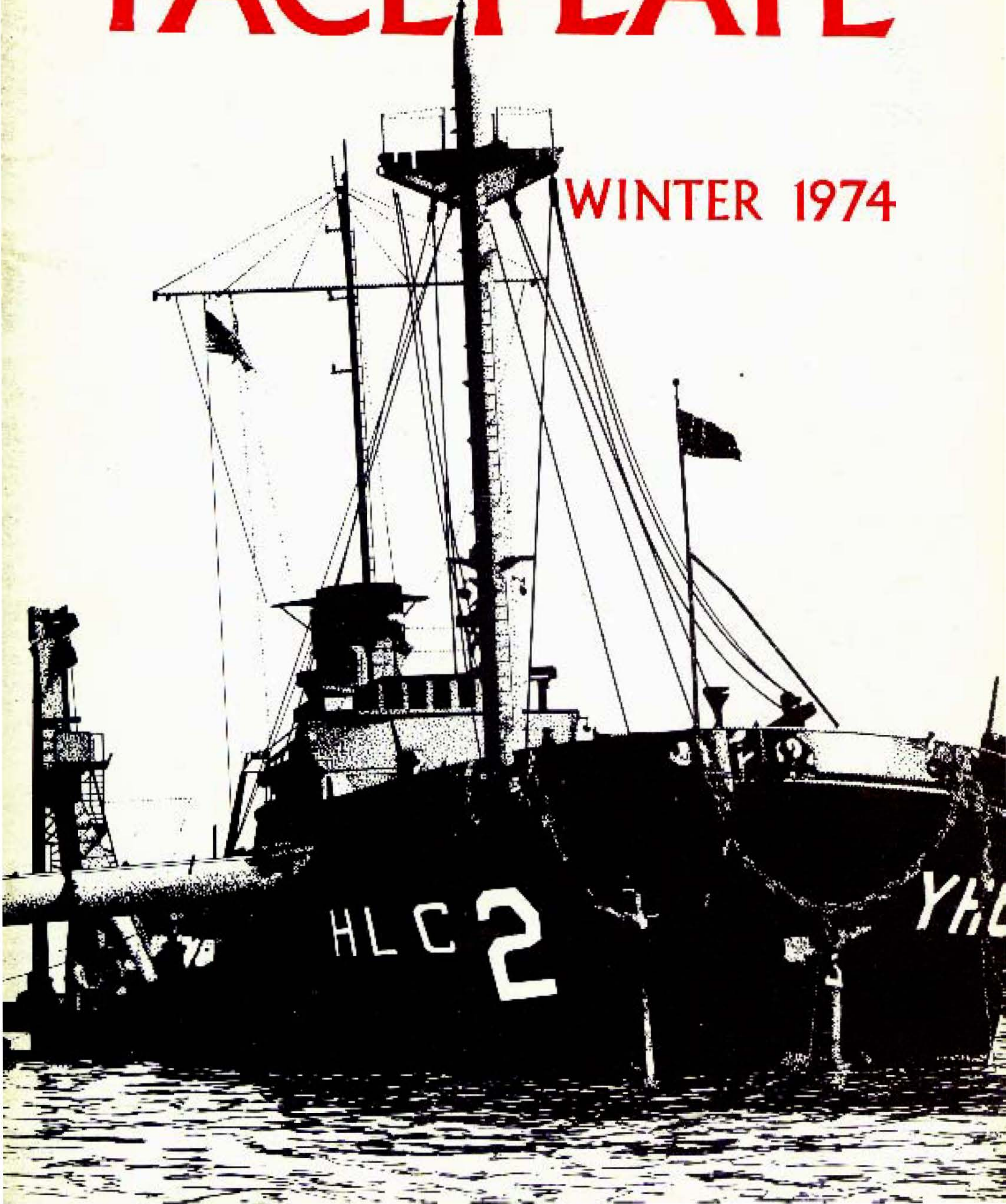
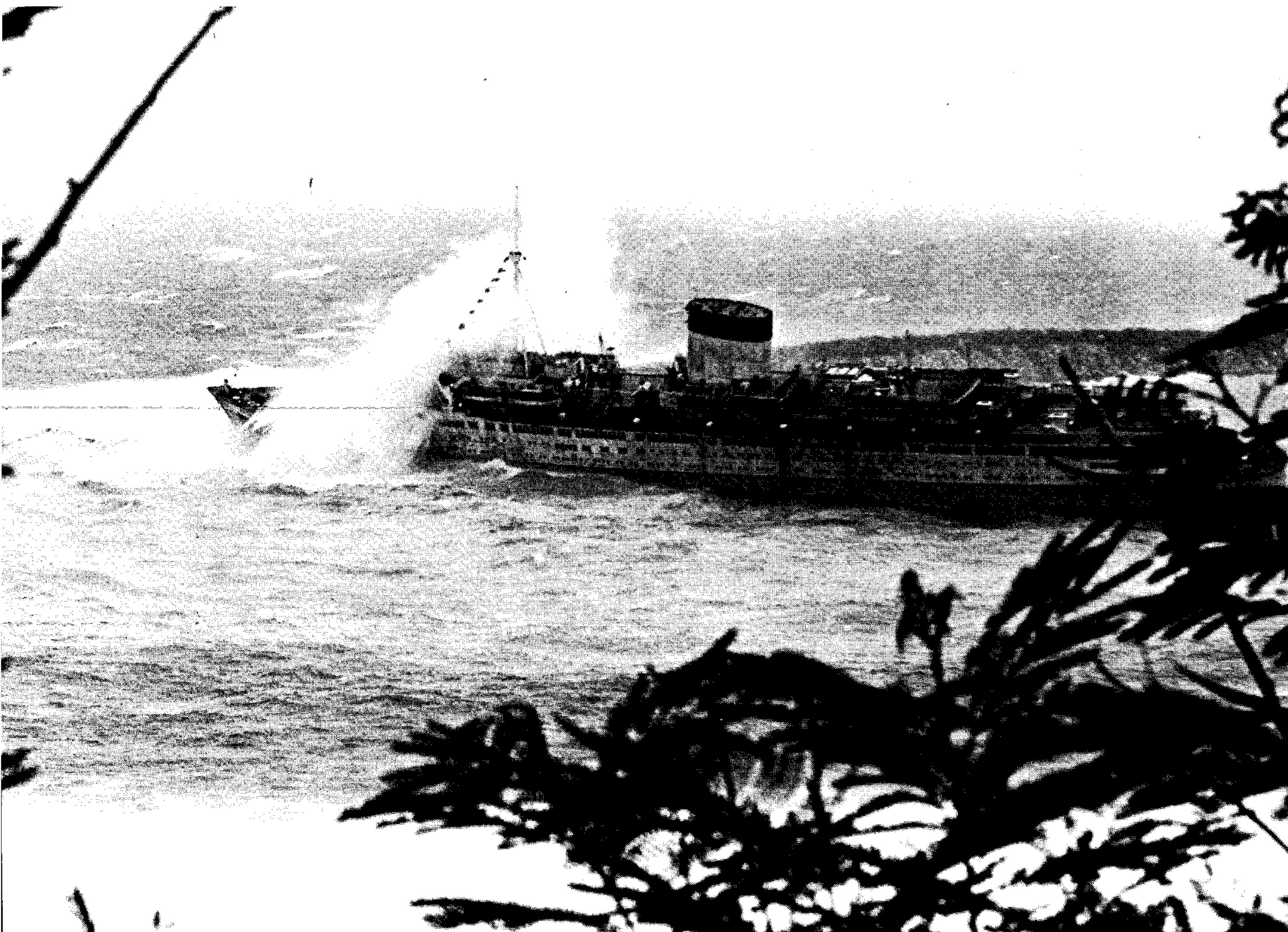
FACEPLATE

WINTER 1974





Liner CARIBIA aground on Glass Breakwater, Apra Harbor, Guam. Story on page 17.

FACEPLATE

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

Volume 5, No. 4

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The cover shows an artist's rendition of the YHLCs, 1 and 2, as they lift a dredge between them. The YHLCs are playing a major role in the Suez Canal clearance. Story on page 29.

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NEW COMMANDERS SELECTED

Listed below are the U.S. Navy Engineering Duty Officers who have been selected for promotion from the rank of LCDR to CDR, with their present duty stations.

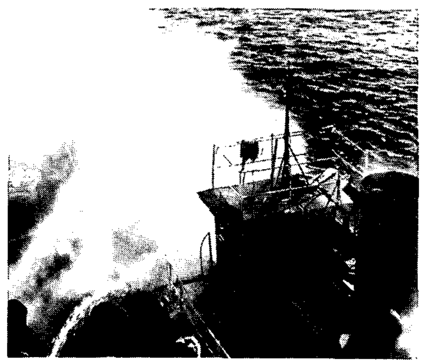
- Jerome V. Burchett, *Supervisor of Shipbuilding, Conversion, and Repair, Bath, Maine*
- Karl L. Keay, *Board of Inspection and Survey, Washington, D.C.*
- William A. Klorig, *Submarine Development Group ONE, San Diego, California*
- Allan A. Ovrom, Jr., *Hunters Point Naval Shipyard, Hunters Point, California*
- Frederick F. Touchstone, Jr., *Service Force, Atlantic Fleet, Norfolk, Virginia*

FLY-AWAY DIVING SYSTEM UPDATE

Several noteworthy events have occurred in the establishment of the Fly-Away Diving System concept (see *FP*, Summer 1974). In a meeting held on October 24, 1974, an implementation plan for the system was developed. The results have been forwarded to the Chief of Naval Operations, OP23, as a basis for formalization of the concept. The principal feature in this plan is the designation of specific east and west coast operating activities.

In addition, acceptance tests were conducted successfully on the first Open Diving Bell (see *FP*, Spring 1974), built under a contract with Perry Submarine Builders. Delivery of units included in the Fly-Away Diving System was completed in December 1974.

SALVAGE TRAINING KEEPS USS CREE READY



Firefighting exercise aboard USS CREE.

Many hours of planning and preparation by the officers and crew of USS CREE (ATF-84) paid off when YG-30 was salvaged from its resting place on the Silver Strand, San Diego, California, during salvage training exercises. Although this was a planned exercise, it nevertheless demonstrated just one of the operational capabilities of a Fleet Ocean Tug. Salvage Training is an annual event for ATFs and ARSs under the command of Commander Service Group ONE, in the Pacific Fleet.

Grounding, beach surveys, laying of beach gear, recovery, and fire fighting were the phases stressed in the week-long salvage training program. The YG-30 was grounded in boat lane number ten on the Silver Strand Beaches of San Diego. After its beaching, ship's divers conducted beach surveys and marked the 30- and 20-foot curves with marker buoys. The actual laying of beach gear legs was a precisely calculated phase in which precision navigation was necessary to properly lay the 8,000-pound Eells Anchors. The massive anchors were used to obtain the required line pull necessary to free the YG-30 off the beach. Recovery was dependent upon pulling in on the anchors with purchases in conjunction with use of CREE's engines. The fire fighting phase enabled CREE to acquire the necessary practical experience to make approaches, boardings, and rescues.

The actual time involved in salvage training is dependent on the professionalism of the crew and the availability of good weather conditions. In its entirety, salvage training tests the professionalism of the crew, its endurance, and its capability to handle stress. The products of salvage training include development of salvage, diving, and navigational skills necessary to maintain a high state of readiness. "Not only that," said LT Donald L. Smith, USN, Commanding Officer of USS CREE, "It can be a lot of fun."

NEW U.S. NAVY DIVING MANUAL AVAILABLE

The new edition of the U.S. Navy Diving Manual, NAVSHIPS 0994-001-9010, (see *FP*, Spring 1974) is now available for purchase. Requests for copies should be sent to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The cost of the two-volume set is $16.70; the stock number is 0846-00072.

LCDR BARTHOLOMEW BECOMES ASSISTANT FOR SALVAGE

LCDR Charles A. Bartholomew, USN, has assumed the duties of Assistant for Salvage in the Office of the Supervisor of Salvage, Naval Sea Systems Command, Washington, D.C.

LCDR Bartholomew graduated from the U.S. Naval Academy in 1961, and later attended Webb Institute of Naval Architecture and the U.S. Navy School of Diving and Salvage. He then served as the 11th Naval District Salvage Officer, where he participated in various salvage/recovery operations off the U.S. West Coast and Mexico. LCDR Bartholomew supervised the Diving Locker and routine underwater repair tasks in his next tour as Diving Officer and Repair Officer aboard USS HECTOR (AR-7). Before reporting to his present duty in summer 1974, LCDR Bartholomew was assigned to NAVSHIPS (PMS 303) PHM Acquisition.

ONE PICTURE'S WORTH A THOUSAND WORDS.

The Pacific Fleet Combat Camera Group's Underwater Photography division, San Diego, California, is one of only two specialized photographic groups with both motion picture and still photographic services available in the U.S. Navy. Following the disestablishment of the Naval Missile Center dive team at Point Mugu, California,in August, 1974, this camera group became the only Navy underwater dive/photography team on the West Coast.

Of the four qualified photographer/divers in Combat Camera Group (CCG), one is a graduate of the Underwater Swim School at Key West, Florida. Two others graduated from the Second Class Divers School at the San Diego Naval Station. The fourth, CWO F. R. Hudek, the command's diving officer, also graduated in San Diego,

PH2 Kulu (right) and PH3 Romano wait with underwater camera for deep sea diver. (*Photo by PH3 Richards*)

and has a SCUBA rating. The group's primary responsibility is to aid any unit under the Commander-in-Chief, Pacific Fleet's cognizance; however, they also accept assignments from any branch of the service.

The division combines the professional ability of still and motion picture photography with special techniques for underwater coverage. To complete their mission, CCG underwater photographers also have underwater television capabilities.

According to Second Class Photographer Harry Kulu, the diving supervisor for the division, there isn't any *official* training in the Navy for underwater photographers. The best way for them to achieve the know-how is by practical experience.

Any organization desiring underwater photographic services should submit its request to the Commander-in-Chief, Pacific Fleet, in accordance with CINCPACFLT Instruction 3150.1G. Additional information may be obtained from the Pacific Fleet Combat Camera Group by calling 951-7944 (Autovon), or (714) 437-7944 (Commercial).

NEW PHONE NUMBER FOR NEDU

A list of phone numbers for various U.S. Navy diving-related offices was published in the Summer 1974 issue of *Faceplate* (see Soundings, p. 5). Since NEDU has relocated to the OSF in Panama City, Florida, it has the following phone numbers: Commercial – (904) 234-4355, and Autovon – 436-4355.

VOLUME 1 OF HYPERBARIC CHAMBER DIRECTORY REVISED

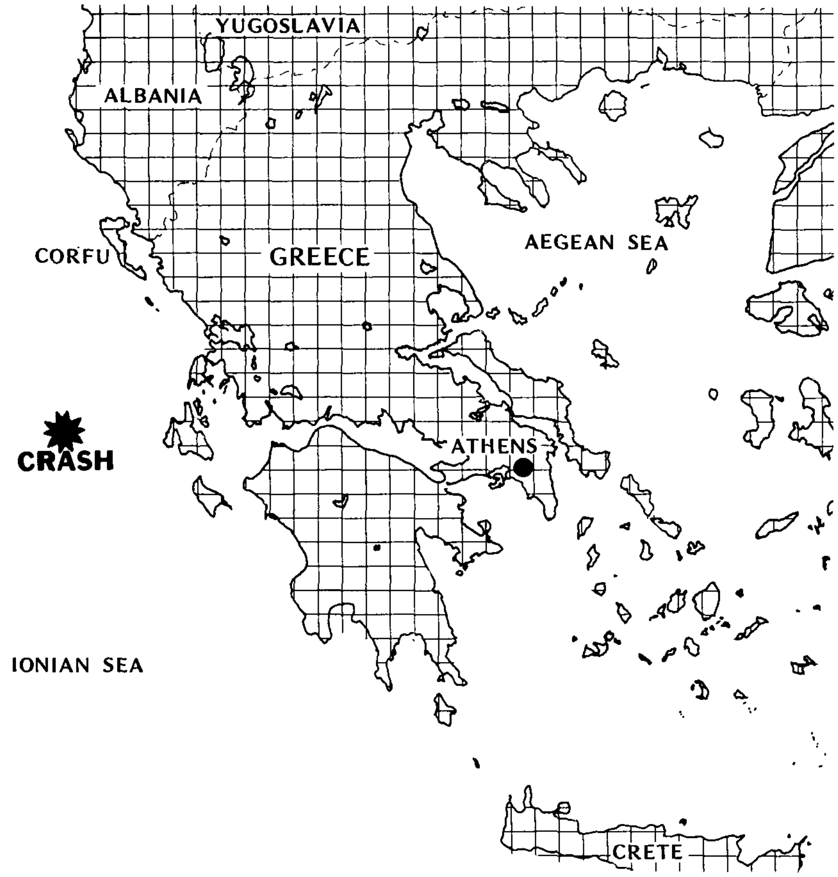
The *Directory of Worldwide Shore-based Hyperbaric Chambers*, Volumes 1 and 2, has been undergoing revision at Battelle Memorial Institute, Columbus, Ohio (see *FP*, Spring 1974). The new edition of Volume 1 has been completed, published, and mailed to those on the original mailing list. Those who have the original text and have not received the July 1974 Revision should contact the Supervisor of Diving, Naval Sea Systems Command, Washington, D.C. 20362, to obtain a copy. The reference number for this edition is NAVSHIPS Document #0994-010-4011.

LT CHANDLER DEPARTS NEDU FOR NMRI

LT Don Chandler, who formerly served as the Supply and Fiscal Officer for NEDU at the Washington Navy Yard, has moved on to a new post at the Navy Medical Research Institute (NMRI) in Bethesda, Maryland. Effective November 1, 1974, LT Chandler will be assisting in and coordinating plans for a new hyperbaric complex, which will be used for animal and human research in hyperbaric conditions. Construction on the building complex, which will be called the Environmental Health Effects Laboratory, has just recently begun this fall. Completion is expected in approximately 18 months.

SEARCH OPS FOR TWA PINGER ACCOMPLISHED BY U.S. NAVY FORCES

U.S. Navy salvage forces were utilized in the investigation of the September 7, 1974, crash of a TWA 707 aircraft in the Ionian Sea, off the coast of Corfu, Greece. The National Transportation Safety Board (NTSB) Aircraft Investigation Office requested the assistance of the Supervisor of Salvage in a possible attempt to recover the voice and flight data recorders. The probability of success for such a recovery was considered extremely slim because of the sonar pinger source level, the amount of time the pinger had been in the water, the assessment of datum based on the known debris field, and the use of improvised equipment. Before a recovery of the recorders, however, the TWA 707's sonar pinger signal would have to be located to provide an accurate location of the wreckage. The depth of the wreckage was estimated at 11,040 feet.



Map shows location of TWA 707 crash site off coast of Greece.

USS PRESERVER (ARS-8) was called in as the surface support ship to provide assistance in the search for the TWA sonar pinger signal. Mr. Charles Bobo, Technical Representative from the Naval Research Laboratory in Orlando, Florida, rendezvoused with PRESERVER in Augusta Bay, Sicily, on October 1, with a deep dipping hydrophone, signal cable, and a strain cable, which would be used in the search for the TWA pinger. Instructions were that the search operations were to continue until the pinger was located or until the suspect area had been investigated to the extent that it was certain the signals were either no longer audible or were not being emitted.

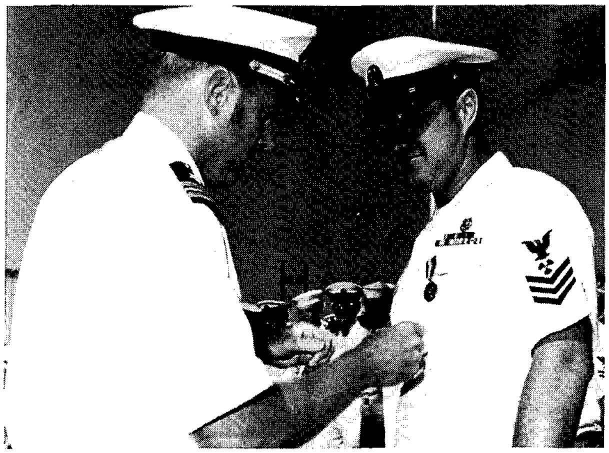
Search ops began on October 3, using an expanding square search method to cover the 5-square-mile suspected crash area. The hydrophone, which was designed in the NRL Orlando Lab to locate specifically any sound-emitting devices under water, was pulled behind the ship with the 2,500 feet of strain cable. The cables could be lowered and raised using a capstan or winch, but they could not be wrapped on a reel in overlapping layers because of the probability of damaging the signal cable. The search pattern consisted of parallel "runs" with 500 yards distance between legs, since the hydrophone would register sound waves below it and 500 yards to either side. An ocilloscope was set up to monitor and evaluate any possible "contacts."

A signal was detected during the mid-watch on October 4. The signal held for approximately 7 minutes and then drifted off, but it was picked up again after further expanded square search procedures were conducted. The signal was analyzed and compared to the signal of the pinger that had been suspended from the ship; and after discovering that they were similar, it was concluded that the TWA pinger had been found.

In accordance with the original instructions, a new pinger was dropped overboard, on top of the TWA pinger location. This remarking of the crash site was necessary because the expected signal life of the aircraft's installed pinger was 30 days after the crash.

The decision now stands that there will be no further search/recovery operations conducted at this time. Should this ruling change, however, the new pinger will serve as a locator for any future recovery efforts.

Navy and Marine Corps Medal Awarded For Bravery Aboard USS ORTOLAN



LCDR R. Ramsay, the CO of ORTOLAN, presents MM1 D. Dodds with the Navy and Marine Corps Medal.

During an inspection/awards ceremony aboard USS ORTOLAN on October 4, 1974, the Navy and Marine Corps Medal was presented to MM1 (DV) Daniel E. Dodds "for courageous action in a non-combat situation." The medal was accompanied by the following citation:

For heroism on 3 June 1974 while serving as Gas King in USS ORTOLAN (ASR 22) during preparations for the conduct of diver training. Petty Officer Dodds was in the Gas Mixing Room of the ship conducting oxygen-pumping operations when an oxygen transfer pump exploded and caused a fire which severely burned him. Petty Officer Dodds, with complete disregard for his own safety and fully aware of the personal dangers involved, unhesitatingly found and closed the oxygen gas supply valve to the burning transfer pump, thereby isolating the direct source of oxygen. He then proceeded to the adjacent gas flask storeroom where he closed the supply and discharge valves to the system banks containing more than 28,000 cubic feet of oxygen. Petty Officer Dodds' prompt and courageous actions in the face of great personal risk undoubtedly prevented numerous injuries and the possible loss of the ship and were in keeping with the highest traditions of the United States Naval Service.

NEDU REPORTS:

Navy Experimental Diving Unit Report 6-73. *Sound Level Testing of the Yokohama Helium-Oxygen Diving Helmet.* Stephen D. Reimers

Abstract: A Helium-Oxygen Diving Helmet manufactured by the Yokohama Diving Apparatus Company, Ltd. of Yokohama, Japan and distributed in the U.S. by J&J Marine Diving Co., of Pasadena, Texas was subjected to sound level testing on a specially built acoustical manikin at the U.S. Navy Experimental Diving Unit. Ten manned test dives were also conducted. The sound levels existing in the helmet were found to be into the hearing damage risk levels, but not so far as to preclude normal helium-oxygen diving operations with the helmet. Subject to certain restrictions, the sound levels existing in the helmet were judged to be safe for exposures of up to 4½ hours per 24-hour period.

Navy Experimental Diving Unit Report 7-73. *Evaluation of the Advanced (Swindell) Air Diving Helmet.* S. D. Reimers, C. Langworthy, J. Hesket

Abstract: The Advanced (formerly Swindell) Series 2000 Model Open-Circuit Air Diving Helmet manufactured and distributed by the Diver's Exchange, Inc. of Harvey, LA was subjected to evaluation testing at the Navy Experimental Diving Unit. The helmet was tested for sound levels and ventilation efficiency using specially built test manikins. It was tested for diver comfort in a series of 36 manned dives. Since many of the testing methods used were new, a discussion of the procedures used as well as the results obtained is presented. The sound levels existing in the helmet were found to be into the damage risk levels under all of the conditions tested, but not so far as to preclude its use provided appropriate precautions are taken. The ventilation efficiency of the helmet was found to be generally adequate provided the air supply pressure is maintained at sufficient levels. The helmet was found to be comfortable for work rates up to and including moderate work.

These research reports have been issued by the Navy Experimental Diving Unit, Washington, D.C. 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.

A Look at the Civil Engineering Lab in Action

Underwater Demolition/Removal Project With Seabees

The U.S. Navy encountered a unique situation when it planned to remove the 30-foot-high concrete columns of the Anaheim Bay Bridge, located on the Naval Weapons Station, Seal Beach, California. The bridge was considered a hazard to navigation, and the span to be demolished was an abandoned section of the old coast highway that was considered expendable.

A series of five environmental restrictions limiting blasting operations had to be considered. The problem involved was how to control the use of small explosives with sufficient force to do the job, yet not endanger a national wildlife refuge that included the proposed blasting area within its boundaries; the Huntington Harbor boat channel passing between columns; civilian houses approximately 700 feet away; a Naval radar facility approximately 400 feet away; and a state highway 500 feet from the bridge.

The Amphibious Construction Battalion ONE (PHIBCB-1), Seal Beach detachment, was called upon for its knowledge and experience in underwater demolition work; and the Civil Engineering Laboratory (CEL), Naval Construction Battalion Center, Port Hueneme, California, was brought into the operation for its capabilities in explosives technology. Dr. L.W. Hallanger, Senior Project Engineer, was assigned to assist PHIBCB-1.

Working with the Officer-in-Charge and the PHIBCB-1 divers, Dr. Hallanger furnished materials and supervised blasting operations. The plan was to detonate three separate series of explosives. Controlled charges were to crack the concrete columns clear through at the base, 15 feet under water, and to spall off the outer surface to expose vertical reinforcement bars for cutting with a torch.

A 55-pound rotary impact hand-held pneumatic rock drill was used by divers to place explosive charges in holes drilled into the base of the pillars. Four of the columns were 8-1/2 feet in diameter at the base and constructed of solid concrete reinforced with 1-inch-square rebar placed vertically on 12-inch centers. The other two columns were almost 8 feet in diameter at the base, hollow with an inside diameter of 2 feet, 8 inches, and constructed of reinforced concrete with vertical 1-inch-square rebar on 24-inch centers.

A Seabee crouches in hollow concrete pillar that was just removed from an abandoned bridge.

Boreholes with 1-1/2-inch diameters were drilled 4 feet deep in the four larger pillars and 18 inches into the two small columns. For the small pillars, the hole pattern consisted of eight boreholes drilled symmetrically around the base. Four boreholes were drilled around the four large pillars and located in similar positions.

A preliminary "test" explosive shot was conducted on a small column, using a 1-1/4-pound charge of C-4 explosive approximately 18 inches long that was loaded into each hole by PHIBCB-1 divers. Four of the eight charges were detonated, but damage to the pillar was limited to small scale spalling of the outer surface.

Quadrex-1 field-mixed liquid explosive, which has a higher gas production than C-4 but retains a high detonation velocity, was used for the second effort, which included the three columns (one small, two large) on the south side of the channel. Quadrex 1 was used for all charges, with 0.6 pound inserted in each hole on the small pillar and 1.8 pounds on the large columns. Approximately 60 percent of the rebar on the small column was exposed, and further inspection of the large pillars revealed that no further blasting was necessary. The remaining three columns were then blasted with similar hole and load patterns with satisfactory results. The six pillars were then lifted and/or dragged onto the beach.

Ground motions at the radar facility were monitored by personnel from the Structures Division at CEL and were judged to be within safe limits. The Navy reported that environmental restrictions were met on all shots.

The delicate but effective demolition operation at Seal Beach will yield valuable data on proper methods for future Navy blasting operations where external environmental effects will be of primary concern.

New Titanium Bolt Designed to Secure Communication Cables to Coral Seafloor . . .

An urgent need to stabilize valuable and expensive communication cables led the Civil Engineering Laboratory (CEL), Naval Construction Battalion Center, Port Hueneme, California, to develop the first titanium rock bolt designed for coral seafloor.

The Pacific Missile Range (PMR), Point Mugu, California, had expressed growing concern about damage being inflicted to underwater electromechanical cables at its Barking Sands Facility in Kauai, Hawaii. Constant wave actions and currents threatened previously repaired sections of the system; and once cables work loose, they are subject to tangling, abrasion, and possible disruption of service.

At the request of PMR, the Laboratory in April tested various commercial rock bolts in coral before recommending one type that could be used to immobilize the cables.

PMR Engineer Fred Roehler, Range Development Department, coordinated the tests and Ronald Brackett, CEL project engineer, supervised the Laboratory's technical assistance.

Tests at the Hawaii facility proved that no conventional rock bolt could satisfactorily hold in coral seafloor for any length of time. Although successful in basalt and sandstone ocean bottoms, existing commercial bolts were unable to sustain sufficient holding power in soft coral and obviously could not stabilize the system.

The section of the underwater communications range requiring immobilization consisted of four cables running from the beach to 4,000 feet offshore and down to depths of 65 feet. One cable has a 4-inch diameter and the others are 1-1/2 inches in diameter.

CEL was asked to completely redesign the bolt, incorporating a new material. Four major criteria had to be met. The new design had to increase the contact between the expansion collar of the bolt and the ocean bottom; ensure uniform and symmetrical expansion of the collar; assure that the expansion cone, once installed, would lock into the collar; and utilize material that would not corrode. Existing rock bolts are made of high-strength steel that corrodes in 2 years.

The Laboratory started work on the new bolt in May, 1974, and the first prototype titanium bolt was tested in June. The bolt is capable of holding 6,000-12,000 pounds, depending on coral strength. It is 18 inches long, 1-1/4 inches in diameter, and weighs less than 2 pounds.

After successful field tests, 200 bolts were installed to stabilize the Barking Sands cables. A team of 30 Navy divers performed the task in 8 working days. An additional 20 bolts were embedded to serve as moorings for a diving support barge. Five moorings were installed along the cable route, enabling divers to move surface operations closer to underwater work sites.

The CEL-developed stabilization system is designed to outlast the operational effectiveness of the cable.

A pair of titanium rock bolts holds cable to coral seafloor.

NEDU Ends One Era...

NEDU CONDUCTS LAST DIVE AT WASHINGTON NAVY YARD FACILITIES

Left-right: BM2 Green, HTC Phillips, IC1 Kimbrel, BM2 Alger, and SGT Hansson, after last dive at NEDU North.

Navy Experimental Diving Unit personnel completed the last dive at the Washington Navy Yard facilities on September 19, 1974, when five EDU divers surfaced at 1:45 p.m. from their manned saturation dive.

Complex #5 had the final honors, where BM2 Robert N. Green, HTC Thomas G. Phillips, IC1 James F. Kimbrel, BM2 George M. Alger, and SGT Thorston S.G. Hansson (Swedish Navy), participated in a 300-foot saturation dive that included an excursion to 450 feet. The dive, which lasted 20 days, was the last in a series of dives conducted to evaluate saturation excursion table limits (see *FP*, Summer 1974).

A more obvious significance of the September saturation dive, however, lay in the fact that it was the final official experiment to be performed at "NEDU North." The following weeks were busy with promotions, retirements, and with packing NEDU equipment for the move to their new facility in Panama City, Florida, where NEDU has resumed its efforts in diving technology.

Pictured below are NEDU personnel on the last day before most were transferred to new duty stations. Not all NEDU personnel are present in photo. Left to right, bottom row: RM2(DV) J.D. Nelson, HT1(DV) J.T. Brady, BM1(DV) R.L. Bowdish, MM1 (DV) S.A. Devolt, ENC(DV) R.G. Watkins, ST1(DV) C.G. Cross, HTC(DV) F.J. Hink. Second row: EMCM(DVM) R.K. Merriman, EMC(DV) E.A. Landstra, QM2(DV) J.M. Zawacki, LCDR T.L. Hawkins, HTC(DV) J.A. Schlegel, BM2(DV) R.N. Green, BM1 (DV) R.A. Bunting, BM2(DV) G.M. Alger, ST1(DV) D.B. Kennedy, MM1(DV) D.N. Hesler, BMCS(DVM) D. Keller, LCDR M. A. Paul. Third row: HTC(DV) R.H. Fine, HM1 M.W. Powers, BM1(DV) M.D. Reynolds, EMC(DV) M.D. Travers, MM1(DV) K.W. Price, EMCS(DV) T.C. King, MMC(DV) R.D. Brewer, LT R.P. Swanson, LCDR B.N. Barrett (RN), BM1(DV) E.L. Euteneier. Fourth row: HTC(DV) T.G. Phillips, BM1(DV) E.W. Thomas, BM1(DV) T.E. Rossi, IC1 J.F. Kimbrel, HMC(DV) C. D. Gibson.

...And Begins Another

NEDU COMPLETES FIRST DIVE IN PANAMA CITY

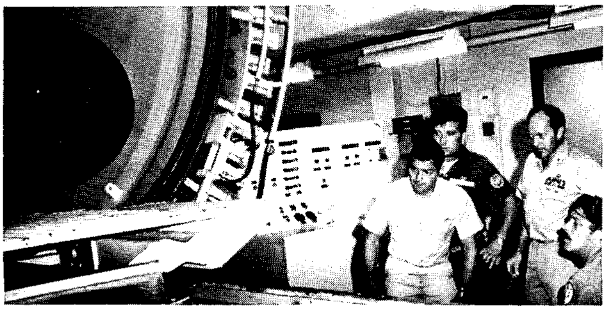
The completion of NEDU's 900-foot unmanned equipment dive at the Ocean Simulation Facility (OSF), Panama City, Florida, signified much more than just a successful working dive to test pontoons.

For NEDU personnel, it signalled the beginning of opportunities for greater diving technological advances in their new home-base installation. (See *FP*, Fall 1974.) The dive also provided the first on-the-job training for the recently relocated Experimental Diving Unit crew. In addition, the 900-foot project tested the newly developed complex operating procedures, provided equipment verification testing, and tested for the first time the new changes incorporated into the complex that were required by the Material Certification Board. For the civilian personnel who have been involved in the progress of the OSF, it was the fruition of many years of striving to transform a concept into a reality.

The basic purpose of the dive was to hydrostatically test two pontoons designed to provide neutralizing buoyancy for the Large Object Salvage System (LOSS) Pontoon Implacement Vehicle. The test was to determine whether the pontoon would withstand a maximum test pressure of 400 ± 20 psi without incurring damage. Diving Officers for the experiment were LCDR J. Michael Ringelberg, Officer-in-Charge of NEDU Detachment Panama City, and LCDR Martin A. Paul, Assistant Officer-in-Charge for NEDU. Diving Supervisors were (Master Diver) EMCM Bob Merriman and HMCM Paul Heckert. Mr. James McCarthy, Special Assistant for Hyperbaric Systems at the OSF, served as the Project Manager; and Mr. James Shelton and Mr. J.M. Brown participated in the dive as the Test Engineers. The chambers utilized in the dive were the wet chamber, trunk, and the center chamber.

After loading the pontoons into the wet chamber, the system was aligned manually and began compressing at 9:16 a.m. for a chamber seal. After stopping once for a leakage check at 200 feet, pressurization continued to 890 feet, which was reached at 11:02 a.m. The 890-foot depth shown on the pressure gauge, added to the estimated 10-foot depth to the center of the pontoon below the water surface, made 900 feet the actual depth reached. After a 30-minute duration at depth, decompression started at 11:34 a.m. in the automatic mode. At 820 feet, decompression switched to manual mode, decompressing at a rate of 60 feet per minute until surfacing at 12:34 p.m. The water was then drained from the wet chamber, and the pontoons were removed and visually inspected by Mr. James Shelton, LOSS Program Test Engineer.

Watching a control panel during dive are, left to right, front: Mr. J. McCarthy, HMCM(DV) P. Heckert, HMCS(DV) J. Reedy; and, back row: BMCS(DV) D. Keller and HMC(DV) G. Carmon.

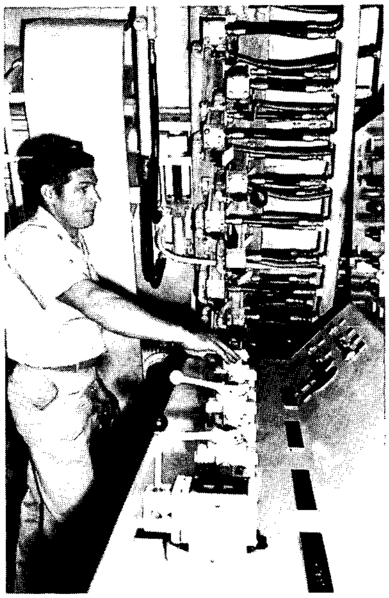


Bottom, left-right: MMC R. Pershing, EMCM R. Merriman, LCDR J. Ringelberg, and HTC R. Jones observe pontoons being loaded into wet chamber.

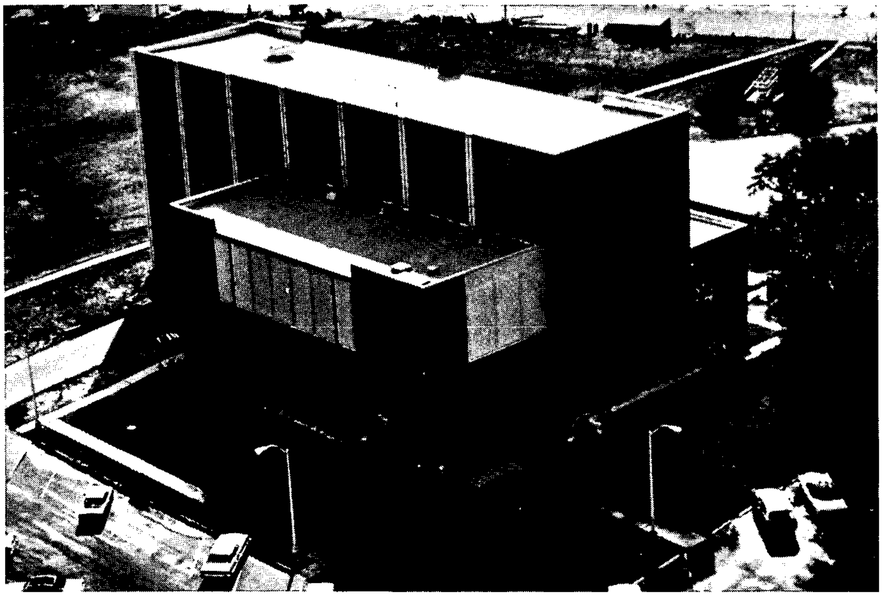
Various chamber subsystems were watched closely during the dive; wet chamber water circulation, the Environment Conditioning Subsystem for the center chamber, and fire suppression capabilities for the center chamber were several that were isolated for observation.

The dive was considered a complete success. The pontoons withstood the pressure; and, more important to those involved, the value of the new chamber complex was demonstrated in its performance during the first of many NEDU working dives in Panama City.

(continued next page)



MMC R. Pershing opens wet chamber door.



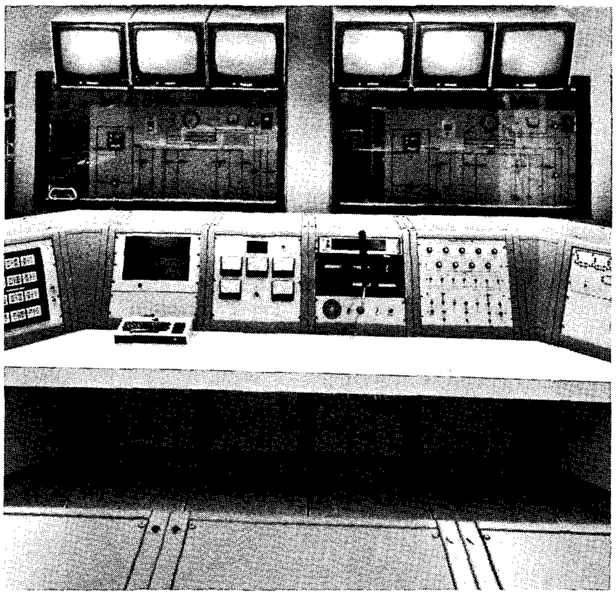
OSF, with personnel area in front, complex in center area, and machinery room off back.

The largest and most modern hyperbaric facility available to the U.S. Navy, the Ocean Simulation Facility consists of a laboratory building that houses a pressure chamber complex including a wet chamber, five dry chambers, and the various support systems necessary for life support, operating control, communication, fire protection, water conditioning, and instrumentation and data acquisition. The special arrangement of the chambers allows simultaneous control of various experiments that may be in progress. These may range from biomedical studies involving divers and small equipment in either of the two dry-chamber complexes to equipment tests with submersibles in the wet chamber. One or both of the dry chambers can be used with the wet chamber, with living space above and the in-water work space below.

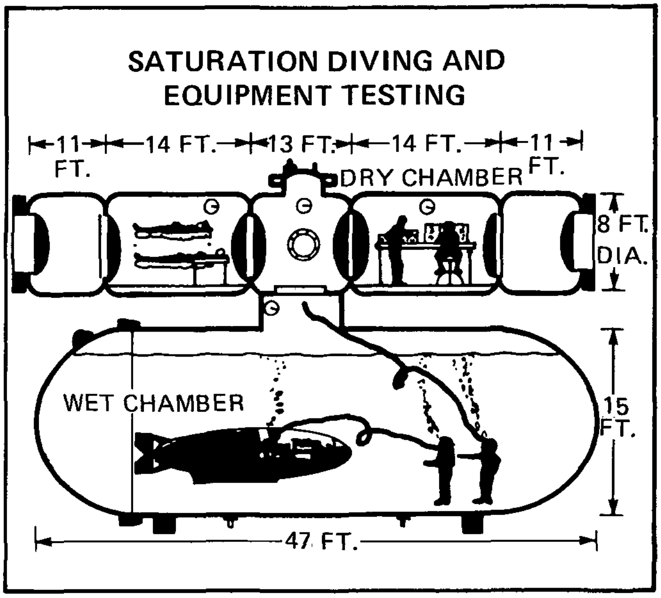
LCDR M. Paul, left, and EMCM R. Merriman inspect wet chamber.

The wet chamber is a horizontal cylinder measuring 15 feet in diameter and 47 feet in length (external). Its maximum holding capacity is 55,000 gallons of water. One end of the wet chamber has a hemispherical door that provides full diameter access for large test vehicles and equipment. Within this chamber, the simulated ocean environmental parameters include pressure (up to 1,000 psig or 2,250 feet of seawater), temperature (29° to 90°F), salinity, light level, and turbidity, all of which may be varied to meet the requirements of the experiment being conducted.

The two dry chambers, each of which are 14 feet long (external) and 8 feet in diameter, provide the dry habitable environment where the subject personnel live when not performing excursions into the wet chamber. Each of the two dry chambers was built to accommodate four subjects for extended habitation times. These dry chambers, like the wet chamber, can be pressurized to equivalent depths of 2,250 feet. When controlled automatically, pressurization rates can vary from as slow as 4 feet per hour to 150 feet per hour; operated manually, however, the pressurization rate may be stepped up much more rapidly. Thermal control varies from 50° to 110°F, and relative humidity can be



Supervisor's console for chamber complex.



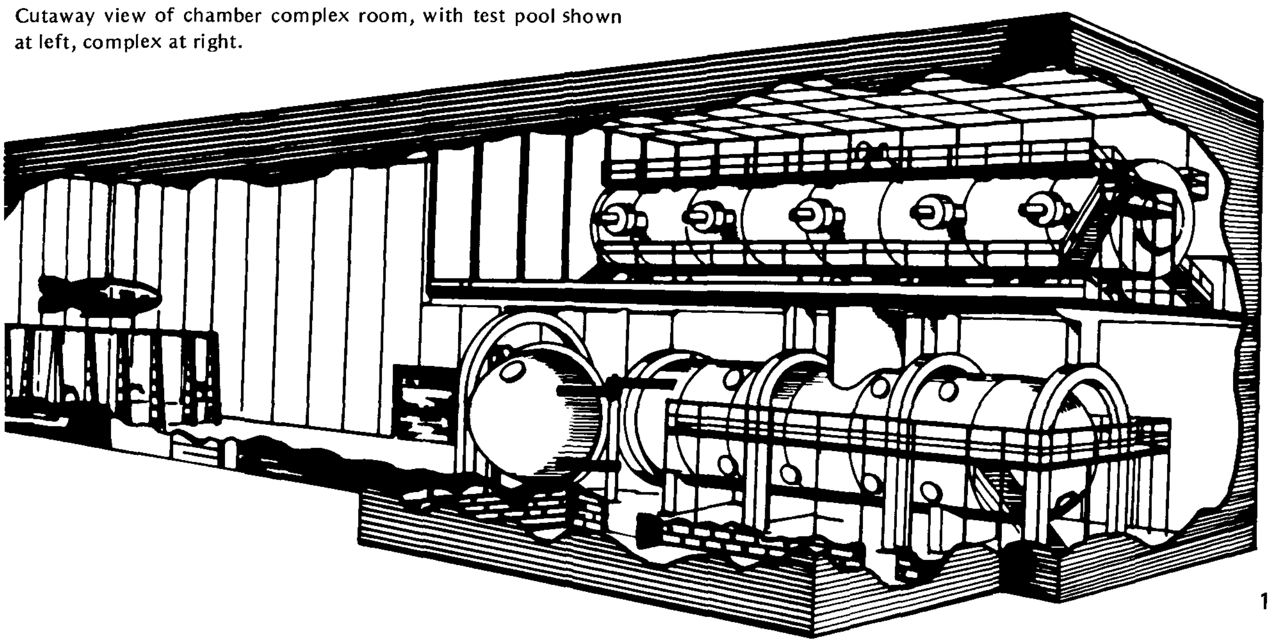
Artist's concept of chamber complex in use.

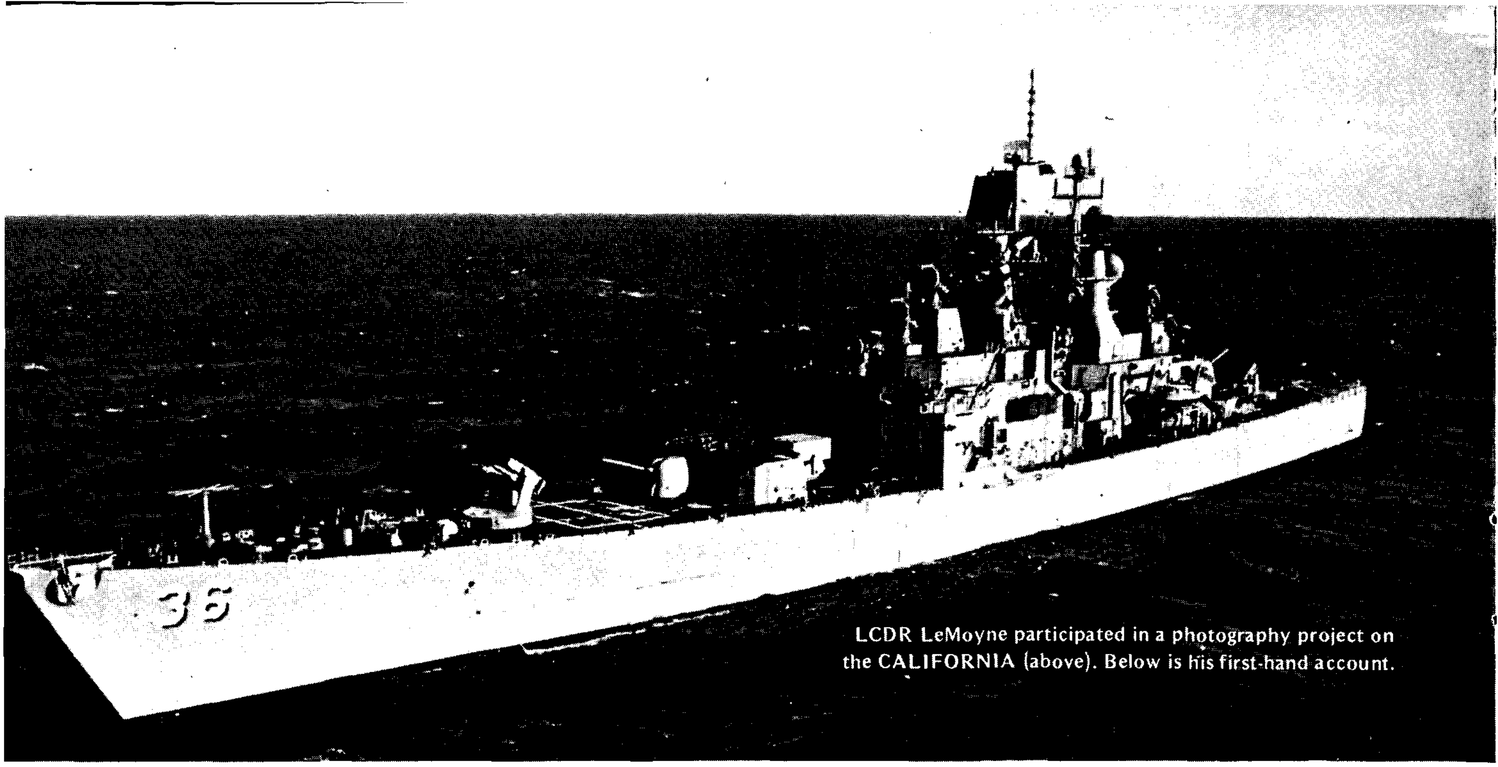
maintained at any level from 50 to 90 percent. Each chamber has its own independent environmental control system that not only controls pressure, temperature, and humidity, but which also filters the atmosphere for the removal of carbon dioxide and contaminant and particulate matter. Achieving the proper gas mixture composition in the dry environment is accomplished in the extensive gas mixing and gas analysis laboratory, an integral feature of the OSF. In addition, oxygen partial pressure is automatically controlled and maintained.

Also included in the dry chamber complex are two 11-foot-long outer chambers and a center chamber that is 13 feet long and is fitted with top and bottom hatches. The center lock allows access from the outside, from one inner chamber to the other, and to the wet chamber below. With this arrangement, the chamber may be used separately with a separate entrance/exit to each, or in combination. Medical locks are provided for each of the five dry chambers to allow the passage of food, medicine, and other support items to the occupants inside.

The OSF will be instrumental for innumerable U.S. Navy research and development programs. Some of the larger efforts that will require simulated ocean testing are rescue and salvage, underwater construction, man-in-the-sea, deep ocean technology, oceanography, inshore undersea warfare, and those programs concerning the selection, training, physiology, and safety of divers.

Cutaway view of chamber complex room, with test pool shown at left, complex at right.





LCDR LeMoyne participated in a photography project on the CALIFORNIA (above). Below is his first-hand account.

under the CALIFORNIA at 30-plus knots

LCDR Irve Charles LeMoyne

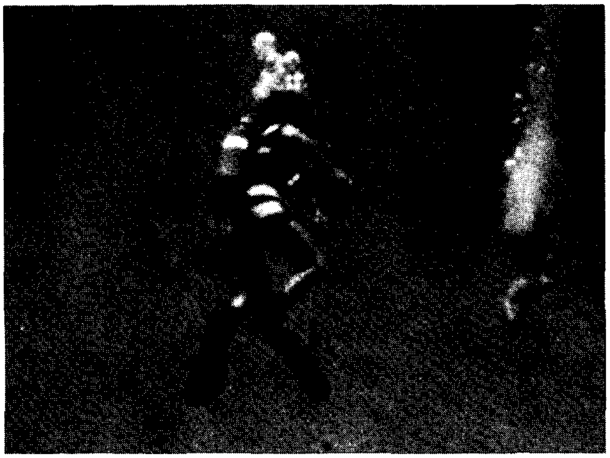
For any diver, the prospect of being run over by a large ship, with the accompanying mental picture of being pulled through the churning propeller, is a nightmare. Thus, having the opportunity to participate in a series of dives to take underwater photographs of the USS CALIFORNIA (DLGN-36) while she was under way at flank speed promised to be quite an experience.

YN2 Williams, UDT-21, awaits CALIFORNIA's next run.

CALIFORNIA is the lead ship in a new class of nuclear-powered, guided missile frigates. The ship's vital statistics—length: 596 feet, beam: 61 feet, and a draft of 31 feet at the bottom of her bow sonar dome—combine to make CALIFORNIA a formidable ship.

Because CALIFORNIA is the first of her class, the Naval Sea Systems Command Program Manager, CAPT

Frank Sampson, NSRDC diver, heads toward the surface.

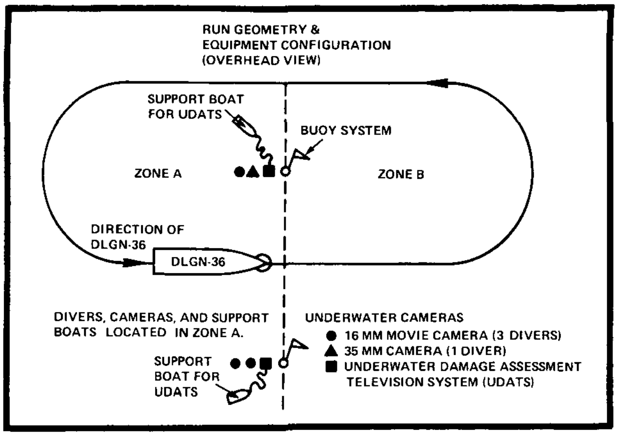


John Orem (PMS 378), decided that underwater photography of the ship while she was under way would provide designers with valuable information pertaining to the ship's actual performance.

The project was conducted at the Atlantic Undersea Test and Evaluation Center (AUTEC), located on the eastern side of Andros Island, in the southern Bahama Islands, where the Atlantic suddenly drops to a depth of 5,000 feet just 1 mile off shore. AUTEC meets all the requirements for this type of operation—clear, deep water, with plenty of unobstructed ship maneuvering room and an excellent diving support capability.

The Ship Acoustics Department of the Naval Ship Research and Development Center (NSRDC), Carderock, Maryland, was tasked to organize the photography operation, using the NSRDC Underwater Naval Evaluation and Photography Team. This team is a four-man diving unit that NSRDC has established to perform a variety of underwater inspection, maintenance, repair, and photography operations in support of ship testing programs. Well trained and highly skilled, the NSRDC diving team has developed a safe and effective technique for the underwater photography of both surface ships and submerged submarines while they are under way.

For photographing surface ships, the NSRDC diving team has a Photo-Diving Buoy System, consisting of a large trapeze suspended beneath two spar buoys. With the divers already positioned on the trapeze, the ship to be photographed passes between the spar buoys. The divers, who use open-circuit SCUBA, then photograph the hull as it passes over. The distance between the spar buoys and the depth of the trapeze can be varied to accommodate ships of different sizes. For CALIFORNIA, the buoys were set at 132 feet apart, twice the ship's beam, and the trapeze was hung at a depth of 40 feet, 9 feet below the sonar dome.

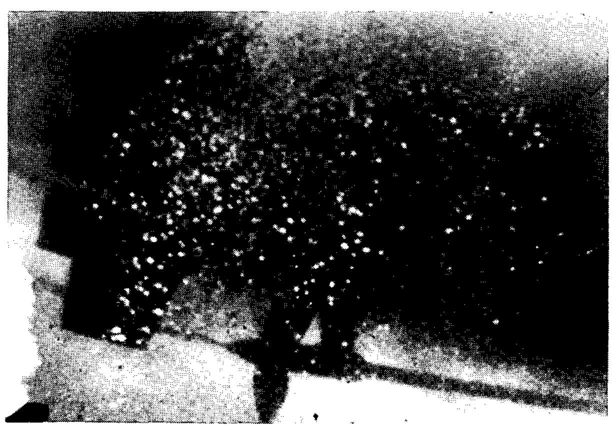


Because of the size of CALIFORNIA and the scope of the photography assignment, the NSRDC diving team was augmented by divers from the Navy Combat Camera Group ATLANTIC, Underwater Demolition Team TWENTY-ONE, and the Office of the Director of Ocean Engineering. Those of us diving in the project arrived at AUTEC on August 22, 2 days before the actual photography runs, to set up and rehearse the operation.

The weather was ideal during the rehearsal, and the project quickly took shape. By the end of the rehearsal, one of the diving boats had completed several runs between the spar buoys, so that we all became thoroughly familiar with our assignments. Now we had time to wonder if things would go as smoothly when CALIFORNIA made her run between the buoys. The NSRDC divers, who had photographed other surface ships without difficulty, were confident that CALIFORNIA would be no different. They admitted, however, that they had never worked with anything as big as CALIFORNIA. In addition, we gave more than an occasional thought to whether we would have the opportunity for a close look

Sonar dome passes by diver with underwater camera . . .

. . . Followed immediately by churning propellers.



at a few of the local sharks. The NSRDC divers assured us that they had never performed an operation at AUTEC without a visit from at least one, and often several, sharks that were *REALLLLY* big. None of us felt inclined to get too specific about it, deciding that if a shark was big enough to cruise these waters, it was big enough.

At 6:00 a.m. on the day of the operation, the AUTEC diving boats ferried us out to rendezvous with CALIFORNIA at one of the spar buoys. A briefing on the entire operation was conducted on board CALIFORNIA for all personnel involved. The plan stated that CALIFORNIA would make a series of runs at increasingly higher speeds, using a race track pattern to build speed and line up on the spar buoys. We were to surface between each run, and then dive when we were given a horn signal from the safety boat, signifying that the ship was 3 minutes out. On each run, one of us would fire a powerhead into a target that hung off the bottom of the trapeze. The cameramen would film the firing, and the ship would record the time of the firing using its sonar equipment. This procedure made it possible to later synchronize the film with the ship's sound tapes. After the briefing, we were given instructions on the hazards of diving on a nuclear-powered ship, and then issued radiation badges and dosimeters to wear.

We shoved off from CALIFORNIA and set up the spar buoys and trapeze while the ship drew away to line up for her first run, a slow-speed pass at 6 knots without divers in the water. The ship had no trouble picking up the buoys, and she slid through them with barely a ripple. It looked easy.

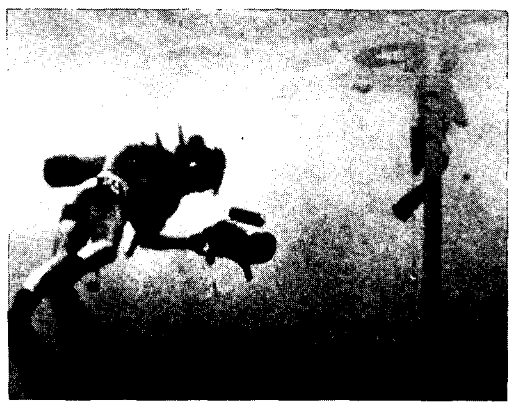
While CALIFORNIA made a long race track turn to prepare for her next run, we suited up, received diving supervisor checks, and entered the water. One team of four divers was stationed at each spar buoy. The next run would be at a speed of 10 knots.

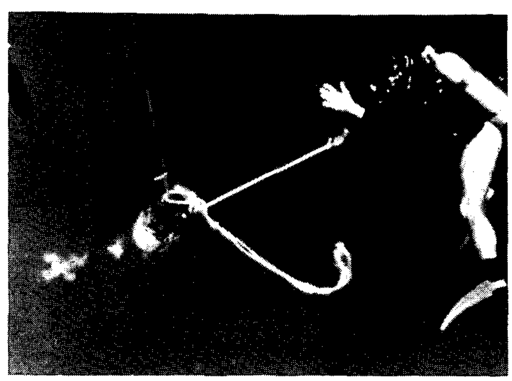
We waited at the surface, holding on to the innertubes tied to the spar buoys, and watched CALIFORNIA line up and bear down on us. She had loomed to an imposing size when we got the signal to dive, and no one had any difficulty getting down quickly to the trapeze; in fact, records may have been set. The power-head was fired, and we all gazed through the 120-foot visibility for some sign of the ship. Silently, her sonar dome pushed into view, chased by the shadow of the hull and her methodically churning screws. Then, as quickly and as quietly as she came, she was gone—no sound, no vibration, no turbulence. We all surfaced slowly, awed and yet a little disappointed. Camera angles were excellent, photographic conditions were ideal, and the picture would definitely be of exceptional quality; but it was almost too easy. The ship had passed by and over us as though drawn through the water by a string, without violence or disturbance.

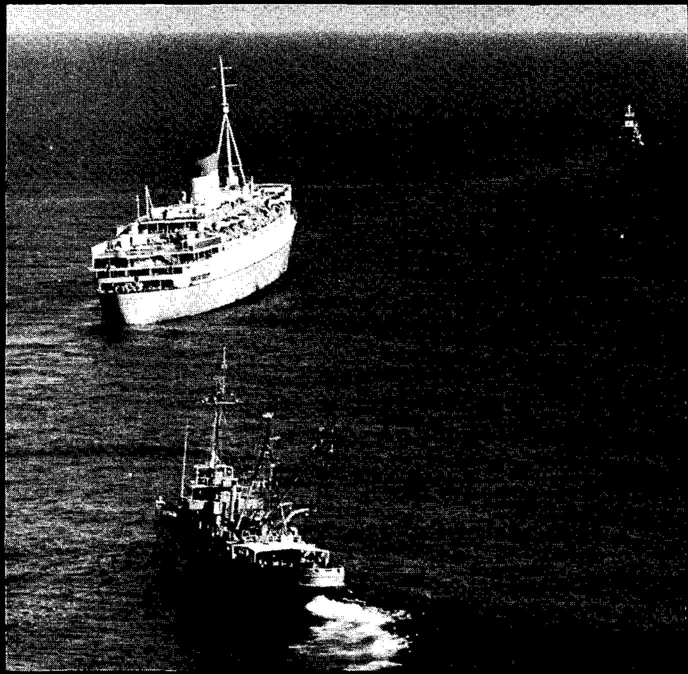
However, the ship's speed increased on each run and suddenly so did the excitement. As she got above 20 knots, CALIFORNIA announced her approach with an increasing roar; her propellers now screamed through the water. We looked up to see the ocean above us torn into a maelstrom of breaking water cascading down toward us, but never reaching us. At this point we surfaced shaking our heads at the speed of the ship, her obvious power, and our apparent immunity to her force. On the fastest run, CALIFORNIA surged past us at over 30 knots, filling the water with the hard, heavy sounds of her enormous force.

At the end of the diving day, several hundred feet of valuable film had been taken, and a very effective system for underwater photography of ships under way had been demonstrated. Those of us who participated in this kind of operation for the first time felt we had learned a different application of diving and underwater photography, and had been given a memorable experience.

Top: Diver ascends to spar buoy. Below: LCDR LeMoyne fires powerhead into suspended target.







the Saga of the CARIBIA

CARIBIA in tow by tug HAMBURG, followed by USS TAKELMA (ATF-113).

CDR William I. Milwee
Salvage Officer, COMSERVPAC

Salvors have a way of referring to a salvage operation by the name of the ship, such as "the Frank Knox job" or "the REGULUS job." The salvage of the liner CARIBIA, however, presents a new situation for Pacific Fleet salvors, because there were two separate CARIBIA salvops within a span of 6 weeks.

CARIBIA, a 715-foot liner of 34,000 gross tons, first touched water in 1948 as the Cunard Steamship Company liner CARONIA at John Brown's Shipyard in Clydebank, Scotland. After some years in the service of Cunard, she was sold foreign and sailed as the Panamanian liner CARIBIA. She was later "laid up" in New York and eventually sold to breakers. She was under tow to a breakers' yard in the Far East when she came to the attention of U.S. Navy salvors.

On July 5, 1974, the Pacific Fleet Salvage Officer was requested by the Honolulu agents for CARIBIA to provide salvage assistance for the vessel, which at that time was taking on water 100 miles east of the island of Hawaii. In response to this request, the standby salvage ship USS TAKELMA (ATF-113), augmented by a team from Harbor Clearance Unit ONE (HCU-1), Pearl Harbor, Hawaii, was dispatched to rendezvous with CARIBIA and the German tug HAMBURG.

When TAKELMA's crew sighted CARIBIA on the morning of July 6, she was down 5 feet by the stern, with a port list of 5° to 7°. The transfer of personnel and a minimum pumping effort by motor whale boat began in heavy seas. High freeboard and the lack of attachment points made small boat transfer the most feasible method; but, as has been proven at each such usage, the motor whaleboat is poorly suited for salvage operations.

When the boarding team was aboard, it was determined that flooding had commenced in the shaft alleys approximately 12 days before and had grown progressively worse each day. P-250 pumps, which had been brought aboard, were rigged with eductors; but the suction lift of more than 30 feet and the discharge head of more than 100 feet rendered this combination fruitless. Consequently, arrangements were made to lift a 30-kw generator and two 4-inch submersible pumps to the ship by a CH-53 helicopter.

Though rigging and changing the placement through the many decks of the liner was arduous work for the boarding team, subsequent pumping was effective, and the flooding was quickly overcome. When the shaft alleys were pumped nearly dry, the floodwater was discovered to have come from two sources, a 1-inch-diameter hole in the salt water cooling line for the shaft bearings and three open bleed-off valves from the shaft bearings. The pipe was patched and the appropriate valves were closed.

The remaining floodwater was stripped, using both the 4-inch submersible pumps and 1-1/2-inch electric submersible pumps, and the ship was returned to her agents for repairs in Honolulu before continuing her last voyage.

The Navy salvors departed to write the salvage report and tell sea stories, assured they had heard the last of CARIBIA. Such was not to be the case, however, for on August 12, CARIBIA was heard from again—this time much more spectacularly.

The tug HAMBURG, making her approach to Apra Harbor, Guam, with CARIBIA in tow, experienced engine problems in heavy weather and was forced to slip the tow a few miles from the harbor entrance. CARIBIA, driven by the winds and seas, seemed bound to enter the harbor, but she failed to negotiate the narrow channel entrance and grounded on Glass Breakwater on the northern side of the channel.

Heavily damaged in the grounding, CARIBIA began to break up in the surf. Weather conditions and questions of legal responsibility prevented any attempts at salvage by naval forces. The wreck, as she lay, however, did present a hazard to navigation for both commercial and military vessels, creating considerable naval interest.

By the morning of August 13, the ship had broken approximately 140 feet behind the bow, and the stern section began to sink. The bow section, firmly grounded, then broke in half, with the after section of the bow completely disintegrating in the heavy seas. The problem now was not one of salvage, but of reaching the wreck, establishing its position relative to the channel, and marking it to permit safe navigation. In addition to the task of getting to the majority of the wreckage, it was necessary to determine whether significant portions had broken off and worked their way into a position where they could present a navigational hazard. To properly locate the wreck and any portions thereof, a side scan sonar and precision navigation system was requested from the U.S. Navy Supervisor of Salvage. Fortunately, weather conditions began to improve as the sonar equipment and support personnel were en route to Guam.

Meanwhile, RADM J. D. Johnson, Commander Service Group THREE, arrived to personally take charge of

Photos above and below show CARIBIA b

the operation. In addition, USS BOLSTER (ARS-38) sailed from Subic to assist Guam-based USS GRASP (ARS-24) and transient USS MOLALA (ATF-106), in case major salvage operations were deemed necessary immediately. Using available assets, attempts were made to locate the wreck. The results were at best marginal, however, since the lack of precision navigation systems and seas that were still quite rough precluded the development of conclusive information.

eaking and sinking in Apra Harbor, Guam.

Arrival of the search equipment coincided with further moderation of the seas, so that shortly thereafter it was determined that the southern half of the channel entrance was free of wreckage. The equipment also made it possible to positively locate the wreck and fix its position relative to the channel.

In order to permit rapid reopening of the port, the U.S. Coast Guard Cutter BASSWOOD laid an obstruction buoy and replaced the navigation aid that had been taken out by CARIBIA when she grounded.

With moderating seas, divers were able to get into the water and place markers, despite heavy surge about the wreck. Initially, inflatable salvage balloons were used to mark the wreck. As the operation progressed, though, these balloons were replaced by Crown buoys, which were attached to the promenade deck to indicate the axis of the wreck.

Sonar search and investigation of the wreck by divers from GRASP and BOLSTER found that the majority of CARIBIA's hull was resting on the bottom, 175 feet from the channel centerline. The wreck was listing approximately 65° to port, with 70 feet of water clear over it at the stern and 20 feet at the bow. A section of the hull was found lying forward, and the stack and mast had broken off but were located near the wreckage.

With the determination that the channel entrance remained passable, the relocation of navigational aids, and the marking of the wreck, the second CARIBIA operation ended. What the final chapter to the story will be remains to be seen, for CARIBIA remains in a position that potentially could be hazardous to shipping.

Faceplate will publish any further developments in the clearance operations as they occur.

Bone Necrosis

Status Report Number 1

LCDR George M. Adams, MSC, USN
Naval Submarine Medical Research Laboratory

This is the first status report on a survey on bone abnormalities being conducted at the Naval Submarine Medical Research Laboratory, Groton, Connecticut (see FP, *Fall 1974). Future periodic status reports will also be published in* Faceplate *as additional information is formulated from this survey.*

Dysbaric Osteonecrosis, or Aseptic Bone Necrosis, commonly described as bone rot without infection, occurs in persons exposed to pressurized environments. Painful and/or crippling symptoms have been observed, although most of the lesions are not associated with obvious symptoms. Utilizing well defined X-ray procedures, population percentages between 5 percent and 52 percent have been observed. The independent efforts that documented these percentages were unable to determine a definite relationship between classical diving accidents, such as therapeutically treated decompression sickness, and the reported percentage. Accurately documented individual exposure histories were not available in each effort.

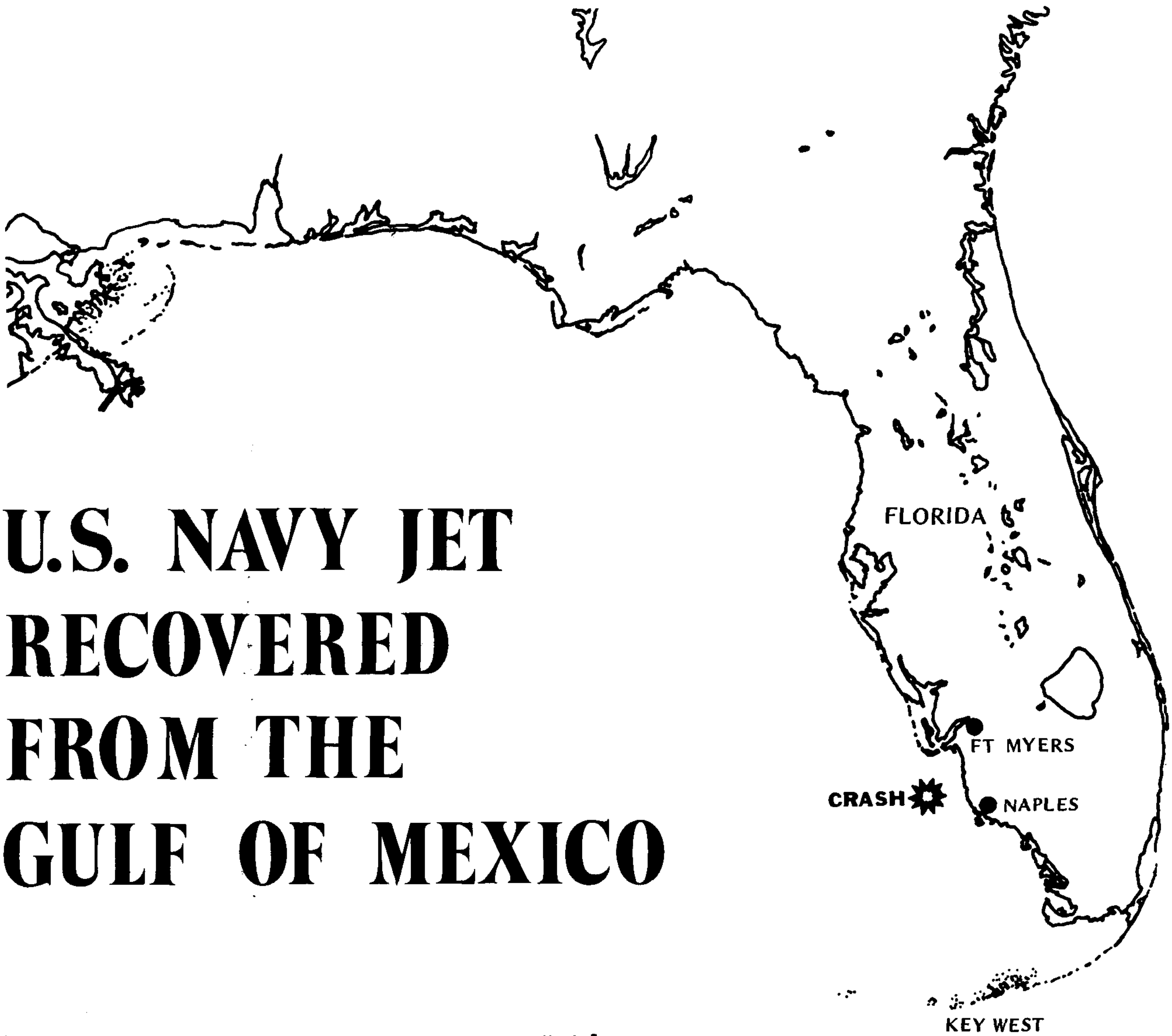
The variability in the reported percentages suggests a relationship between the population's approach to diving and the occurrence of bone necrosis. Diver populations with the highest percentage (Japanese shell divers) are thought to dive without standardized procedures and consistent therapeutic management of accidents. Diver populations with the lowest percentages reported (United States and Royal Navy divers) use standardized procedures and consistent therapeutic management of accidents. *Thus, the inadequate execution of a dive could be directly related to the occurrence of dysbaric osteonecrosis.* In one case in the past, crippling bone necrosis was observed after a required submarine escape that resulted in untreated decompression sickness, further substantiating this conclusion. These observations suggest that bone necrosis could result from an inadequately completed dive, regardless of the overall procedures employed.

While searching for those specific aspects in diving that cause bone necrosis, there are various steps that individual divers and diving supervisors can take to minimize the problem. Modern theories and recent data suggest that bone necrosis could be caused by either compression or decompression-related events. To minimize the problem, divers should take every precaution to follow the schedule of their respective dive and decompression procedures. Rates of pressure change should be strictly followed and not exceeded during either compression or decompression.

Another precautionary rule is to dive sober. Heavy, regular use of alcohol can in itself cause the problem without the added stress of a dive. Individual divers *must* report *all* symptoms during and after a dive, and rely on independent medical judgment of the situation. Actual past experiences clearly define the lack of reliability in the symptomatic diver's assessment of his own problems. The prompt treatment of accidents, even when doubt exists, is a necessity. Most of the information supplied in the OPNAV Form 9940 is used in statistically searching for specific causative factors. In addition, participant assistance in supplying accurate and complete information will aid these efforts.

As indicated, an inadequately completed dive can eventually result in painful and/or crippling bone necrosis. The first line of defense is the diver. Taking the time to plan a dive and follow standardized procedures while tending or supervising a fellow diver begins the difficult sequence to reduce the problem. This may not eliminate or even significantly reduce the problem, but it will eliminate obvious causative factors.

U.S. NAVY JET RECOVERED FROM THE GULF OF MEXICO



The Office of the Supervisor of Salvage was called upon to use its search and recovery expertise to locate a downed aircraft when a Navy RA-5C jet crashed in the Gulf of Mexico, 12 miles southwest of Fort Myers Beach, Florida, on August 13, 1974. Early reports indicated that possible generator problems, which then led to other malfunctions, caused the crash. The aircraft was on a routine flight mission over Fort Myers when it experienced difficulties.

The aircraft, attached to squadron RVAH-3 at Boca Chica Naval Air Station, Florida, was on a northwesterly course at an altitude of approximately 13,000 feet when the pilot initiated ejection. Only the rear seat navigator survived the accident.

A Coast Guard 42-foot crash boat and a local fishing boat rendezvoused soon after the crash and placed a marker buoy around the suspected RA-5C debris. A diving team from the EOD detachment at Key West, Florida, entered the search the following day. The team, consisting of CWO R. Abenante, GMTCS J. Boudreaux, and SM2 T. Hinote, used hand-held sonar in the suspect area but came up with negative results. Several additional diver searches were also conducted 3 to 5 miles from the buoy, but these efforts also proved unsuccessful.

SUPSALV's assistance was formally requested on August 15. ALCOA Marine Corporation, and its subcontractor, Seaward, Inc., were then tasked by SUPSALV to perform the search and recovery operation. Mr. E. F. Daley, Seaward Project Manager, and ENS D. C. Rhodes, USN, SUPSALV Representative, arrived at the Fort Myers Beach Coast Guard Station on August 16 to meet with LT J. Carter, Safety Officer of Squadron RVAH-3, to initiate the search phase.

Interviews with eyewitnesses to the crash were conducted; and, with this information and the original data, two precision navigation reference stations were established on the coast.

The search team got under way early August 17, utilizing the Coast Guard's 42-foot crash boat and Seaward's search/navigation equipment. Using side scan sonar and NAVAID, a new site of aircraft debris was located within 30 minutes after commencing the search. Because of the shallow water in the area, the sonar "fish" had been towed just below the hull of the search vessel, approximately 5 feet below the surface. The flat sand bottom in the area made detection of the aircraft wreckage a relatively simple task. Several confirmation runs were performed; and, after positive verification of the RA-5C wreckage, a marker buoy was positioned over the debris site.

Mr. H. R. Rueter, SUPSALV Representative, arrived on August 18 to initiate the recovery phase. A diving team from Harbor Clearance Unit TWO, Norfolk, Virginia, arrived on August 19 to relieve the EOD Key West divers in the salvage operation. In addition, arrangements were made with the Fort Myers Beach Coast Guard Station to use the USCGC JUNIPER (WLM-224) in the recovery. JUNIPER, a 177-foot-long buoy tender, is commanded by LCDR J. T. Potts, Jr. Except for the larger bulk pieces, most of the wreckage was lifted by cargo nets rather than by wire rope straps, since the majority of the debris was in small pieces. Divers encountered prolonged underwater conditions of minimum visibility and JP-5 contamination hazards during the recovery operation.

With 93 percent of the wreckage on board, JUNIPER departed the wreck site and sailed to Key West, where the debris was unloaded for inspection by Naval Safety Center representatives. LCDR J. R. Walker was in charge of the Safety Board investigation. Using two small Coast Guard work boats, the HCU-2 divers and Mr. Rueter remained at the site to continue retrieving aircraft debris off the bottom. This extra recovery effort was deemed necessary in the later inspection process because several aircraft of this type had crashed in a relatively short span of time. The Safety Center was exerting every effort to recover as many parts as possible to determine the cause of the malfunction.

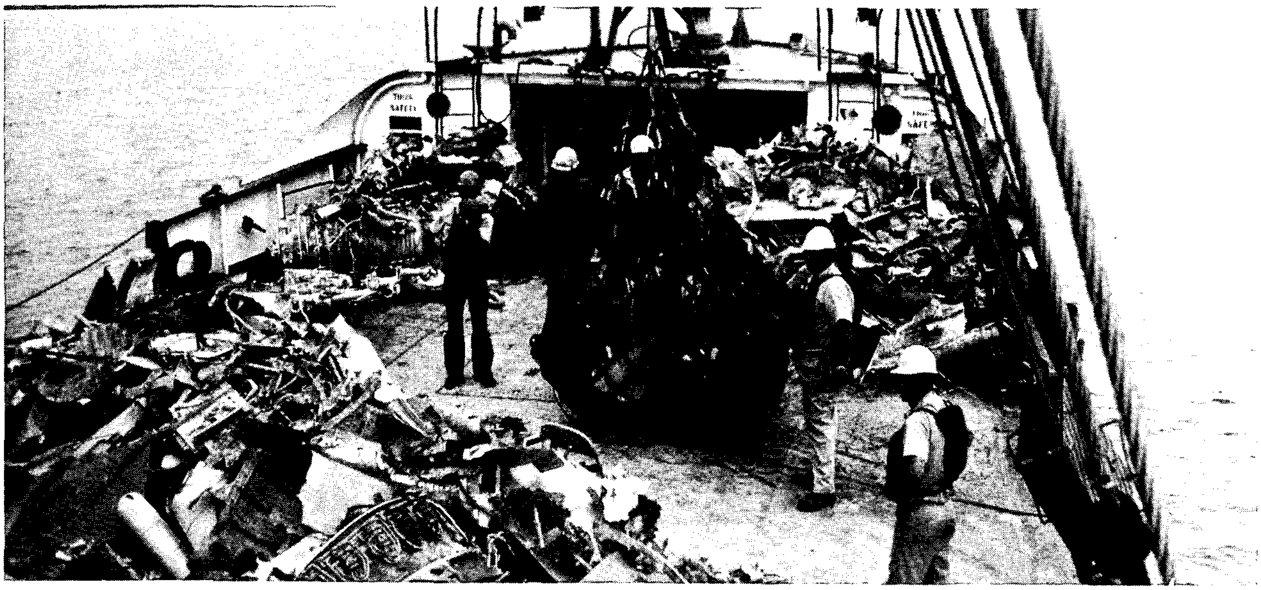
The recovery phase was terminated on August 30, with 98 percent of the wreckage recovered. The Supervisor of Salvage commended both the Fort Myers Beach Coast Guard Station and the HCU-2 diving team for their efforts in the operation.

Below: Controls for the after boom used for lifting wreckage.

In a letter of appreciation to the Coast Guard Station at Fort Myers Beach, which was used as the command station for the mission, it was noted that throughout the search/recovery operation, the Station "provided services and equipment vital to the eventual success of the operation." The letter also praised the Coast Guard personnel, and particularly the Station's Petty Officer-in-Charge, BMCS T.L. Smith, who "demonstrated a 'can-do' spirit during the entire operation."

The letter of appreciation for the HCU-2 diving team praised their "most proficient and enthusiastic manner" in successfully completing the recovery task. The diving team, which consisted of CWO-3 B. H. Vinson, HTC J. W. Roan, BM1 J. E. Seaquest, HM1 C. K. Blair, HT1 J. F. Johnson, and MM2 J. F. Leland, worked for long periods in JP-5 contaminated water with little visibility. Their "superior performance typifies the U.S. Navy diver's professionalism."

Above: Lifting slings bring a bulky piece of wreckage aboard. Below: Smaller wreckage is lifted in cargo net and set on fantail of USCGC JUNIPER.



Reserve Harbor Clearance Unit Fact Sheet

The design shown here is one suggestion for the official RHCU symbol. Suggestions are welcome; anyone wishing to submit an idea should send it to Mr. B. Sanders, NAVSEA OOC, Washington, D.C. 20362. A selection will be made in mid-February 1975.

Faceplate will be covering Reserve Harbor Clearance Unit events on a regular basis in future issues. Each Reserve Harbor Clearance Unit team is urged to "let us know what's happening" with its individual group by sending the news to *Faceplate,* Supervisor of Diving, Naval Sea Systems Command, Washington, D.C. 20362.

Presented below is a general update of RHCU news, submitted by Mr. Bernard Sanders, Office of the Supervisor of Salvage, Naval Sea Systems Command.

PERSONNEL

CAPT David Swan has been designated to command the NAVSEA D&S 106 group, which has its headquarters in Washington, D.C., and serves as a liaison team for the 10 units located around the United States. Each of these 10 units has also had its commanding officer named, listed below with the team numbers and locations:

LCDR L.L. Reynolds	HCU 104	Philadelphia, PA
LCDR T.L. Apjohn	HCU 1001	Portsmouth, NH
LCDR M.G. Gentle	HCU 208	Jacksonville, FL
LCDR D.J. Patterson	HCU 1106	Norfolk, VA
LT G.W. Petering	HCU 1209	*New Orleans, LA
CDR V.J. Shanahan	HCU 1313	Chicago, IL
LCDR F.T. Ingersoll	HCU 321	San Diego, CA
LCDR D.E. Engman	HCU 420	San Francisco, CA
LCDR G.A. Michelson	HCU 1419	Long Beach, CA
LCDR G.A. Ziegler	HCU 1522	Bremerton, WA

*Approval is expected soon on a request to relocate the New Orleans Unit to Corpus Christi, Texas.

Billets are still available on the individual teams. Those interested in joining should contact the local unit or write Mr. B. Sanders, Naval Sea Systems Command, Code OOC, Washington, D.C. 20362, for additional information.

NEWS BRIEFS

Applicants should realize that physical training and diving correspondence course studies in physics and medicine are prerequisites for Active Duty Training. A point of interest for those involved in the program is that U.S. Navy green uniforms have been authorized for RHCU personnel. Also, a proposed training plan, written by the NAVSEA D&S 106 group, is presently undergoing study and will be published by the Chief of Naval Reserve and the Chief of Naval Technical Training. Meanwhile, individual units are being "geared up" for action. Each team is acquiring necessary equipment on a continual basis; new SCUBA gear, if not already received, is on the way to each individual unit.

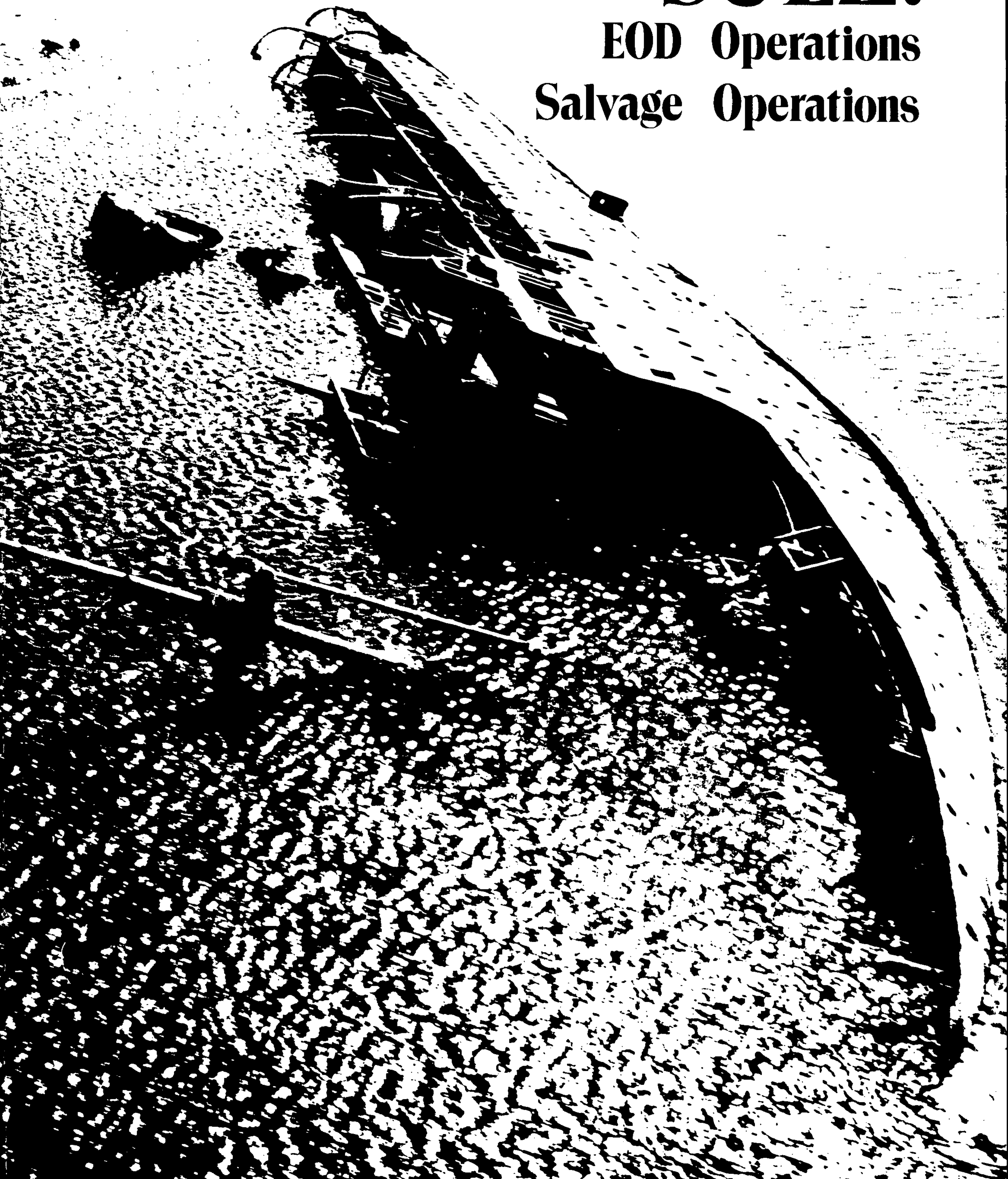
WELL DONE

Deputy Supervisor of Salvage Robert B. Moss, who has played a key role in the formation of the RHCU Program, has been promoted from CDR to CAPT. [*Faceplate* joins in congratulating CAPT Moss for this recent recognition.]

There have been many favorable comments from the field praising the diligent efforts by skippers and personnel. LCDR Robert Larrick, Code 213, in the Office of the Chief of Naval Reserve, has been commended for his assistance in the RHCU Program.

Below: MECCA, as she lay in the Canal before removal operations.

SUEZ:
EOD Operations
Salvage Operations



EOD Operations

CAPT David J. McAnulty, USN, CTG 65.5.

The Fall 1974 Faceplate *carried a brief introduction to the various Suez Canal clearance operations. Included among those discussed was the NIMBUS MOON project, which involves the removal or disposal of unexploded ordnance in the canal water or along the banks. The following article deals with the water investigation phase of this project – NIMBUS MOON Water.*

LT Lawrence Kelley, USN
Naval Explosive Ordnance Disposal Facility

The United States Government sent an Explosive Ordnance Disposal (EOD) Consultant Team to Egypt in February 1974, to determine the scope of the ordnance clearance project, recommend areas for U.S. participation, and advise the Government of Egypt on procedures they themselves could use in the canal clearance operations. The plans and concepts in this team's report, developed primarily by CDR Robert Moody, Commanding Officer, Naval Explosive Ordnance Disposal Facility (NAVEODFAC), were used as a basis for the actual EOD operations in the following months.

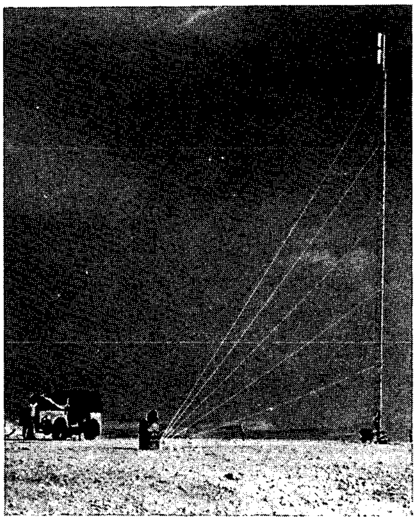
Commander Task Force (CTF) 65, RADM Kent Carroll, responsible for the overall Canal clearance involving ordnance and shipwrecks, assigned the EOD operations to Commander Task Group 65.5, under the direction of CAPT David J. McAnulty, USN, Commander, Explosive Ordnance Disposal Group TWO (EODGRUTWO), Fort Story, Virginia.

The EOD mission was to plan, execute, and evaluate a sonar and magnetometer search of the Canal; and, based upon sensor produced contacts, plan and advise the Egyptian Navy divers on the optimum method for diver investigation of the ordnance-like contacts. To support this operational mission, four mobile EOD teams from EODGRUTWO deployed with CAPT McAnulty and his staff. In addition, augmentation teams were later deployed from EODGRUONE, Pearl Harbor, Hawaii. NAVEODFAC, a research and development activity located at Indian Head, Maryland, provided overall technical assistance to CTF 65.

Egyptian divers attend training class conducted by U.S. Navy EOD personnel.

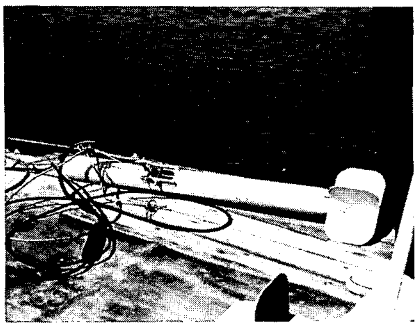
The EOD forces and the Airborne Mine Countermeasures (MCM) forces deployed together for the Canal Zone in April 1974. The EOD forces, as CTG 65.5, cleared the land and waterway approaches to the Canal to allow the helicopter MCM force to set up base stations and deploy their equipment.

Initially, CAPT McAnulty established his headquarters in Port Said, Egypt. EOD personnel from EODGRUTWO and the Naval School, Explosive Ordnance Disposal, conducted training classes there for their Egyptian Navy counterparts in render safe and disposal procedures for ordnance items expected to be in the Canal and in the use of hand-held ordnance locators.

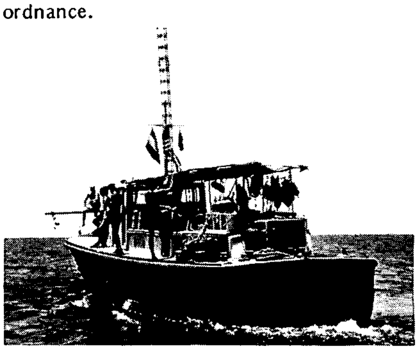


Responder site at Geneffe.

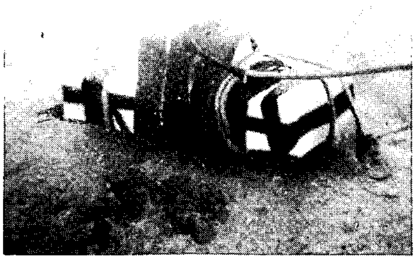
PO1 Matherly reviews sonar records.



Side scan sonar towfish used to detect ordnance.



Sonar boat used in canal.



Countercharging a bomb in the canal.

Tests were conducted in various geographical locations with the side scan sonar and precise electronic navigation systems on a planted array of ordnance to evaluate total system performance. This information was valuable in search planning to assure a high degree of confidence in detecting and locating targets as small as a 155-millimeter projectile. On May 5, 1974, the training and testing phases were completed, and CTG 65.5 moved to Suez City and the Port Taufiq area at the southern end of the Canal to commence sonar searching and subsequent diver investigation/disposal operations.

Three unique sensor systems were utilized during this operation. The sonar system was a 100-kilohertz dual channel side scan sonar towfish and recorder that was capable of detecting an object as small as a 155-millimeter projectile 50 meters away. This system produced a hard (paper) copy of the bottom of the search area and had three operating scales, 75 meters/150 meters/300 meters, to either side of the towfish. The 75-meter scale was used to ensure a high probability of detecting small ordnance objects. The first magnetometer system used was the AN/ASQ81 atomic precession type sensor, similar to those currently installed in the tail boom of P-3 ORION aircraft. These sensors were modified, however, to fit into a towfish body, allowing it to be towed under water from the stern of any available vessel. Recently, an array of four towfish (ganged sensors) was used to increase the effective area of coverage or footprint for the magnetometer detection system. This array allowed the operator to classify the relative size of the contact more precisely by comparing the four individual readouts of the system.

The third system used, and the key to the mission's success, was the precise electronic navigation system. This system operated with an interrogator located on the search boat and two shore-base responder stations, and radiated at 3100 megahertz, allowing line-of-sight transmissions. The system was able to provide accurate ± 0.5-meter fixes over a distance of 40 kilometers. The shore-base stations were erected on towers, as was the antenna on the search boat. The Naval Aids Support Unit, headquartered in Fort Story, Virginia, provided EODGRUTWO with NAVAIDS support in establishing shore stations and erecting and maintaining towers.

The execution of the sonar search commenced in early May 1974, at Suez City (km 162) and proceeded northward through heavy concentrations of ordnance at former Israeli and Egyptian crossing points. Sonar operations were conducted up to the Deversoir earthen causeway, just north of the Great Bitter Lake. They were then leapfrogged north to Port Said over the British sonar effort, which was proceeding south from Port Said.

Sonar search plans called for multiple sonar sweeps across the Canal, so the sensor could detect a single fixed contact several times. The clusters formed by these multiple detections were used to increase the accuracy of the estimated dive positions, filter out transitory targets, and plot errors.

Multiple sonar sweeps running both north and south also provided different aspects on the same object. An object might not have been detected if the sonar acoustic signal had a singular degree of incident; but these varied runs gave multiple degrees of incidence, increasing the probability of detection.

The sonar effort was successful in detecting 250-pound and 500-pound bombs, projectiles, rockets, aircraft, trucks, pontoon sections, and various war debris. The sonar detection system succeeded in localizing contacts for diver search, providing a 95-percent probability of finding the target of interest in a 10-meter circle.

Search plans, made on the basis of system performance during the many in-situ tests, were followed as closely as possible. However, predetermined tracks were deviated from in some cases because of occasional high winds, current, and shipwrecks. During the first few weeks of the search effort, the operators were required to work 15 hours a day, 7 days a week, until the search task unit's effort solidified into a well-synchronized operation. Sonar operators were required to classify contact appearances on the basis of whether they were intense or dark, uniform in darkness, sharply outlined, lacking a shadow, or whether there was any disparity between the contact and the surrounding bottom features.

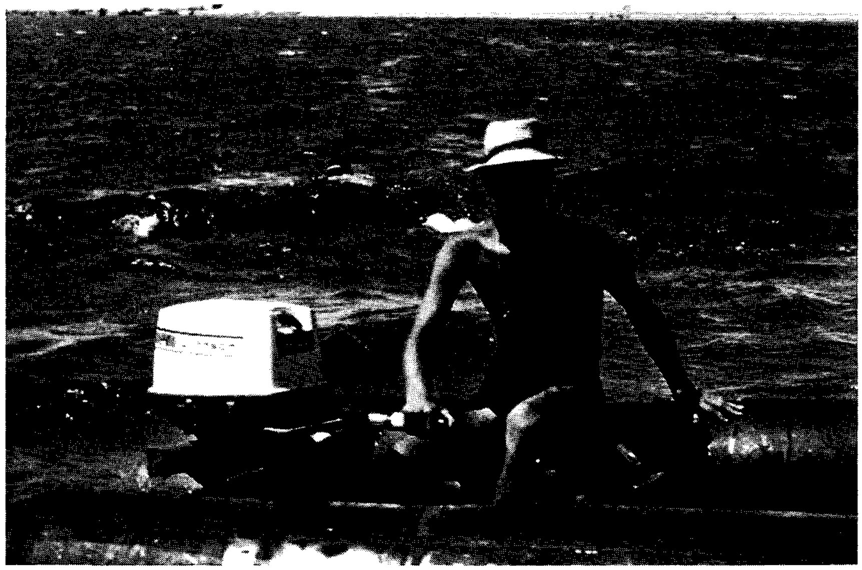
The sonar operator did not filter any contacts if they did not show up in other runs over the same area. Contact filtering was done by the analysis group that computerized all contacts and plotted their positions.

Magnetometer operations started in Suez Bay with some initial tests to determine the system's ability to detect and localize ferrous contacts for diver investigation. The results of these tests showed that total system performance was accurate enough to place divers within 5 meters of an object of interest. The magnetometer detection system was utilized in Suez Bay and in the Great Bitter Lake, where background magnetic levels were low. The magnetometer proved to be the only effective detection system in the anchorage areas of the Great Bitter Lake, since the sonar could not penetrate an abnormally dense layer of water that existed there.

Evaluation of the search effort was necessary since conditions never allowed the search boat to follow the exact search plan. Post-operations analysis gave the search commander a statistical figure that indicated how effective his search was in a specific area and in the Canal as a whole. This quality assurance aspect of the operation ensured that areas that did not receive sufficient search effort were identified for later investigation. The areas of high concentration of sonar contacts noted during the search underwent more intensive search and diving efforts.

The operational success of this mission can be attributed in large part to the efficient use of limited diver assets through the use of sophisticated sensor search systems and statistical analysis. Overall, however, the force that provided the inertia for making the operation a success despite the arduous schedules and spartan living conditions was the professional determination and pride of all the personnel involved.

Egyptian divers in Suez Canal.



Divers involved in locating underwater ordnance in the Suez Canal encountered a dense layer of very salty water in the Great Bitter Lake area. The 9-foot-thick layer lies approximately 42 feet below the surface; however, water below and above the area is normal.

The phenomenon was discovered when U.S. Navy SCUBA divers submerged to find out why their sonar equipment was not operating effectively in detecting obstructions along the canal bottom. Divers literally "hit" the layer, and could not penetrate it until extra weights were sent down. Once into the layer, divers found themselves in darkness until they came out on the opposite side. Divers emerged from the water completely coated with salt.

The murky layer has evidently been saturated with oil, probably from fuel leakage from ships, as well as with salt. Initial analysis indicated that the briney layer is twice as salty as the Great Salt Lake in the United States. The layer's extent of coverage over the Great Bitter Lake is not known.

Salvage Operations

The scope of the canal clearance is such that it cannot be covered adequately in one article. Therefore, just the northern zone operations, which concern MECCA and ISMAILIA, are discussed below. Spring 1975 Faceplate *will continue the Suez coverage.*

MECCA and ISMAILIA were the only two wrecks in the northern zone of the Suez Canal. Their sectioning was given top priority so that the heavy-lift cranes THOR and ROLAND could be fully utilized when they arrived in the Canal. Clearance of MECCA and ISMAILIA would also facilitate access to the central and southern zones. Moreover, because MECCA was the largest and the most difficult wreck to clear, it was decided to initiate its removal without delay.

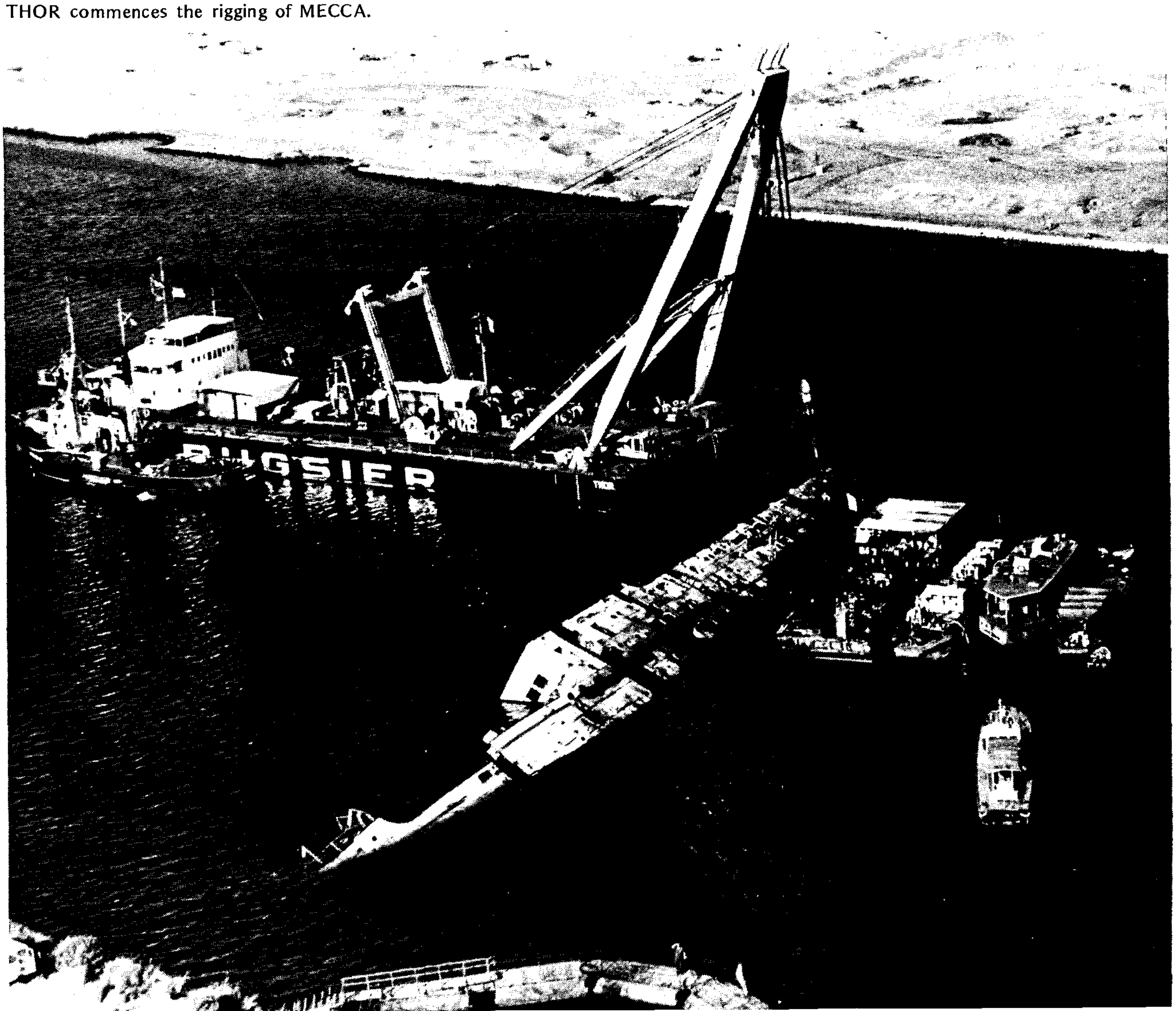
The U.S. Navy and the Suez Canal Authority (SCA) tentatively decided before the salvage survey began that both ISMAILIA and MECCA were too old to merit salvaging by a method that would permit them to be returned to service.

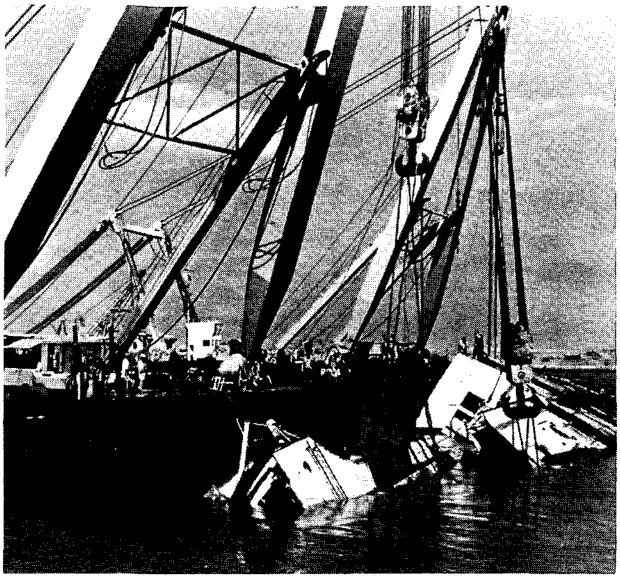
Cutting each wreck into sections and lifting the sections onto a barge required the use of a heavy-lift crane. Two such cranes, THOR and ROLAND, capable of lifting 500 tons off each end, were ordered from northern Germany. The salvage plan was to cut each wreck into sections of approximately 400 tons each, and use THOR and/or ROLAND to lift the sections and transport them to the disposal site.

After the decision was made to clear ISMAILIA and MECCA from the Canal, detailed planning for the operation began. A brief salvage survey of each wreck was conducted to determine its attitude, the extent of damage and silting, and the most advantageous approach to the salvage operation.

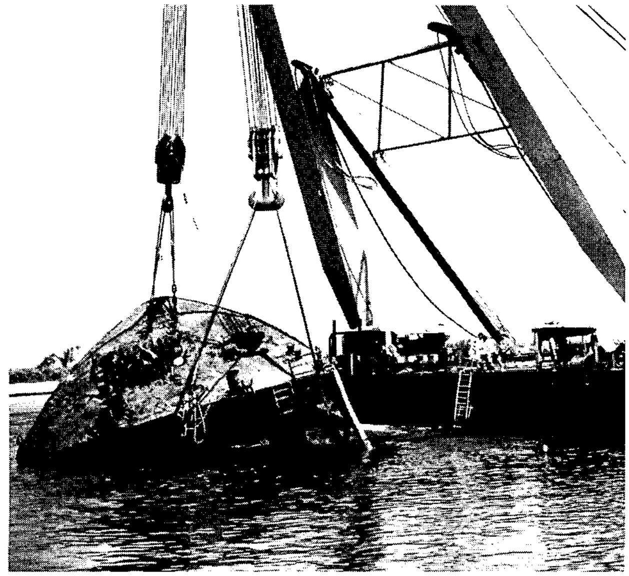
ISMAILIA was found to be upright rather than lying on its starboard side as described in the 1967 SCA survey. The hull was in 52 feet of water and was lying at an angle of 60° to the Canal centerline, its bow toward the

THOR commences the rigging of MECCA.





THOR and ROLAND conduct twin lift of a section of MECCA.



THOR lifts ISMAILIA's bow section.

west bank approximately 82 meters from the revetment (the facing sustaining the Canal sidewall). About 17 feet of water covered the main deck. The ship was clear of the Canal bottom at the bow and stern and was supported by the bottom under the mid one-third of its length. The superstructure had been completely demolished, and the shelter deck, much of the main deck, and the side plating down to the main deck had been removed. Although most of the propulsion and other machinery had been removed, the boilers, propeller, and shaft were still in place, and all frames were intact. The hull contained considerable silt.

MECCA rested on its starboard side at a 75° list and at a 75° angle to the Canal centerline. The bow was in 13 feet of water, 26 feet from the west bank, thus much of the bow and superstructure was above water. The stern was in 65 feet of water approximately 180 feet from the east bank. The hull was found to be intact, supported by mud by more than 80 percent of its length. The starboard side could not be surveyed because it was buried in mud.

SALVAGE OPERATIONS ON ISMAILIA

Actual salvage operations in the Suez Canal began with the initiation of silt removal from the ISMAILIA wreck on June 3, 1974.

Oil Removal Operations

Because ISMAILIA was being scrapped before it was sunk, the salvage team concluded that the ship contained little or no oil; therefore, no oil removal operations were planned. During the salvage operation, the team was alert for signs of oil leaks, but there were none.

Another consequence of the early scrapping operations was that ISMAILIA's superstructure had been removed, leaving just the hull proper to be sectioned.

Silt Removal Operations

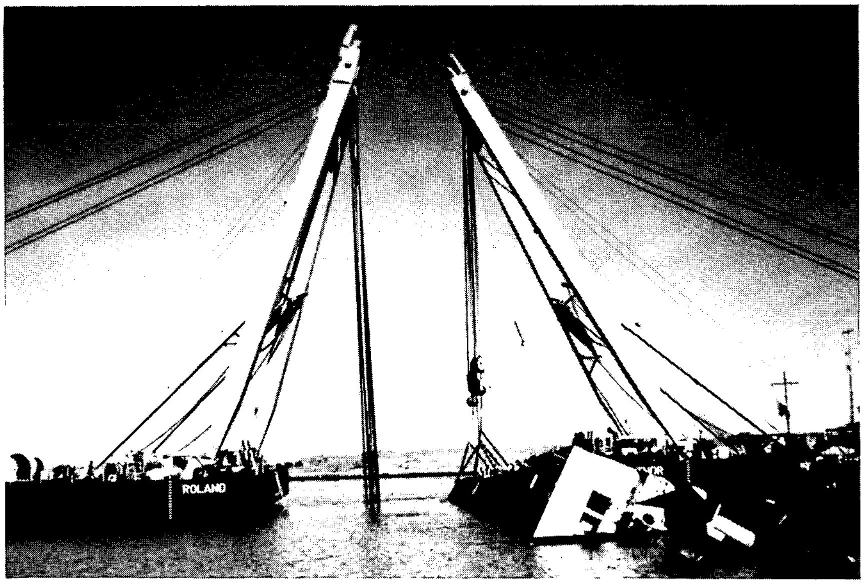
A considerable amount of silt had to be removed from ISMAILIA's hull before commencing cutting operations, to permit access for cutting in way of the double bottoms and to lighten the wreck for lifting. When the salvage operation began, the SCA diving barge BAYOUMI was moored over the wreck, and silt removal operations by air lift were begun. The diving teams worked one at a time using a 6-inch air lift.

Work was slowed by the depth of the wreck. The salvage team had no recompression chamber, and the work was hard; therefore, each diver was limited to one no-decompression dive per day. After delivery of a recompression chamber at the beginning of the second week of operations on ISMAILIA, divers could dive more than once per day. As the magnitude of the silt-removal problem became more apparent, the operation was expanded to two teams of divers using two 6-inch air lifts.

Mud also proved to be a problem. Conventional air lifting alone was successful for the top layers of mud; but the lower layers were packed hard and had to be broken up with a high-pressure jet pump (500 gallons per minute at 300 pounds per square inch) before air lifting.

Cutting Operations

The salvage team commenced cutting operations on ISMAILIA's hull on June 14, 1974. Cutting could have



ROLAND and THOR conduct a double lift on MECCA hulk.

been hastened by using more oxyarc; however, the use of explosives was stressed because ISMAILIA was an ideal training ground for more difficult work in other wrecks to follow, where explosive cutting might be mandatory. Cutting progressed satisfactorily in the usual sequence of tank top, bottom, sides, and main deck, and was completed by the end of the first month of salvage operations.

After 14 days and the expenditure of 2,400 pounds of explosive, ISMAILIA had been cut into five sections and awaited the arrival of the heavy-lift crane THOR.

———Lifting Operations———

Salvage operations on ISMAILIA resumed on August 13, 1974, when the heavy-lift crane, THOR, arrived in the Canal Zone from Bremerhaven, Germany.

Insufficient cutting to separate the sections caused a minor delay when the first section (bow) was lifted. To further complicate matters, the lifting slings ripped the "skin" of the ship, so that the crew had to rerig the after sling, running the lift wire under the hull rather than through the hull.

The second section to be lifted was section 5, the stern section. Based on the experience with the bow section, the original plan to make a forward connection through lifting windows was abandoned in favor of a sling rigged under the hull. The first lift had required 7 days to rig, lift, and dump the bow section, whereas the second lift required only 2 days for the same sequence.

ROLAND, the sister crane to THOR, had arrived in Suez on September 15 and was being used to move the sections of MECCA. She was shifted from the MECCA site to ISMAILIA, however, to lift the remaining two sections.

———Lessons Learned———

The cutting effort had been successful, and the ease with which the cuts were made increased as the operation progressed. The essential ingredient was careful placement of the charges alongside the frames to achieve a shearing action. Charges placed off the frames frequently distorted the structure rather than cutting it. When the size of the charge was increased on such a cut line, cutting was achieved, but that portion of the wreck was distorted to such a degree that the divers' ability to reorient themselves to place subsequent charges was seriously impaired. Thus, increased weight of explosives was not a substitute for careful charge placement. No significant advantage was gained by using angle-iron charges as opposed to hose charges.

SALVAGE OPERATIONS ON MECCA

Salvage operations on MECCA commenced in early June, as soon as practicable after personnel arrived in the area and were able to outfit Suez Canal Authority barges as work platforms.

Three initial operations were carried out concurrently in the MECCA salvops. First, a diving survey was conducted, followed immediately by commencement of underwater oxyarc cutting. Second, oil removal operations were begun, first to remove surface oil, and then to remove oil from the tanks. The third operation was the initiation of nonexplosive cutting on the exposed superstructure to section it into pieces suitable for lift by the SCA 80-ton crane.

———Oil Removal———

The sequence of the removal of oil from MECCA was determined by the order of the cutting work. Men and equipment were diverted to oil removal operations as necessary to clear a way for the cutting. Thus, oil was removed simultaneously from the midship and after tankage areas, with the major effort in the midship tanks.

Using a hot-tap method, the surface oil was essentially removed without difficulty in one day; but because of seepage, it continued to reappear during the remainder of the salvage operation and required collection when significant amounts accumulated. In the interim, spray and air curtains were rigged to minimize interference with divers.

Cutting Operations

Nonexplosive cutting on MECCA's superstructure began immediately after completion of the salvage survey on May 29, 1974. SCA burners worked topside with oxyacetylene burning equipment, while divers worked underwater with oxyarc equipment.

Cutting and lifting the superstructure sections proceeded routinely; there was a growing tendancy, though, to use explosive cutting rather than oxyarc methods. However, emphasis was placed on using more oxyarc and less explosive cutting in areas of light construction.

The cutting and removal of all 15 sections of MECCA's superstructure was completed within 30 days.

The first part of the hull of MECCA to be removed was a 16-foot section of the stern, which was removed to increase the depth available for the passage of USS BARNSTABLE COUNTY (LST 1197), enroute from Port Said to Ismailia. (BARNSTABLE COUNTY, serving as the flagship for the Task Force Commander, RADM Kent Carroll, replaced USS IWO JIMA (LPH-2) and USS INCHON (LPH-12) when the minesweeping operations were concluded in June.) Removal of this section proved to be very time consuming, so much so that it was necessary to reduce the size of the section by cutting the hull on a bias.

A problem appeared, however, that would eventually necessitate changing the basic plan of cutting from inside the wreck. At cut 12, mud and debris in the space blocked access to the hull and was evacuated by airlift. However, the mud, debris, and wreckage shifted by cutting charges made it difficult for divers to gain access to the structure or to determine what must be cut.

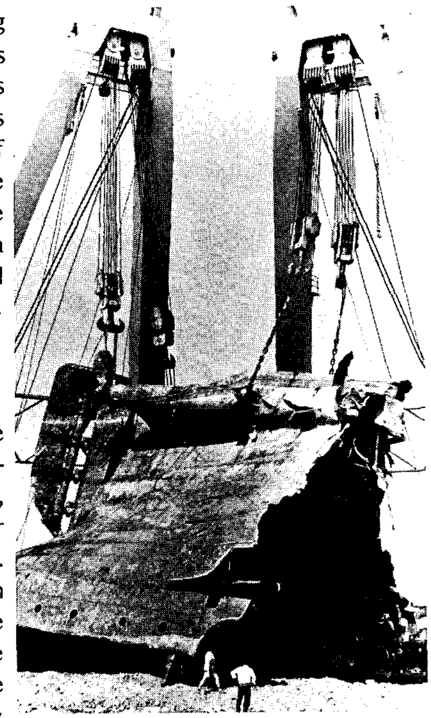
Two major decisions affecting the cutting operations were made at this time. The first was to order the second heavy-lift crane, which arrived in the Canal on September 15. The principal effect on MECCA operations was to permit consideration of eliminating three cuts, so that the pairs of sections on either side of these planned cuts could be lifted as nominal 900-ton lifts by two cranes. The elimination of these cuts would save considerable time in the overall operation. The second decision was to employ a second cutting team, which would start forward and work aft. By this stage, expertise and some definitive techniques for explosive cutting had been developed.

One explosive cutting technique found particularly effective was "shooting" from the outside of the wreckage, which in addition to generally easier access presented other advantages. Guide holes were cut in the bottom and in the starboard shell to guide the placement of explosives on the outside of the wreckage. When shooting the starboard side, it often was necessary to use hogging lines to secure charges in close contact with the hull. Larger charges could be used without disrupting other work, and shooting against the support of the frames increased the tendency of the charge to cut the plate, rather than merely distort it. Finally, there was less of the interference from mud, debris, and wreckage than was experienced when cutting from inside. Explosive cutting was discontinued while the heavy-lift cranes were alongside for lifting. To ensure that cutting operations did not lag to the point that the heavy-lift cranes were unemployed, and to avoid conflict with divers rigging for lifts, the cutting crew was divided into two shifts—a day crew doing oxyarc cutting and a night crew doing explosive cutting. Two-shift work continued for 5 days, until a reasonable backlog had been accumulated.

Lifting Operations

Lifting operations on the superstructure began with the arrival of the 80-ton SCA crane at the site on June 10.

The heavy-lift phase of MECCA's removal, using the heavy-lift crane THOR and later THOR and ROLAND in tandem, began with the arrival of THOR at the MECCA site late in the third month of salvage operations.



Gantries of THOR and ROLAND loom behind MECCA's stern on dry dump area.

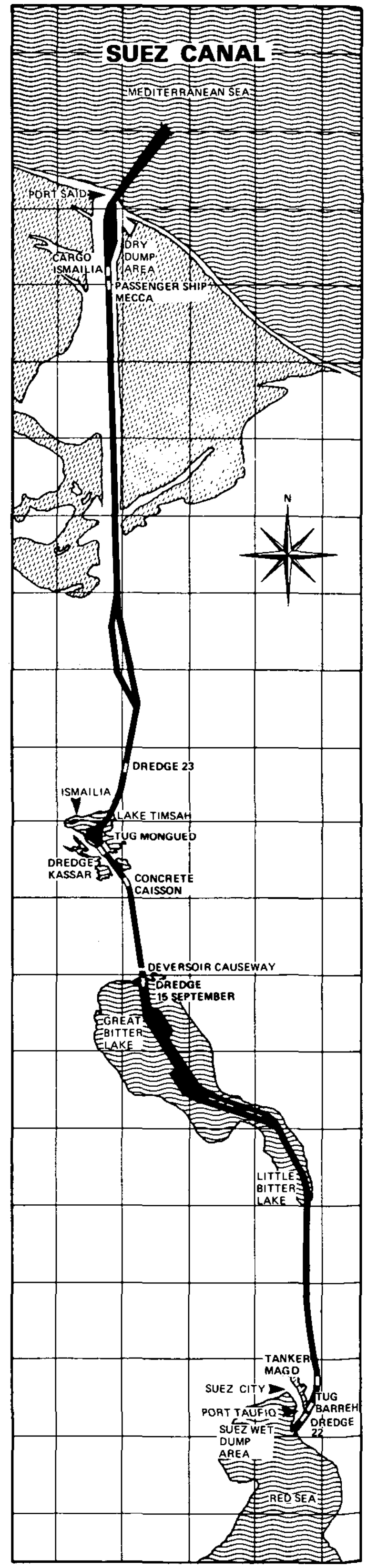
The major difficulty encountered was in lifting the last section of MECCA. THOR and ROLAND attempted this lift on October 15, but as the topmost deck broke the surface, one of ROLAND's chain slings completely pulled through the ship's structure, transferring all of ROLAND's share of the weight to the other sling. This sling then parted, causing hooks, slings, and chains to lash about. Fortunately, no personnel or equipment suffered injury. THOR set its side of the piece down without damage.

An inspection found that all connections had to be redone on this section, and that a considerable amount of structure/machinery had to be removed to lighten the piece for lifting. After accomplishing the lightening, THOR/ROLAND completed this final lift on December 17, concluding the northern zone operations.

The chart below summarizes the major SUPSALV milestones completed in the overall Canal clearance in the three operational zones. The Spring Faceplate *will discuss the southern zone operation in detail. The map at right shows the original location of each of the 10 wrecks. There are three major dump areas: the dry dump in the northern zone, the Great Bitter Lake wet dump area in the central zone, and the Suez wet dump in the southern zone. The last piece of MECCA, however, was deposited in a wet dump offshore of the northern dry dump area because of the excessive weight of this section.*

CHRONOLOGY OF SUPSALV EFFORTS IN SUEZ CANAL CLEARANCE 1974

April 1974	SUPSALV Planning Phase.
May 22	Executed CNO 221155Z May – SUPSALV, staff, and contractor personnel commenced salvage surveys of 10 wrecks in Suez Canal.
May 29	Commenced salvops on northern wrecks, ISMAILIA and MECCA.
June 16	Completed initial survey of remaining eight wrecks.
June 28	YHLCs departed Subic Bay for Suez Canal.
July 7	Commenced salvage survey of remaining eight wrecks.
July 29	Completed salvage survey of remaining eight wrecks.
August 13	Bugsier crane THOR arrived Port Said.
August 21	THOR completed first ISMAILIA lift.
August 22	YHLCs arrived Port Taufiq, Egypt.
August 29	THOR completed first MECCA lift.
September 11	Completed tug MONGUED salvops. YHLCs lifted MONGUED and deposited it in Great Bitter Lake on September 12.
September 15	Bugsier crane ROLAND arrived Port Said.
September 22	Completed dredge KASSAR salvops, YHLCs lifted KASSAR and deposited it in Great Bitter Lake on September 25.
September 23	THOR/ROLAND commenced parbuckling dredge 23 and completed on September 29.
October 3	THOR/ROLAND completed first double lift on MECCA.
October 5	YHLCs commenced lifting dredge 23 and deposited it in Great Bitter Lake on October 9.
October 10	ROLAND completed final ISMAILIA lift to dry dump area.
October 27	THOR/ROLAND parbuckled dredge 22; lifted dredge and deposited it in Suez wet dump area on November 4.
November 8	THOR/ROLAND lifted and deposited tug BARREH in Suez wet dump area.
November 23	THOR/ROLAND completed lifts bow/stern sections of tanker MAGD and deposited sections in Suez wet dump area.
November 30	THOR/ROLAND completed parbuckling dredge 15 SEPTEMBER.
December 4	THOR/ROLAND lifted dredge 15 SEPTEMBER, pumped it out, and towed it away for rehabilitation.
December 6	Dredge 15 SEPTEMBER delivered to SCA Dredging Department.
December 13	YHLCs deposited eastern half of concrete caisson in Great Bitter Lake.
December 17	YHLCs completed lift of western half of concrete caisson and deposited it in Great Bitter Lake.
December 17	THOR/ROLAND lifted last piece of MECCA and deposited it in wet dump area.
December 19-20	THOR/ROLAND demobilization, transit to Bremerhaven.



New Diver Communication System Designed For DDS Mk2 Mod1

The Naval Coastal Systems Laboratory (NCSL), Panama City, Florida, has developed a diver communication system for the Deep Diving System (DDS) Mk 2 Mod 1 used aboard two of the Navy's newest submarine rescue vessels, USS PIGEON (ASR-21) and USS ORTOLAN (ASR-22).

The system provides two-way communication with the capsule operator and the Main Control Console (MCC) for three divers operating out of the Personnel Transfer Capsule (PTC).

Two major problems experienced on the DDS Mk 2 Mod 0 aboard ELK RIVER (IX-501) were the effect of breathing gas noise, and the confusion of microphone input level controls and headphone volume controls.

The effect of the breathing gas noise was reduced by the design of a voice operated relay (VOX) circuit that activates the microphone circuit only when the diver speaks. The circuit distinguishes between gas noise and the periodic sound of the human voice. When the diver stops talking, the circuit detects the lack of a periodic signal and switches the microphone circuit off. Generally, the real interference of breathing gas noise is not from the diver talking but from the other divers on the party line. This circuit therefore reduces the effect of the gas noise by activating only the microphone channel of the diver communicating. Operators have also become accustomed to determining that their divers are all right by listening for their breathing. To maintain this condition, some of the gas noise bypasses the VOX circuit, but at a level that does not blank out communications.

To relieve the capsule operator of the chore of adjusting microphone input levels, which were sometimes confused with the headphone volume controls, an automatic level control (ALC) circuit was incorporated. The ALC was also included in the capsule operator's microphone channel. This circuit provides better system performance since all inputs are at the same level.

Two other features were incorporated into the system. No power is required in the PTC to drive the diver's and capsule operator's earphones. Therefore, in case of loss of all power in the PTC, the MCC or capsule operator can give instructions to the divers to cope with the emergency. The second feature was the addition of a circuit to permit the intercom speaker in the PTC, which also doubles as a microphone, to be fed to the helium speech unscrambler. This provides a no-power means of communication from the PTC.

The Mk 10, Mk XI Mod 0, and modified KMB-9 band mask require direct current power for a diver-mounted microphone preamp and other electronic circuitry peculiar to the individual breathing system. The communication system provides an isolated power supply for each diver and a means of connecting the electrical umbilical.

Maximum use was made of integrated circuits, and all circuits are constructed on printed wiring boards. The circuits are exposed to ambient pressure in helium-purged enclosures and are capable of operating to 1,000 feet of seawater depth. Thus, the DDS Mk 2 Mod 1 has been provided with a state-of-the-art diver communication system.

The Old Master . . .

I want to take a moment in this issue to make sure all of y'all realize that there are now *two* Navy Experimental Diving Units in operation. Y'all have read both the Fall 1974 *Faceplate* article and the current story on pages 10-13 on the relocation of NEDU to Panama City, Florida; however, this does *not* mean that the Washington Navy Yard NEDU is closing! Any problems or questions you have regarding diving procedures or equipment may be addressed to either facility—NEDU "North" or NEDU "South."

Chief Bob Watkins is your point of contact in Washington, D.C., at Autovon 288-2672. At the Panama City facility, Master Chief Bob Merriman will be glad to answer your questions. He can be reached at Autovon 436-4355. The Officer contact in Washington is LCDR Tom Hawkins; and in Panama City you can contact LCDR Jack Ringelberg, Officer-in-Charge of the Panama City Detachment, or LCDR Marty Paul, Assistant Officer-in-Charge.

A message will be circulated to y'all soon, informing you what to do should you need medical assistance for a medical emergency or diving accident. You can call either NEDU location for help; however, Dr. Bill Spaur, the Senior Medical Officer for NEDU, has asked me to tell you to make every effort to call the Panama City facility first, since the majority of his staff is now at NEDU South. They have a 24-hour watch there now, and are available for assistance at any time. If you don't have access to Autovon for the aforementioned number, you can call commercial, (904) 234-4355.

I'd like to emphasize particularly that NEDU, North and South, is ready to assist you for any diving need—and it's just a phone call away.

If any of you get to Panama City, you definitely should make a visit to the new complex. This Old Master has never seen anything quite like it!

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