Gorman rig. I was manager of the Underwater Division of Siebe-Gorman and Company for two years after leaving the Royal Navy—until I had the good sense to marry a lady who is a commander in the USN!

P. A. BALINK-WHITE
COMMANDER, MBE, ROYAL NAVY
KANOEHE, HAWAII

Our thanks for clearing up the mystery. We were unable to identify the photo (reprinted above) when Chief Scalpi at NSDS loaned us his copy.

Ed.

HE'S QUESTIONING MARKS

I am researching and writing a book on Navy ratings and distinguishing marks. Perhaps your readers can help me. The distinguishing mark for salvage divers was authorized by BUPERS in 1943. I have two varieties—one with a white S and one with a red S on the breast plate. To date, I have been unable to locate any reason or authorization for the difference. One suggestion—that different courses were given (perhaps hull, the other machinery) and therefore the difference in color. A second possibility—that the white S signified divers of the Seaman Branch whereas the red S indicated a diver of the Artificer or Engineering Force Branches. Additionally, if any readers have a spare distinguishing diver's mark with a D on the breastplate (authorized by SECNAV in 1957), I would appreciate receiving same (either blue, white or both).

CWO4 L. B. TUCKER
2745 TRIANGLE LANE
ALEXANDRIA, VA 22306

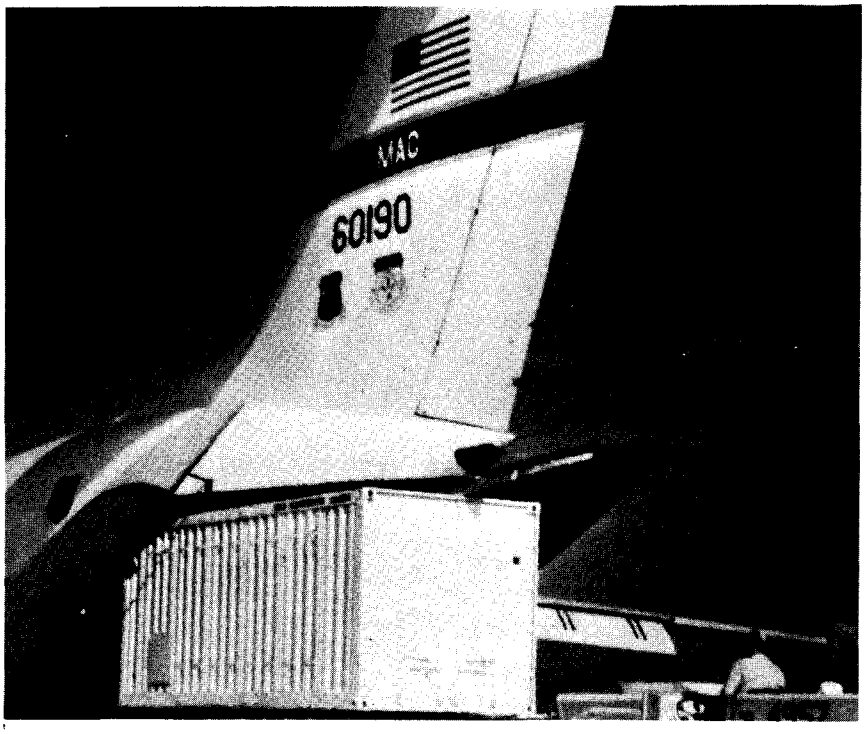
SOUNDINGS

WANT TO REQUALIFY FOR DIVING?

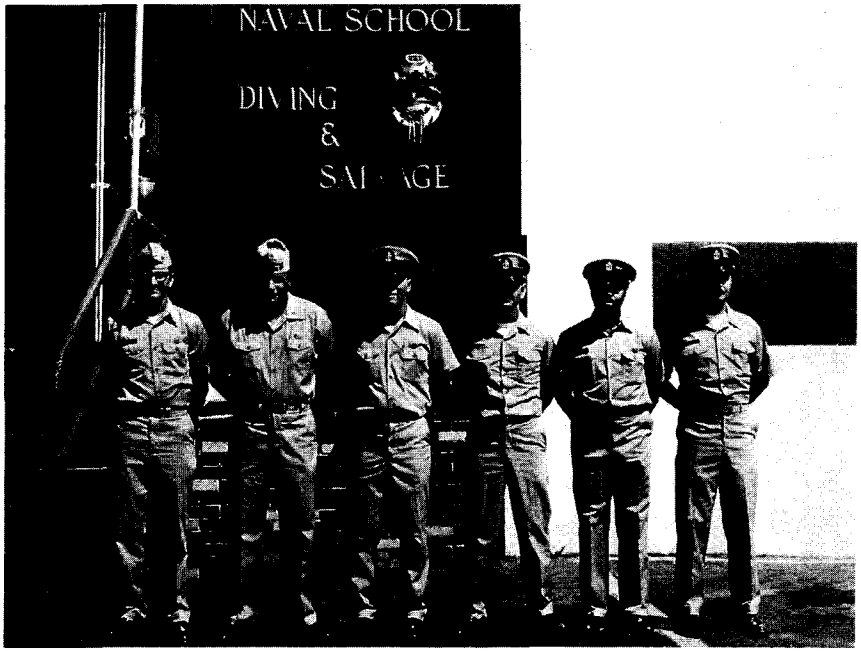
First-class divers whose qualifications have lapsed for more than a year may apply for a new requalification course convening on November 9 at the School of Diving and Salvage in Washington, D.C. This is a pilot course for individuals who have kept their desire for diving and who want to be redesignated. It condenses 17 weeks of training into four weeks. If the response is favorable, similar requalification courses will be offered at a later time in Norfolk, San Diego and Pearl Harbor. Further information may be obtained by calling Chief Personnelman Whitehead, Autovon 291-5771, or commercial 301-427-5771.

ORDERING PUBLICATIONS

Ordering information for the diver tools manuals appearing in the Winter 1978 issue of *Faceplate*, page 9, was in error. The Naval Publications and Forms Center requires use of standard requisitioning and issuing procedures (MILSTRIP) as outlined in NAVSUP Publications 437 and 2002 from all federal agencies and contractors holding government contracts desiring these manuals and other COG I materials. Commercial firms (which do not hold government contracts) and private individuals may purchase COG I material through the Center's Cash Sales Program by submitting a letter to the Naval Publications and Forms Center, Attention Customer Services Division (Code 1051), 5801 Tabor Ave., Philadelphia, PA 19120, listing publications desired. The cost of the publications will be forwarded by return mail requesting prepayment prior to release of the materials.



PORTABLE CHAMBER TO GREENLAND—Underwater Construction Team Two's 35,000-pound portable recompression chamber system is shown being loaded onto a C-141 aircraft at NAS, Point Mugu, for transport to Thule, Greenland, recently. The exercise demonstrated the speed with which the newly-certified system can be packed and transported to remote areas in support of diving operations.

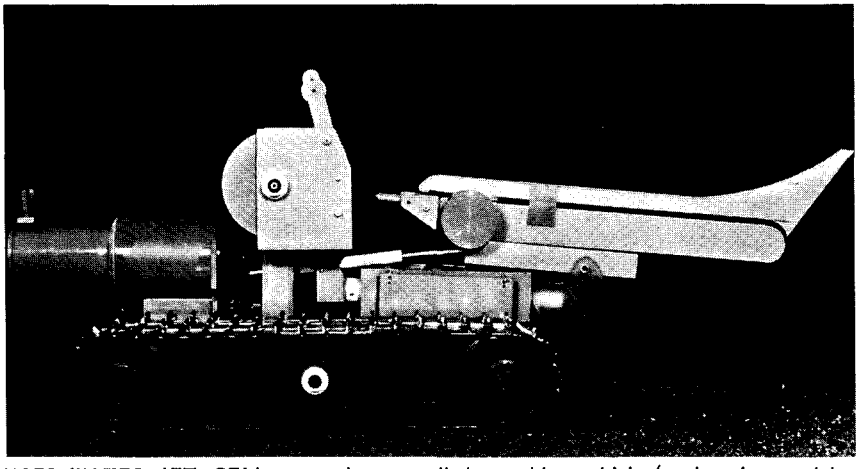


DIVERS MAKE CHIEF—Six divers were promoted to chief petty officer at the Naval School, Diving and Salvage, in August. They are, l-r: BMC(DV) Oran Ray, BMC(DV) George Golds, BMC(DV) Frank Gilson, HTC(DV) Jack Welch, HMC(DV) Doug Johnson, and QMC(DV) Ted Griggs.

SOUNDINGS (CONT'D)

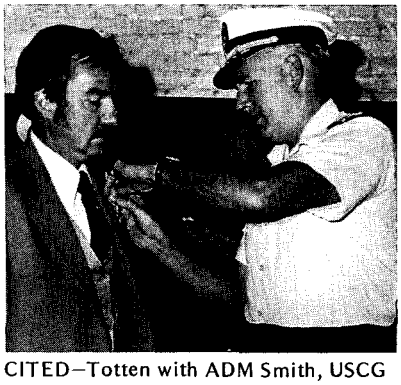
UNDERWATER TRENCHING VEHICLE

The Civil Engineering Laboratory at Port Hueneme, California, is developing a remotely controlled underwater trenching vehicle that will cut through sand, granite or ice; place prelaid cable or pipe in the trench; and backfill the trench, all in one operation. The most significant feature of the concept is its use of an articulated cavitating water-jet system, which will allow the vehicle to cut a trench up to 18 inches wide and 3 feet deep, at a rate of one foot per minute in granite. The tracked vehicle will be driven by an electrohydraulic source from which all subsystems will be powered. Capable of operating in depths of 150 feet, it will be tethered to a primary electrical power source, driven by a diesel engine, which will set either on the beach or on a floating support platform.



USES WATER JET—CEL's remotely controlled trenching vehicle (engineering model of prototype shown above) has a cavitating system which will improve the Navy's capability to cut trenches for cable and pipe underwater.

Construction of the vehicle is about four years away, but the Laboratory expects to have the prototype for testing in 18 months. Several demonstrations have already proved the feasibility of the technique. When operational, the vehicle will constitute a major breakthrough in surf-zone and near-shore construction technology. Wayne Tausig is CEL's project engineer for the underwater trenching vehicle.



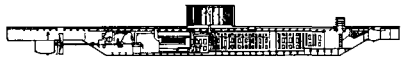
CITED—Totten with ADM Smith, USCG

COAST GUARD HONORS TOTTEN

On June 29, Mr. Jerry Totten of the U.S. Navy Office of the Supervisor of Salvage was presented with the Coast Guard's Distinguished Public Service Award for his work in freeing a grounded vessel in Salem Sound, Massachusetts, last year. For four weeks during February and March, Mr. Totten worked to free the Greek tanker, *Global Hope*, which had run aground during the famed "Blizzard of '78." Removal of the vessel averted the threat of massive oil pollution to the commonwealth's North Shore area. The award cited Mr. Totten's accurate analysis of the physical condition of the tanker and his proposed salvage plans. "Despite foul weather conditions and the hazards of remaining aboard the stricken tanker," the citation read in part, "you enthusiastically sought opportunities to contribute to the successful resolution of the problem, . . . reflecting great credit upon yourself, the Office of the Director of Ocean Engineering/ Supervisor of Salvage, and the Naval Sea Systems Command."

AGROUND—*Global Hope* stranded in Salem Sound, Mass., last February.

MONITOR WILL PROBABLY BE LEFT TO THE SEA



USS MONITOR — From an early drawing

What are the chances of raising the wreck of the Civil War ironclad *USS Monitor* intact from its watery grave 16 miles off Cape Hatteras? Virtually none, say those who participated in the 28-day archaeological exploration of the vessel conducted by NOAA, the State of North Carolina and the Harbor Branch Foundation last August. Close inspection by salvage experts, including former U.S. Navy Supervisor of Salvage, Captain Bill Searle, revealed the deck of the vessel to be riddled with holes. Moreover, the structural timbers show extensive damage from teredo worms. Nearly 50 dives were logged on the fragile wreck. Some three dozen artifacts were recovered, and the vessel was completely surveyed for the first time since it sank 117 years ago.

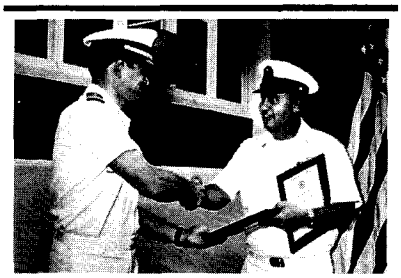
TRANSITIONS

CAPT JONES REPORTS—On September 17, Captain Colin M. Jones, USN, reported to the Naval Sea Systems Command as the new Director of Ocean Engineering/Supervisor of Salvage. Captain Jones relieved Commander W. N. Klorig, who will remain onboard as the Deputy Director. Captain Jones was previously assigned as the Pearl Harbor Naval Shipyard repair officer.

NEW C.O. AT NCSC—Captain Raymond D. Bennett was named commanding officer of the Naval Coastal Systems Center in Panama City, Florida, on August 3, 1979. NCSC is the host activity to the Navy Experimental Diving Unit and is a major center of diving and salvage research and development for the Navy. Captain Bennett was previously Deputy Director of Navy Laboratories and Programs at NAVMAT in Washington, D.C.

CDR MILWEE RETIRES

Commander W.I. Milwee, Jr., retired from the Navy on October 1, 1979 after twenty years of service. A Navy diver and salvage officer since 1966, CDR Milwee served with Harbor Clearance Unit One from 1967-1968. In 1968, he reported to the Navy Experimental Diving Unit as Project Officer and for nine months in 1971 was Officer-in-Charge. He was a plankowner in the Supervisor of Diving organization when it was formed in 1969. While at NEDU/SUPDIVE, he initiated the work that led to: the adoption of the USN diver's mask Mk 1, development of the Mk 12 SSDS, the two-volume diving manual, and the renascent *Faceplate* magazine. From 1973 to 1977, CDR Milwee was Pacific Fleet Salvage Officer. As such, he directed a number of salvage operations, including the clearance of Apra Harbor, Guam, after Typhoon Pamela, in 1976, the largest all-Navy harbor clearance operation since the Vietnam war. Articles on Navy diving and salvage authored by Commander Milwee have appeared in *Faceplate*, the *Naval Engineer's Journal*, *Naval Institute Proceedings* and other publications. CDR Milwee has accepted a position in the offshore industry.



BMCS(MDV) A.J. "Pete" Petrasek (r) retired from naval service at NSDS, Washington, D.C., on August 3rd.

Send news of events, personnel transitions, awards, upcoming conferences, etc., to: Soundings, Faceplate, *Supervisor of Diving, Naval Sea Systems Command, Washington, D.C. 20362.*

FACEPLATE
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Change of Command at NSDS

"...In the Tradition of Gunner Stillson"

Right: *Commander Nelson (r) relieves Commander Roper.*
Below (l-r): *Chaplain Hamilton, Commander Roper, Rear Admiral Burkhardt, and Commander Nelson.*

At change-of-command ceremonies on August 20, Commander James R. Nelson relieved Commander James E. Roper as commanding officer of the Naval School, Diving and Salvage, in Washington, D.C. Upon his relief, CDR Roper assumed duties as Supervisor of Diving, Naval Sea Systems Command (see interview, page 10).

Guest speaker, Rear Admiral Lawrence Burkhardt III, Director of Deep Submergence Systems, underscored CDR Roper's impact at NSDS, noting that under his leadership, "the quality of training and professional level of instruction has been upgraded, with curricula revised, the training tempo increased, and the qualifications of those who attend this school even more carefully screened."

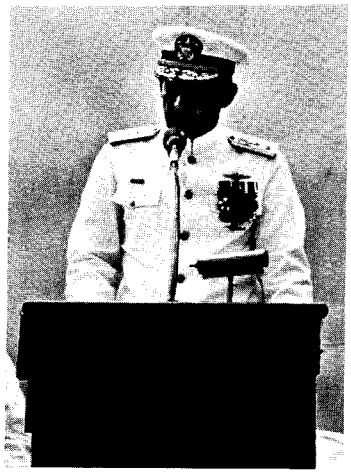
"The final result is that CDR Roper has systematically improved the overall posture and readiness of the diving Navy. All of this," said RADM Burkhardt, "is in the tradition of Gunner George D. Stillson, for it was through his foresighted efforts that the diving school first came to be."

CDR Nelson assumes his new duties at the school after serving as Commander of Special Boat Squadron Two, Little Creek, Virginia. RADM Burkhardt cited CDR Nelson's "broad background of command at sea, diving, salvage and extensive combat experience."

CDR Nelson enlisted in the Navy in 1946. Following commissioning as an ensign, he served aboard *USS Conserver* (ARS 39). Some years later, in 1969, he became commanding officer of the same ship.

TITANIUM CAPSULES AND MINIATURE LIFE SUPPORT SYSTEMS :

RADM BURKHARDT LOOKS AHEAD TO THE 1990s



Following are exerpts from the speech given by Rear Admiral Lawrence Burkhardt III at the NSDS change-of-command on August 20. RADM Burkhardt is Director of Deep Submergence Systems and is responsible to the Chief of Naval Operations for diving in the Navy.

". . .I have been aware of the diving Navy for many years. My early impressions were from my father-in-law, Torpedoman Chief Howard Horan, whose long career in diving and salvage started in 1916 at the Torpedo Station in Newport, R.I. Through him I became aware of how difficult and hard won your skills are, as well as how much fun and satisfaction you derive from employing them. His experiences ranged from helping to develop the underwater torch and recover the submarine S-51, to service aboard coal-burning diving support ships. Navy diving has come a long way since his day. But, most of the changes have been in recent years."

★★

"In the past, dedicated Navy divers developed diving equipment such as the Mk V deep sea diving helmet and the Jack Browne mask which became the main battery of diving equipment in the 1920s and 1930s. The advent of scuba, which entered naval service in the late 1940s, altered our diving capability by providing a new degree of mobility. Diving research and development then lay relatively dormant until the 1960s when we experienced the tragic loss of *USS Thresher*. This caused an in-depth review of the Navy's diving and submarine rescue capability. . .that enabled us to begin saturation diving and to achieve a depth capability increase from 300 feet to 850 feet. But, the working diver. . .received little or no new equipment. He was still back in the 1930s. The late 1960s and early 1970s were then targeted to give attention to this area. Requirements were established and new equipment developed."

★★

"Our Navy today employs about 700 officer and 2,300 enlisted divers. . . These men are truly a special breed who are just starting to receive updated equipment. The Mk V is being replaced with the Mk 12. . . The older Jack Browne equipment has been replaced with the Mk 1 Mod 0 diving mask with full communications, thus significantly improving shallow water ship husbandry tasks. The flyaway diving system compressor/diver console package is now being issued to fleet units to replace older air compressors. . .In essence, the work of the 1960s and 1970s provides the foundation for the diving capability we will possess in the 80s."

★★

"The 1990s offer a great potential for further enhancement of our diving capability. . .The precise depth capability for which we should aim is open to some question, but 1,000 to 1,500 feet appears to be the depth range to seek. Our research and development goals will consider the design of a smaller, less complex, saturation diving system which may utilize a lightweight titanium transfer capsule and multiplexing to reduce the size of diver umbilical cables. One significant step forward is the Mk 14 CCSDS push-pull saturation diving system which will improve diver mobility as well as the reliability and maintainability of the equipment."

"Improved tools for the working diver will be developed for ship husbandry tasks, including a ship's hull cleaning system. We may well be able to establish hull cleaning stations at critical locations, much like degaussing range stations, where ships and submarines have their hulls and propellers cleaned by divers in a total system approach. Another goal will be to develop on-line, real-time, monitoring of divers' air purity to increase diving safety."

★★

"Refinement of thermal protection, both active and passive for all divers, in an effort to achieve four-hour duration in 35°F water, will be pursued. CO_2 absorbent designs, for use in closed-circuit underwater breathing apparatus, will be targeted for six hours' continuous operation. Attention will be given to a much desired, unified umbilical for shallow and deep equipment. Miniature life support systems will be investigated for installation in conventional recompression chambers."

A CONVERSATION WITH THE SUPERVISOR OF DIVING

Shortly before he became Supervisor of Diving for the U.S. Navy in August, Commander James Roper talked with Faceplate *Managing Editor Steve Person about his new assignment and his thoughts about the direction of Navy diving.*

Faceplate: The new Mk 12 Surface-Supported Diving System is coming on-line at about the same time you become Supervisor of Diving, and is being taught right now at the schools. What effects will the Mk 12 have on Navy diving?

CDR Roper: It will definitely improve the capability of the Navy diver to work. It will be a year or so after it is in the fleet before the training program will catch up with the equipment. As with any piece of new equipment, we'll have that, and we expect to have that. But the overall impact that I foresee is that it will improve the mobility of the diver and that, perhaps in the long run, it will eliminate two or three of the other pieces of equipment that we have, based on its expected capabilities. It will probably be the primary piece of surface-supplied diving equipment in the Navy.

Faceplate: What about the future of the Mk V? Will it disappear over night when the Mk 12 is introduced?

CDR Roper: Based on our training plan, there will be about a two-year period that we'll phase the Mk 12 in and the Mk V out. And, of course, that also is contingent upon the delivery of the Mk 12 mixed-gas mode, which is in the final stages of development right now. I expect that when the Mk 12 mixed-gas mode is in the fleet, the Mk V will disappear totally.

Faceplate: Can you give us a brief look at the new T-ATF ship?

"We're making 1,500-foot dives and conceivably it could go deeper if the mission requirement is there."

CDR Roper: Yes. The first T-ATF is in Norfolk right now, and the equipment is arriving at Harbor Clearance Unit Two, which will be doing the Operational Evaluation to test the mission of the ship and its capabilities. It will have a complete set of diving gear, a chamber, the Mk 12, the Mk 1, hydraulic beach gear pullers, welders—the whole bag of tricks—to do a salvage job.

Faceplate: What is its mission, specifically?

CDR Roper: Well, the T-ATF is a single-mission ship. It can't do diving and beach gear at the same time, for example. It's a smaller platform than

the ARS and it is primarily a towing vessel that will be able to support specific salvage efforts as required. It has crew's quarters built in for the salvage team, but other than that, the salvage team brings everything that it needs to operate with. All this is air-transportable and loaded onto the deck of the ship by pallets. So, it's primarily a towing vessel with a salvage platform capability to augment a salvage operation.

Faceplate: How many will be built and where will they be stationed?

CDR Roper: They'll be divided between the East and West Coasts, and the program calls for seven ships. They haven't all been funded. One has been delivered and two are ready for delivery.

Faceplate: Can you explain the diver consolidation program that is in the works?

CDR Roper: Yes. It's in San Diego and they're trying to take the divers from all of the small diving lockers and surface tenders and bring them under one command to consolidate equipment, boats, and personnel and hopefully do all the diving work in that port. Hopefully, there will be a conservation of personnel, equipment and money. A large group of divers can do a lot more jobs than several small groups because they have the base knowledge and can draw from their common experiences, so you're not as limited in carrying out a job. Hopefully, the overall diver support effort capability will be elevated.

Faceplate: Will there be an East Coast counterpart?

CDR Roper: It's not off the ground yet on the East Coast. It's being discussed and they're doing some of the preliminary groundwork for it.

Faceplate: Let's turn to the commercial diving industry for a moment. Just a few years ago, the Navy was recognized as the leader in almost every area of diving. Is that still true? Is the Navy holding its own in diving advances with respect to the commercial industry?

CDR Roper: The commercial industry has taken all the things we've done and they've refined them to fit their jobs. Their mission, of course, is in oil field work and pipelaying, and we don't do too much of that type of work in the Navy—not too much construction. But, they've taken our research and development as it's readily available and expanded. They're not so much dollar limited in their budgets as we are; their budgets have been expanding while ours has been reduced. But, we're still able to do our mission extremely well. We are still the leader in diving medicine in this business, and government-supported research is the leader, the Navy being a major part of it. Anything we have is readily available to the industry. They've made quantum leaps in their capabilities compared to 15 years ago; it's now a highly skilled and refined industry.

"We're still able to do our mission extremely well. We are still the leader in diving medicine in this business . . ."

Faceplate: Will the budget limitations you spoke of preclude any further large-scale Navy programs like SEALAB?

CDR Roper: No, I don't believe it will. It won't preclude them if the mission requirement is there to do it. We've proved we have the capability to go under water and survive in the habitat and we're making 1,500-foot dives and conceivably it could go deeper if the mission requirement is there. We have the base knowledge to go on. I believe the budget will come if the mission is there.

Faceplate: Can you address our relationship with foreign navies' diving programs?

CDR Roper: Our Navy School of Diving and Salvage trains a lot of divers from many foreign countries. We work very closely with the British and Canadians and we have information exchange programs with them about diving research and development to support diving and submarine rescue. We also train civilian doctors in hyperbaric medicine here through a NOAA program and we train divers from most friendly nations in the world.

". . . we will not lower the standards (of divers), no matter what the attrition. The people have got to meet those standards. We intend to maintain the quality . . ."

Faceplate: How is the new 1140 Special Operations Officer program working?

CDR Roper: Well, it's in its first year and it's like any program that is in its infancy. Right now, we're separating the wheat from the chaff, and the people are getting into their billets and getting settled down. It provides a viable program for officers in EOD and salvage to see the top of the ladder and a reasonable opportunity that compares with the 1100 counterpart. It has created a career pattern that is identified, and not one that goes by chance. The reception at the junior officer level has been quite good. We're getting top-notch people and all they need is experience. Our first 1140 people are getting command of ships now, so the future looks bright. The degree of success or failure is now on the individual. He has the opportunity and if he performs, he'll be recognized. The vehicle is there for him to be recognized,

to stay in diving and salvage and become a professional salvor, diver, or EOD technician and have a reasonable expectation of success.

Faceplate: How about the enlisted diver? Is there a retention problem and, if so, how serious is it?

CDR Roper: The retention problem is probably the same as for the rest of the Navy. It is serious; we have our problems. However, we've had improvements over the last year and I can give you some figures. In June of last year, we had 60 percent of master diver billets filled and today 65 percent filled; first-class divers, last year we had 75 percent and today we have 83 percent filled; a year ago, we had 72 percent of second-class diver billets filled and now we have 97 percent filled. We've had a big drop that went back to about 1976, when we lost a lot of people and weren't training enough to cover it. We're now into a very rigorous and vigorous training plan at the second-class level. We've moved manning up 25 percent in that area in a year and hopefully at the end of the year we will have closer to 100 percent. A year from now, I would anticipate a great increase in the manning at the first-class diver level.

Faceplate: Will you be qualifying more master divers to boost manning on that level?

CDR Roper: The Navy master diver is, of course, a very saleable commodity in the civilian world and goes through a very rigorous qualification process. We're very selective and only about 40 percent of master diver candidates are successful in attaining it. We have maintained our standards and we will not lower the standards, no matter what the attrition. The people have got to meet those standards. We intend to maintain the quality rather than quantity.

"There are people who believe that it is necessary to practice pain, but I'm not sure that should be the case in the learning stages of becoming a diver. I don't see that you have to be totally uncomfortable."

Faceplate: Now that the new diving school is nearing completion in Panama City, what effects will it have on the Navy diving program, and on recruiting?

CDR Roper: Well, just the location, weather and the warm water will be much more attractive to a prospective diver, I would imagine. January in Panama City is much better than January in Washington, D.C. We're increasing our instructional capability by almost double. We'll have total control over our destiny. It will be easier to train because we'll have the barracks right there, and this will have an overall positive effect in the management of the school. Plus, we'll have all new equipment to train with. In the past, we've renovated and remodelled and done whatever we could with existing facilities. Our new facility is designed expressly as a school and the whole academic atmosphere will be enhanced. Washington, our present quarters, is a very hostile area, weatherwise and in overall conditions. This doesn't necessarily enhance training. There are people who believe that it is necessary to practice pain, but I'm not sure that should be the case in the learning stages of becoming a diver. I don't see that you have to be totally uncomfortable. We have enough discomfort built in the system. But the added things—the ice, etc.—I don't see that it adds too much to the training. I think we'll be turning out a better product at the new school.

Faceplate: And, once again, the school will be reunited with the Experimental Diving Unit . . .

CDR Roper: Yes, they'll be there to mutually support each other. They'll be transferring information to each other and plan to work closely together. But, of course, NEDU is a separate command with their own projects and activities. And, they test and evaluate things years in advance. What they're doing now, the fleet diver won't see for three or four years. Some of the things they do may never be seen by the fleet diver —they're put on the shelf to be used if the need arises.

Faceplate: What special skills or experience do you bring with you to this job?

CDR Roper: I hope that I'll be able to bring over to the job a real understanding of deck level requirements and to update diver training.

"One priority I have will be to make life better for the fleet diver and the waterfront technician—the individual down there doing the work."

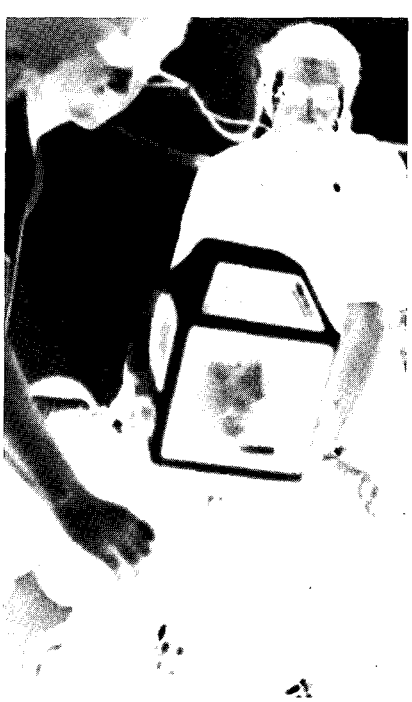
Faceplate: What are your immediate priorities as SUPDIVE?

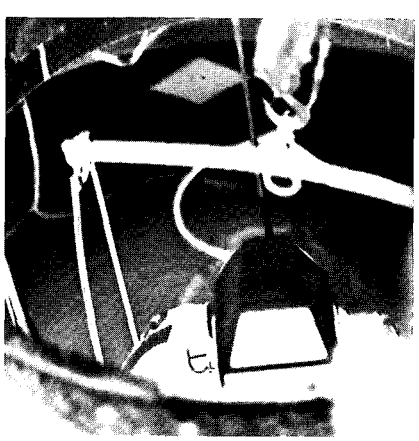
CDR Roper: One priority I have will be to make life better for the fleet diver and the waterfront technician—the individual down there doing the work. And, there are a lot of things we're doing from cave-man days. We've got to improve our capabilities in ship repair work. That's one of our major priorities in the overall diving program, to improve equipment and underwater techniques. We've got to improve our capabilities in welding, underwater maintenance, and ship husbandry to reduce drydock time, as a major part of the Navy's fuel economy measures. I see as my main priority getting equipment to the diver so he can do his job better and cheaper.

MK 12 ERA OFFICIALLY BEGINS

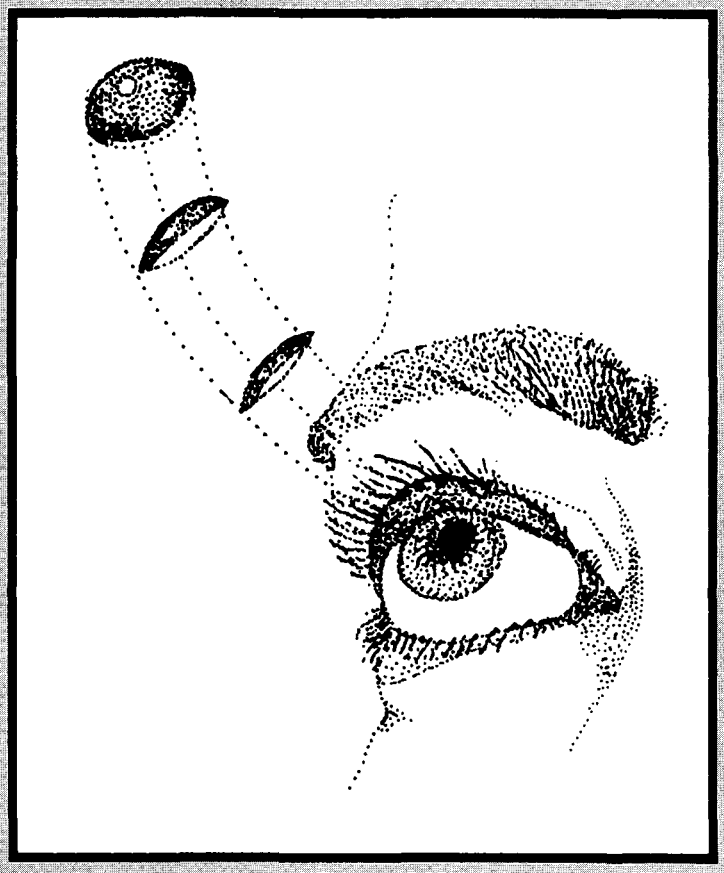
First Class of Students Receive Training in New Navy Diving System at NSDS

THERE WAS NO FANFARE AS DIVING INSTRUCTOR GMGC(DV) JOSLYN (ABOVE) CHECKED OUT HIS STUDENTS BEFORE THEY WERE LOWERED INTO THE WET POT AT THE NAVAL SCHOOL OF DIVING AND SALVAGE (NSDS) IN WASHINGTON, D.C., ON AUGUST 29. BUT, IT WAS A SIGNIFICANT DAY NONETHELESS. THESE DIVERS WERE IN THE FIRST FORMAL CLASS AT NSDS TO RECEIVE TRAINING IN THE NAVY'S NEWEST DIVING SYSTEM, THE MK 12 SSDS. THUS BEGINS THE GRADUAL PROCESS BY WHICH THE MK 12 WILL REPLACE THE MK V DEEPSEA DIVING RIG, USHERING IN A NEW ERA IN U.S. NAVY DIVING.





CONTACT LENSES AND DIVING: WHAT ARE THE RISKS ?



Mary M. Matzen
Naval Medical Research Institute

The findings of two NMRI researchers explain many of the eye problems reported by divers wearing contact lenses.

Do you or your divers wear contact lenses while working underwater? If so, you will be interested in the recent findings of a team of medical officers from the Naval Medical Research Institute in Bethesda, Maryland.

Because of the greatly increased use of contact lenses by divers in recent years, Captain M. E. Bradley and Commander D. R. Simon studied the effects of wearing contact lenses during and after decompression from high pressure. Their subjects were two male Navy divers (ages 40 and 47) who routinely wore contact lenses.

An instrument known as a slitlamp was used to examine the corneas of the subjects before, during, and after the exposures, and the corneas were photographed with a slitlamp camera before and after the exposures. The slitlamp provides magnification and a narrow beam of intense light; it is used by eye doctors for examining the eyes.

Damaged Corneal Tissue

For the hyperbaric exposures, the subjects were placed in a double-lock hyperbaric chamber in which compressed air was the breathing medium. Exposure depth was 150 fsw; bottom time, 30 minutes. Decompression followed a standard U.S. Navy decompression table for a 160-fsw, 40-minute exposure. Throughout the repeated exposures, subjects wore polymethylmethacrylate (hard) lenses or membrane (soft) lenses in one eye and no device in the other eye. Two kinds of hard contact lenses were used: a fenestrated lens, which had a 0.4-mm hole in the center, and a nonfenestrated lens, which had no hole in it.

As decompression progressed from 150 fsw, small bubbles in the precorneal tear film under the hard contact lens were first noticed at 70 fsw en route to the 30-fsw stop. The bubbles increased in number and expanded during the 30-fsw stop; they grew together at both the 20-fsw and 10-fsw stops. By the time the divers reached the surface, there was a reduction in size and number of bubbles. After 30 minutes at sea level, no bubbles were left under the contact lens, but coin-shaped patches of damaged corneal tissue could be seen in the areas where bubbles had been.

At the time of bubble formation, divers expressed a feeling of soreness in the involved eyes, saw halos and radiating spokes when viewing lights, and had decreased sharpness of vision. Symptoms lasted for about 2 hours after return to sea level.

"As decompression progressed, small bubbles under the hard contact lens were noticed . . . After 30 minutes at sea level, patches of damaged corneal tissue could be seen in the area where bubbles had been."

Tears Must Flow

No bubbles were seen: if no contact lens was worn, if a soft lens instead of a hard lens was worn, or if a single 0.4-mm hole was made in the center of the hard lens.

Soft lenses are larger than hard lenses and contain a large amount of water; they are designed to cover the entire cornea. The permeability and flexibility of the soft lens allows exchange of gas and nutrients such as sugar, and each blink pumps the nutrient tears across the cornea-lens interface. These features in the soft lens are responsible for rapid turnover of the nutrient tear film and dissolved gases; thus, bubble formation does not occur during decompression.

"... divers (wearing hard lenses) expressed a feeling of soreness, saw halos and radiating spokes when viewing lights, and had decreased sharpness of vision."

The eye symptoms experienced by the subjects wearing the hard lenses without the hole in the center were the result of corneal epithelial edema (excessive fluid in the thin skin covering the cornea). This edema was caused by formation and trapping of nitrogen bubbles in the precorneal tear film. The formation and trapping of these bubbles resulted from the outgassing of mainly nitrogen from the cornea and tear film as pressure was decreased. Because the movement of the hard lenses with blinking did not completely uncover the central cornea, gas remained trapped, which disturbed tear exchange and interfered with the nutrient exchanges that normally occur between the tear film and the corneal epithelium. Thus, the corneal epithelium was deprived of oxygen and excessive retention of carbon dioxide occured; tissue damage resulted.

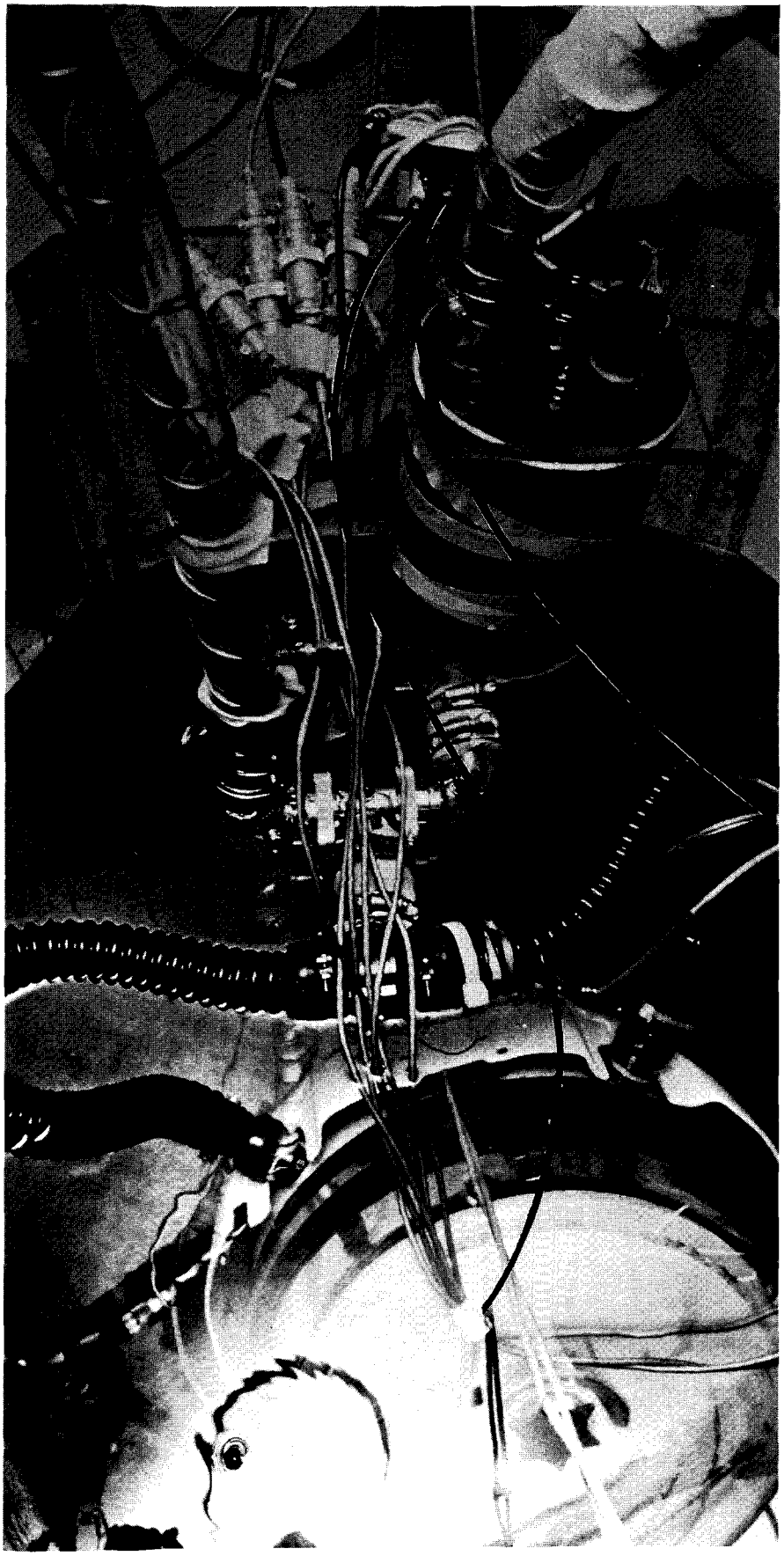
When hard lenses with a 0.4-mm hole were used, the hole did not permit the movement of bubbles from one side of the lens to the other, but it did serve as a channel through which tiny amounts of tear could pass, which allowed tear exchange and the flow of gas and nutrients in solution. The subject's sharpness of vision was not affected because the hole filled with tear did not alter the contact lens's ability to transmit light.

Conclusions

Doctors Bradley and Simon conclude:

- The use of hard contact lenses by individuals working in the hyperbaric environment can cause injury to the cornea.
- The injury causes discomfort and temporary visual impairment.
- The injury causes the cornea of the eye to be prone to infection.

The researchers recommend that the nasty effects of wearing contact lenses during decompression can be avoided by the use of fenestrated hard contact lenses, membrane contact lenses, or, preferably, a prescription facemask instead of contact lenses.



NAVSEA Instruction 9597.1, the List of Equipment Approved for Navy Use, is a document familiar to most Navy divers. This comprehensive listing includes not only Navy-designed, special-purpose diving systems, but scores of off-the-shelf, commercial diving products and accessories as well.

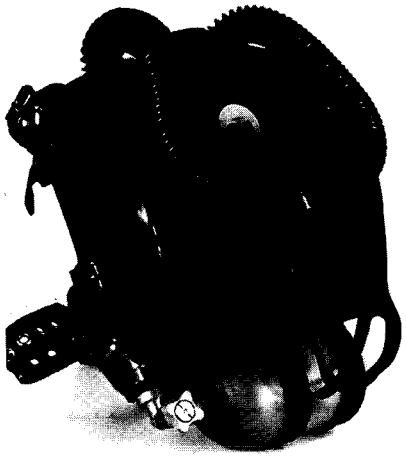
If a piece of equipment is not on the list, Navy divers don't use it. Those items that do make the list are there because they have passed rigid Navy testing. (It should be noted, however, that the rejection of a piece of equipment does not necessarily mean that it was found to be unsafe or poorly manufactured; in many cases, it simply means that its design is not in every respect compatible with the Navy's specialized mission requirements.)

Here's a look at the evaluation process undergone by diving life support systems and accessories before they are approved for use by Navy divers.

All testing is carried out at the Navy Experimental Diving Unit (NEDU) in Panama City, Florida, by the Test and Evaluation Department headed by Lieutenant J. T. Harrison. T & E Engineer Jim Middleton, Diving Operations Specialist Jack Schmitt, and Chief Petty Officers Bailey, Dodds and Kidman and their team of enlisted technicians have at their disposal a broad inventory of test equipment and facilities, plus the unique Ocean Simulation Facility hyperbaric complex and a highly advanced Reimers breathing machine, one of only a few such sophisticated machines in the world. With

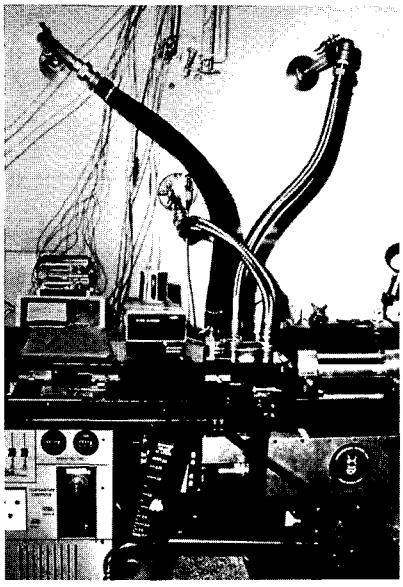
NAVY EVALUATES DIVING EQUIPMENT

these facilities, tests can be conducted safely, efficiently, and objectively; data obtained are both reliable and repeatable.



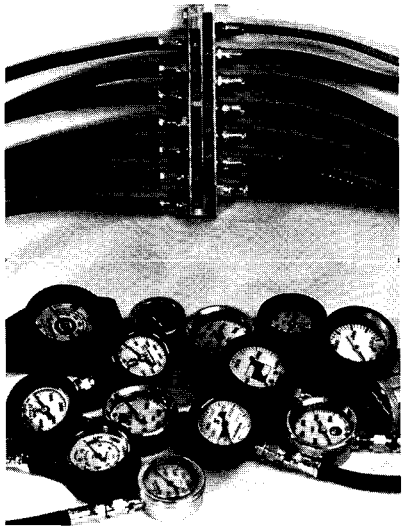
NEDU's funding and authority for conducting diving equipment tests comes from the Naval Sea Systems Command (NAVSEA) in Washington. Once a test program is conceived, NEDU gears up for the production of a test plan and makes arrangements for procuring the item or items to be tested. New, navy-designed equipment goes to NEDU for testing after completing its developmental cycle at one of the Navy's research and development laboratories; commercial products to be tested are usually purchased directly from the retailer, and as a matter of routine practice, factory representatives are invited to observe the testing.

Some of the items tested most recently at NEDU are shown in the accompanying photographs. They range from submersible scuba cylinder pressure gauges and regulators, to a German-made, closed-circuit underwater breathing apparatus. Slated for evaluation in the near future are buoyancy compensators, underwater communication systems, diver hot water heaters, the EX-16 UBA, and diver watches.



At the heart of NEDU's testing capability is the Reimers breathing machine (above, and opposite), of which there are only several in the world. The Draeger LAR V (left) was tested and modified to correspond with U. S. Navy specifications. Fourteen cylinder pressure gauges (right) had varying degrees of accuracy, but all yielded readings that were well within an acceptable range of error, and, as such, were approved for Navy use.

After every evaluation, a formal report is prepared and published by NEDU explaining the complete test procedure, test equipment used, test

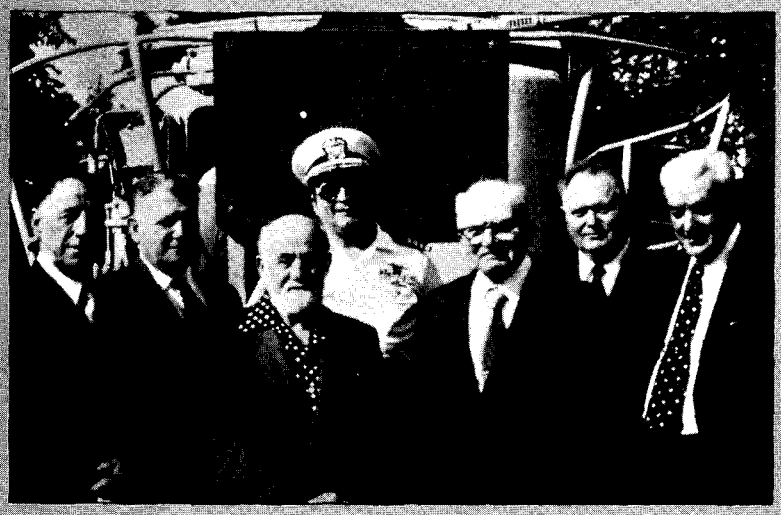


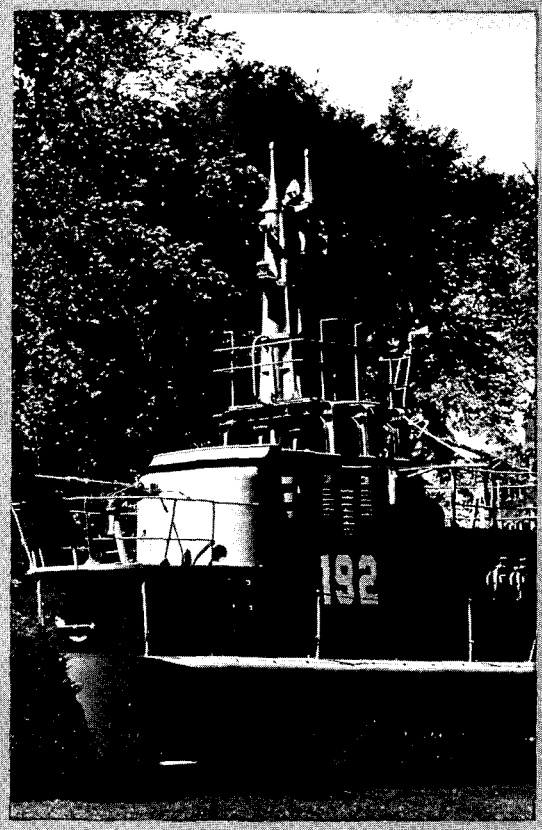
results and conclusions. The report also includes a recommendation for or against the inclusion of the equipment on the Navy's approved list, and in many cases it will suggest modifications and improvements that could be made to the equipment.

ORDERING NEDU REPORTS

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.

Squalus Survivors Recall Rescue





Reunited at the Squalus/Sailfish *memorial at Portsmouth Naval Shipyard on May 27 are (l-r) Gerald C. McLees, Donato Persico, Leonard de Medeiros, Allen C. Bryson (second from right), and Robert L. Washburn (far right). At center is Captain Ray Jones, commanding officer of the shipyard, and, to his left, Roland Fiedler, a* Squalus *diver who was awarded the Navy Cross.*

Five of the 33 crewmen rescued from *USS Squalus* 40 years ago *(FP,* Summer '79) were reunited recently at the Portsmouth Naval Shipyard in Kittery, Maine, where the famous submarine was built and where its conning tower is now exhibited as a memorial.

Five other *Squalus* survivors are known to be still alive, including the submarine's skipper, then-Lieutenant Oliver F. Naquin (see accompanying story).

Electrician's Mate Gerald McLees was in the first group to be brought up from the sunken submarine by the McCann rescue chamber, and later served aboard *Squalus* after she had been recovered and put back into service as *USS Sailfish.*

Robert Washburn, a seaman-second and youngest of the crew, was on the second trip. He recalled Lieutenant Naquin giving him his coat to fight off the cold that gripped the submarine as it rested on the bottom in 240 feet of North Atlantic water. Washburn now works at General Dynamics-Electric Boat in Groton, Connecticut, builders of the new Trident submarines.

In the third trip was Torpedoman Leonard S. de Medeiros, who recalled, "We kept beating on the hull to keep contact. I felt sure the good old Navy was going to come through and we knew it when we heard the clomping on the deck that a diver was there." Two days after he was rescued, de Medeiros was quoted by newspapers as saying, "I hope they get *Squalus* up, and I hope I'm on her again. She's a good ship. A tough break happened, that's all." He got his wish, and, with McLees, made several patrols aboard *Sailfish* during World War II.

Rescued in the fourth and last trip to save the 33 crewmen still alive in the submarine's forward compartments were Donato Persico and Allen Bryson, Machinist's Mate Second Class, who recalled, "I can't communicate the closeness of the people in the *Squalus.* The loss of the ship and the people prevented reunions until now."

From Mr. de Medeiros' collection of newspaper clippings is this photo of crewmen from Squalus' *sister ship* Sculpin *lowering the ensign to half mast in tribute to the 26 who were lost on* Squalus. *Above, right: Navy diver during the rescue.*

Persico, who also returned to submarine duty during the war, called the trip to the surface "the best ride I ever had in my life."

Also present at the reunion was Roland Fiedler, a diver who took part in the rescue and salvage. He and 14 other Navy divers received Navy Crosses for their heroism.

Pearl Brisson, president of the Kittery Historical Society, organized the reunion project. *Faceplate* is grateful to her and to Lieutenant Robert Johnston, public affairs officer at the Portsmouth Naval Shipyard, for their assistance in compiling information for this article.

"there was no fuller meaning to the word 'shipmate'"

Lieutenant Oliver F. Naquin, 1939 photo

"My officers and men acted instinctively and calmly," wrote Oliver F. Naquin, skipper of *Squalus*, in a letter to the organizers of the survivors' reunion last May at the Portsmouth Naval Shipyard. "There were no complaints about the bitter cold. There was no fuller meaning to the word 'shipmate.'"

Naquin, now 75, retired as a rear admiral and lives in Arlington, Virginia. He received his invitation to the reunion too late to attend, but talked to *Faceplate* shortly thereafter.

"None of us (*Squalus* survivors) would be here today if it weren't for the forethought of 'Swede' Momsen years before the accident," RADM Naquin said.

"He persevered for many years, but was defeated on his rescue bell idea. He went on to develop the (Momsen) lung, while Commander (Allan) McCann revived the bell and improved it."

The McCann rescue chamber, as it is now called, is still in the Navy's submarine rescue equipment inventory. Commenting on the new cable reel unit developed by the Civil Engineering Laboratory (*FP*, Summer '79), RADM Naquin said, "I was very interested to read about it, and am sure it will save time on the first dive (to a stricken submarine). The diver was very lucky to have landed right on our hatch the first time."

Recalling his conversation with Lieutenant Wilkin, skipper of *Sculpin*, which was the first vessel to come to the aid of *Squalus*, RADM Naquin said, "He said, 'Hello, Oliver,' and I said, 'Hello, Wilkie,' and that was the end of it." The communications cable then broke, cutting off further conversation, but the admiral quickly agreed that the abbreviated exchange was better than nothing.

at least 10 still living

Historian G. Pearl Brisson of Kittery, Maine, is a determined woman. Inspired by David Sudhalter's recent article commemorating the 40th anniversary of the *Squalus* rescue operation, she set out to learn the fates of the 33 survivors, a task, she says, "which I hope to bring to a successful conclusion in time."

Mrs. Brisson writes:

"There are ten survivors living that we know of at this date, seven others who have since died, and no information on sixteen other survivors. We are attempting to make a record of what has happened to these thirty-three men since their rescue, as a permanent part of Kittery history... Three of the *Squalus* men were assigned to *Sailfish*: McLees, de Medeiros, and Cravens. Lloyd Maness (who, during the flooding, closed the door to the forward compartment and saved himself and 32 of his shipmates from sure drowning) was also assigned, but on sailing day, he was in the hospital, and missed the boat. Maness was lost when *Growler* was sunk November 8, 1944 in the Pacific."

JUDSON T. BLAND
LA MESA, CALIFORNIA

ALLEN C. BRYSON
NEW LONDON, CONNECTICUT

EUGENE D. CRAVENS
ST. PETERSBURG, FLORIDA

LEONARD de MEDEIROS
FAIR HAVEN, MASSACHUSETTS

WILLIAM T. DOYLE

GERALD C. McLEES
PORTSMOUTH, NEW HAMPSHIRE

OLIVER F. NAQUIN
ARLINGTON, VIRGINIA

JOHN C. NICHOLS
MENLO PARK, CALIFORNIA

DONATO PERSICO
AMSTERDAM, NEW YORK

ROBERT L. WASHBURN
OAKDALE, CONNECTICUT

trouble on the horizon

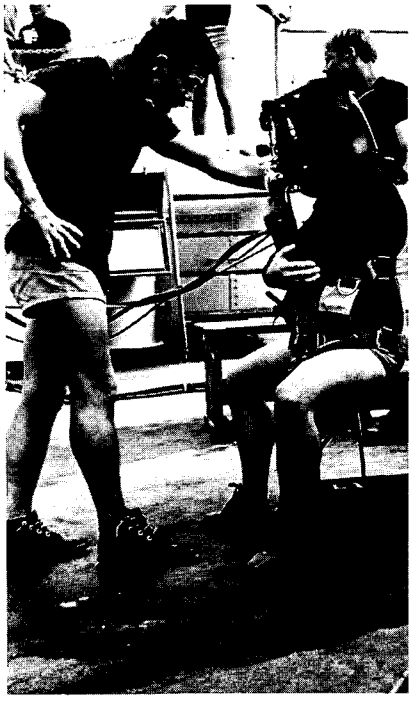
master diver

Master diver candidates Straining (above), LeJeune (below) and Fomby (bottom) running their dives and expecting the unexpected.

candidates are put to the test

Faceplate spent a day aboard YDT-14 on the Potomac River off NSWC-Dahlgren in early August to observe a segment of the process by which the Navy's Master Divers (MDVs) are selected. After the ship anchored in about 65 feet of water, the five MDV candidates took turns supervising dives with the Mk 1 Mod O diver's mask and open diving bell.

The subjects: 24 first-class diver students from the Naval School of Diving and Salvage in Washington, D.C. It was the students' first dive with the bell. Suspended by cable from the ship, the bell transported each dive team—one "red diver" and one "green diver"—to the bottom, where they stayed for approximately 15 minutes. Each diver was instructed to exit and return to the bell, and to operate its circulation and ventilation controls. The bell holds a reservoir of air and is a refuge for the diver in the event of an emergency.



On the final dive of the day, the MDV evaluators set up a simulated emergency to test the response of the unsuspecting MDV candidate. At the prescribed moment, the red diver staged a state of panic, then began groaning and talking incoherently through his voice communications to

the surface. Not expecting this type of drill until the following week, the MDV candidate nonetheless responded immediately. After taking personal command of the communications box, he attempted to calm the stricken diver.

"Red diver, this is the diving supervisor," he said, with firm authority to calm the diver. "Relax and listen up. Green diver is on his way to assist you. . ."

In rapid succession, the MDV candidate instructed the green diver to go to the aid of the red diver and to report on his condition. But, the seconds fleeted by, seeming like hours. Unsatisfied that the situation was improving, the candidate instructed the standby diver to enter the water and assist.

Finally, the stricken diver was brought to the safety of the bell, which was then raised to the surface. All hands guided the bell to the edge of the deck and assisted the diver, who feigned unconsciousness. The MDV candidate, knowing his every word and movement was under close scrutiny by his evaluators, coolly directed the series of events until the diver was safely inside the ship's recompression chamber.

The speed with which such an accident can occur, and its potential finality, demand that MDVs be selected with extreme care. They must hold a keen sense of judgement, alertness, anticipation and authority, plus a thorough knowledge of the technical aspects of diving. Three of the candidates ultimately were selected to become master divers from this August class. They are: ENC

(MDV) Ray Straining, from the Escape Training Tank, Submarine School, New London; HTC(MDV) Dave LeJeune, Submarine Development Group One, San Diego; and BMC(MDV) Mike Fomby, *USS Grayback* (SS 574), Subic Bay.

SHIP HULLS TO BE KEPT CLEANER TO CUT DRAG, SAVE FUEL

CDR K.A. Gustafson, Diving Officer
U.S. Naval Ship Repair Facility, Yokosuka, Japan

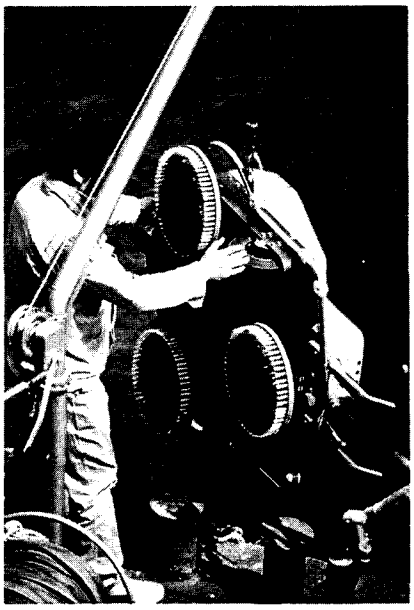
Like a catfish sweeping the sides of an aquarium, the Brush Kart system moved across the hull of USS White Plains (AFS-4) last March, efficiently sweeping away the accumulated marine growth that so greatly increases drag on ships under way. The event marked the beginning of SRF Yokosuka's expanded efforts to support the Navy's program to reduce fuel costs for ships operating at sea.

The Navy estimates that it can save hundreds of thousands of dollars in fuel costs each year by controlling marine fouling on the hulls of its ships. At the Ship Repair Facility (SRF) in Yokosuka, Japan, earlier this year, a search began to identify both equipment and contractors available in Japan to meet the Navy's requirement to clean the hulls of ships homeported in Yokosuka at least once annually and to provide the same service to visiting Navy ships when requested.

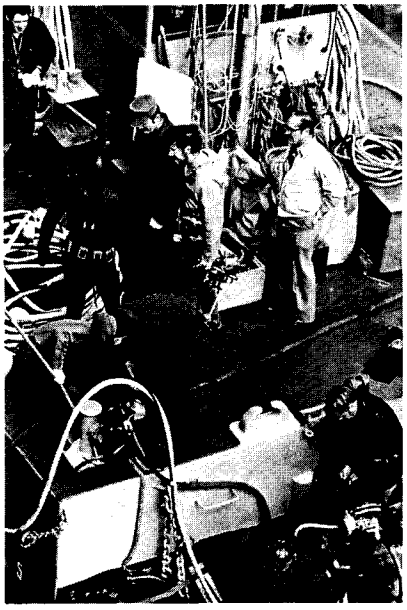
The costs quoted by Phosmarine Far East K.K. Company were promising; in addition, the firm offered to demonstrate the effectiveness of their Brush Kart system on one of the Navy's ships. An opportunity presented itself to try out their proposal when PERA (CSS) requested that *USS White Plains'* hull be cleaned to allow a thorough pre-overhaul inspection. As a result, *White Plains* was scheduled to receive a hull cleaning using Brush Kart on March 22 and 23.

The primary objective of the demonstration was to measure the system's capability. Also, it was to be an evaluation of the ability of SRF divers to handle hull cleaning equipment and a means to discuss the quality of cleaning required by both the contractor and SRF.

To evaluate the results of the hull cleaning, the demonstration consisted of (1) a UDATS inspection of the hull prior to the cleaning, (2) cleaning of one side of the ship, (3) inspecting the cleaning accomplished and critiquing the results, (4) cleaning of the other side of the ship using lessons learned from the first side, and (5) completing final UDATS inspection, camera photos, and inspection report. To provide SRF an understanding of hull cleaning standards expected for naval ships, representatives from other commands were invited. Mr. Clark Mallder from the Office of the Supervisor of Salvage (SUPSALV) and Messrs. Bohlander, Partlow, and Sampson from David Taylor Research and Devleopment Laboratory flew to Japan to observe the cleaning and



As the brush unit is lowered into the water (right), MMCS Fulkerson gives pre-dive instructions to HM2 (DV) Carr (page 22), who will photograph the results.



After the demonstration, divers return the unit to the barge (below) as the SRF inspection team confers with NAVSEA and David Taylor NSRDC representatives (left).

discuss requirements as related to the results achieved.

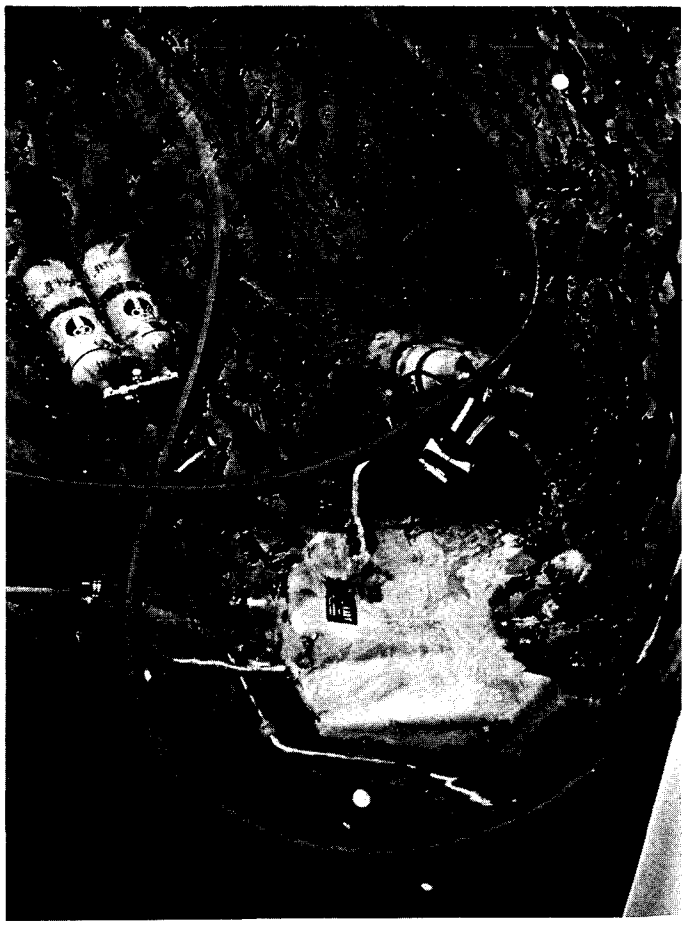
With the stage set and the audience ready, the team from Phosmarine began their demonstration. The Brush Kart unit, using three rotating brushes to clean grass and barnacles off the hull, was driven by the commercial divers. The system cleans approximately 22,000 square feet/hour with a forward speed of 125 feet/minute. It has a hydraulic power system with 52-hp diesel engine. Brush Kart is effective on curved surfaces, but cannot clean effectively at the water's surface. For a satisfactory cleaning of a ship similiar to *White Plains*, a minimum of four days would be required.

The basic objectives of the demonstration were met, and, in terms of helping SRF develop its future hull cleaning standards and the overall program to meet ship requirements, it was a complete success.

The inspection of *White Plains* after the demonstration revealed that the traction wheel of the Brush Kart system had rubbed the hull coating in some areas. However, Phosmarine has already made some modifications to correct this problem, and a redemonstration has been scheduled on *USS Lockwood* (FF 1064).

What does the future program look like at SRF Yokosuka? The time and effort to clean *White Plains* and an expanding workload at the SRF Yokosuka diving locker will probably prevent the entire SRF predicted workload to be shouldered by the locker. Instead, a combination of hull cleaning using leased equipment and contracting out some services is envisioned. This capability will allow hull cleaning services to be provided at any time to ships in the Western Pacific.

The next step is to train the divers on hull cleaning equipment available. SUPSALV is assisting in this effort. Then, SRF will implement a hull inspection and cleaning program that should benefit the "Seventh Fleet steamers" and contribute to vitally important fuel savings for the Navy.



USS RECOVERY IN TOULON: SOME SPONTANEOUS DIVING AT THE FRENCH NAVY DIVING SCHOOL

LT(jg) Melvin Bell
USS Recovery (ARS 43)

During a recent Mediterranean deployment, divers from USS Recovery *(ARS 43) were given the opportunity to train with divers from the French Navy Diving School in Toulon, France. Following is a brief report:*

From May 11 to 17, *USS Recovery* was in the city of Toulon for a scheduled port visit. Through the assistance of a French liaison officer, a visit was arranged to the Ecole de Plongée Marine Nationale. The school's commanding officer gave *Recovery* a warm reception and invited our divers to participate in some of the French divers' scheduled training. The school conducts training dives almost daily in the morning, with classroom training in the afternoon.

Recovery's Lieutenant (jg) Kirk E. Davis and the school's training officer L. V. Segot set up two dives. The first day was for exploration and orientation at a depth of 124 feet and the second day was for a compass/navigation swim at 68 feet. All dives were designed to be no-decompression dives with scuba.

Each morning, *Recovery*'s 35-foot workboat arrived at the school to pick up the French divers and their equipment for the 30-minute ride to the dive site.

The first day's dive was on two wrecks maintained by the French as a training area. A small cargo ship and a tug had been sunk years ago by the French in 66 to 132 feet of water just yards from the rocky shoreline. The visibility on the bottom was about 75 feet and the water temperature was 51°F. Both wrecks were well preserved in an upright position and provided good background for a very enjoyable dive. Divers went down the anchor line in mixed teams of French and Americans to explore both wrecks for as long as no-decompression limits would allow.

The second day's dive was a 64-foot navigation and orientation dive. Again, the workboat returned to the same general area as the first dive. Divers descended the anchor line and swam on a predetermined bearing to a large rock formation 100 yards away. The dive was completed after successfully navigating back to the anchor. This type of diving is not often practiced by salvage divers, so it proved to be an instructive dive for all.

While the training dives were in progress, other *Recovery* personnel were treated to a film, orientation briefing, and tour concerning French Navy deep submergence capabilities. The film covered the new French Navy deep submergence support ship *Triton* and its submersible. The briefing and tour also covered the bathyscaphe *Archimede* and remote-controlled vehicle *Eric.*

Recovery, in turn, hosted 12 French salvage officers for a tour and brief of the ship's capabilities. Their questions centered around engineering maintenance, towing and salvage. Additionally, seven officers from the French ship *Gismer* toured the ship. They were interested in the Mk 1 diver's mask and the Mk 12 surface-supported diving system.

During informal discussions with the French, many questions concerning the U.S. Navy's deep submergence rescue vehicle (DSRV) arose, and significant interest was expressed by senior diving personnel in conducting a joint exercise similar to the recent US/UK endeavor.

The French Navy diving school stopped teaching surface-tended diving several years ago. Primary emphasis is now placed on different forms of scuba. Both open- and closed-circuit, as well as mixed-gas, scuba rigs are used. The French seemed very eager to have the chance to make a few orientation dives with our Mk 1. Unfortunately, *Recovery*'s busy schedule made it impossible at the time. With a minimum of advanced planning, however, joint US/French training exercises could be scheduled that would be extremely beneficial to both sides.

USS Recovery *(left) and the French Navy Diving School (above).* Below, left: Recovery's *LT (jg) Davis presents a ship's plaque to the school's executive officer.* Below and opposite: *Divers return to the anchor line following a 100-yard compass swim.*

SEAWATER MOTOR DROWNS OUT THE COMPETITION

Motor is First Component of a Seawater Hydraulic System for Powering Diver Tools, but has Other Potential Uses Underwater as Well.

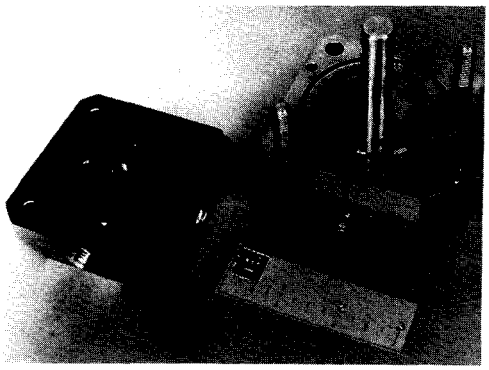
The Navy has successfully developed its first underwater hydraulic motor using seawater instead of oil to power diver tools. Additional tests and evaluations of the prototype motor will continue during the remainder of this year at the Civil Engineering Laboratory (CEL), Naval Construction Battalion Center, Port Hueneme, California, which started work on the project three years ago.

During preliminary studies, three of the most promising types of motors (gear, vane and piston) were selected for a more detailed design analysis. CEL decided to develop a double-entry, balanced vane motor which required relatively simple shapes, demands few parts and is easy to maintain. The prototype motor is compact and small, measuring just 3"x3"x2½", and weighs only five pounds.

Most rotary power hand tools employed by Navy divers today are operated by oil hydraulic motors. But, they pose disadvantages, such as oil leakage, which causes contamination; seawater intrusion, resulting in corrosion and reduced lubrication; the need for two, stiff hoses; and the demand for expensive hydraulic fluids, which present logistic problems and shipboard fire dangers.

The use of seawater in place of oil as the working fluid has long been considered an attractive alternative. The advantages are many and obvious, but limited past efforts failed to solve developmental difficulties caused by seawater's low viscosity, lubricity and corrosive nature.

Stanley Black, CEL project engineer, said the proper selection of materials enables the motor's components to survive such a harsh environment. By combining high strength thermo-plastics, rubbing against a nickel-based alloy, engineers are working with materials that feature low coefficients of friction, minimal wear, and resistance to corrosion in seawater.



A distinct advantage is the motor's capability to compensate for wear on the vane tips. Leakage will not increase as the vanes experience the effects (wear) of high mechanical loads. The vanes are made of Torlon plastic, which has a low wear rate when subjected to heavy loads at high speeds.

One performance goal, Black said, is to achieve 3.0 hp at 1,500 rpm, provided with seawater at 5 gallons, 1,500 psi (70 percent efficiency). Another target is to have the motor operate for 50 hours under full load conditions.

The motor design was based on results of a comprehensive materials study done under contract to CEL by Mechanical Technology, Inc., N.Y. The vane motor was designed and built under contract by Westinghouse Electric Corp., Oceanic Division, where tests are under way. Additional testing is scheduled at CEL later this year. Based on results of both test programs, the Laboratory will design a motor to be installed in an underwater tool. Black said it would be the first component of a seawater hydraulic system. The system will include newly designed pumps for supplying pressurized seawater; special flow control valves, hoses, and fittings; filters to remove contaminates; and the tool head performing the desired operation, such as an impactor, drill or saw.

Development of seawater hydraulic systems is of international interest. The U.S. Navy and the British Royal Navy are cooperating in similar programs that could satisfy most underwater requirements. Under the Deep Ocean Technology (DOT) program sponsored by the Naval Facilities Engineering Command (NAVFAC), CEL is working closely with the United Kingdom's Department of Industry, National Engineering Laboratory (NEL), which in turn is under contract to the Royal Navy. Both laboratories have been exchanging ideas and technology for approximately two years to prevent duplication of efforts.

Before oil hydraulic tools were developed, electrical and pneumatic systems were studied. Electric tools were eliminated because of several negative factors, such as the need for safety devices to prevent shock, relatively low power-to-weight ratio, and basic problems of sealing the conducting elements from the corroding environment. Pneumatic tools are generally limited by depth; efficiency decreases as the diver goes deeper. Exhaust bubbles also obscure visibility and often create compression waves that may cause nausea in the diver.

There are many advantages in using seawater hydraulic systems, Black said. Obviously, the use of oil is eliminated. That means no environmental pollution and no contamination of the working fluid. Fire hazards also are eliminated. There is no need for a return hose; less pump power is required; and the drag force from current and surge is reduced. Divers will find that the reduced back pressure will provide increased tool working depth. They also will observe that the more flexible hose is easier to handle.

The potential for seawater hydraulic systems is not limited to diver tools. The technology is adaptable to such areas as submersibles, amphibious vehicles, submarines, and shipboard machinery.

THE OLD MASTER

Some Ways to Scout Potential Divers, and Hone Your Own Diving Skills . . .

As one looks about in today's diving community, it is apparent that staffing is below the optimum level. Although the situation is improving, Commander Roper points out in this issue that master diver billets are only 65-percent manned, while first-class and second-class divers are staffed at 83 percent and 97 percent, respectively.

On the surface, one might say the responsibility to bridge this gap lies within the Navy recruiting command. However, in the search for top quality diver candidates, it behooves each of us in the community to act as recruiters. A considerable number of excellent divers are initially introduced to the challenges of diving while in the Navy. The interest of these individuals in diving is generally sparked by the talented, aggressive, and professionally competent Navy divers found within their own command.

What to Look For

A Navy diver must possess a high degree of manual dexterity, physical strength, stamina, and exceptional self-control under stressful situations. The diver must be capable of accomplishing a wide variety of tasks requiring mechanical skill under arduous conditions, often in a cold, dark, confined environment. Since diving schools must concentrate primarily on training an individual to be a safe, qualified, and confident diver, those individuals who already possess mechanical skills, and a familiarity with hand tools, welding, and/or construction techniques, will generally make the best divers.

I encourage you to actively seek out those sailors among you who show an interest in diving, answer their questions, and encourage those qualified individuals to pursue their interest by requesting training as salvage, EOD, construction, or special warfare divers. Your willingness to devote your time and enthusiasm to this effort can only ensure continued progress towards achieving 100-percent manning at all levels within the community. Without your support, the job is much tougher.

Improving Your Own Skills

While writing on the subject, I would also like to encourage those qualified divers we have at present to request first-class training or saturation school. For those previously qualified first-class Navy divers whose qualifications have lapsed, there will be a four-week requalification course offered at NSDS, Washington, D.C., beginning 9 November 1979 (see the Soundings note in this issue).

To reinforce the formal training received by second- and first-class divers and diving officers, HCU-2 offers a quarterly refresher course for air and mixed-gas diving supervisors. A total of 20 divers attended the one-week course during the summer, and 15 were enrolled in the September course. In the future, HCU-2 plans to offer this training for air and mixed-gas supervisors in separate courses. In reading the recent message traffic, I see that HCU-1 is offering a two-week course for master diver screening from 22 October to 2 November; this course also offers excellent refresher training for diving officers and enlisted divers. A diver cannot receive too much training, and a good one always seeks to enhance his skills through additional informal as well as formal training. These refresher courses tend to fill up early, so submit your request chit to attend as soon as possible.

Odds 'n Ends

I have had several inquiries requesting copies of AIG 239 messages. Check with your operations officer to ensure your locker is on the routing for these vitally important messages. I am quite sure that all diving activities are on the distribution list.

For those of you interested in ocean engineering and deep submergence systems (and what Navy diver isn't), the June 1979 issue of *NAVSEA Journal* is devoted to many interesting articles on the subjects. Check your Log Room and Engineering Department for a copy.

Keep up the good work and *safe diving.*

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