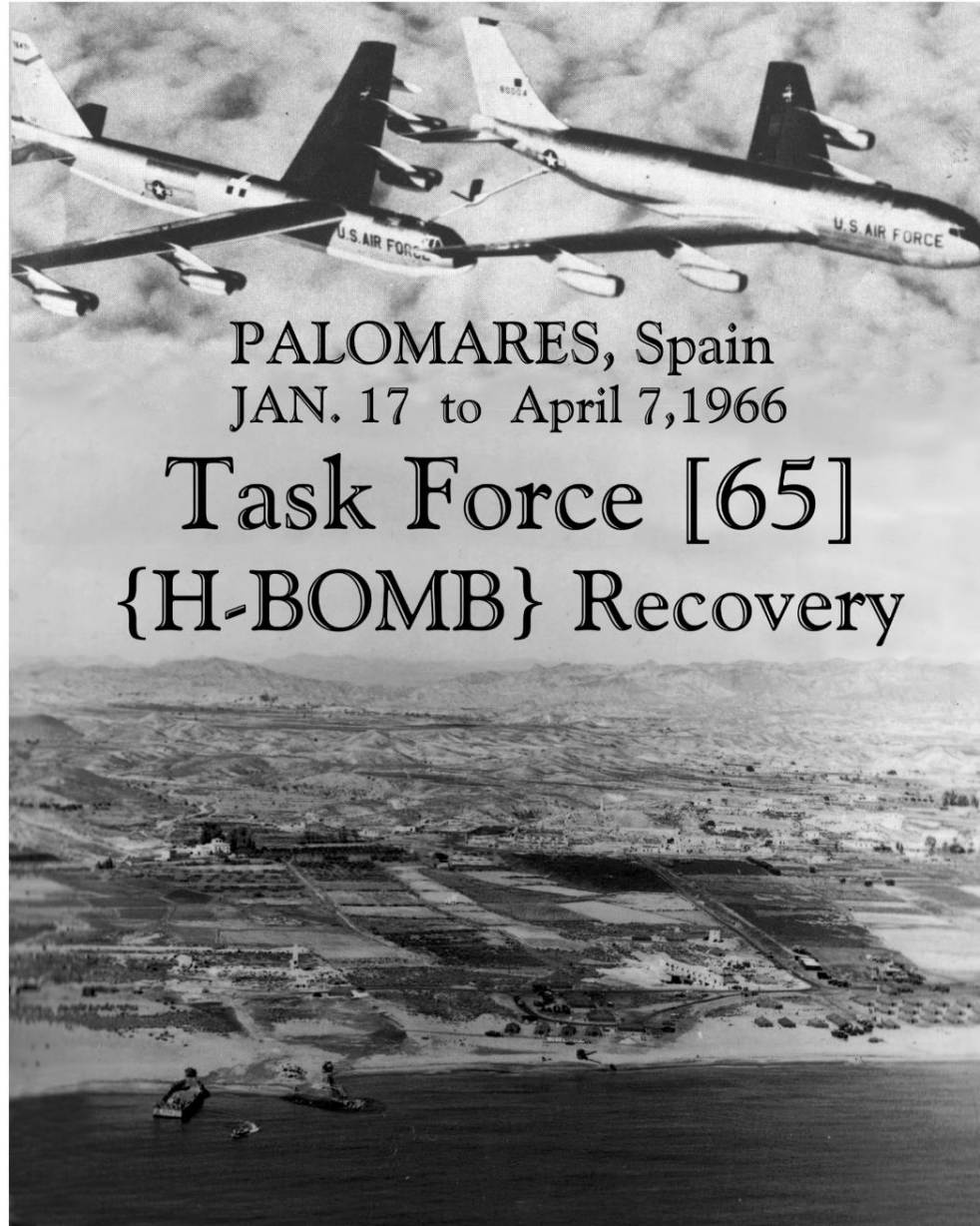


USS Albany CG-10
H-Bomb Recovery
April 7, 1966

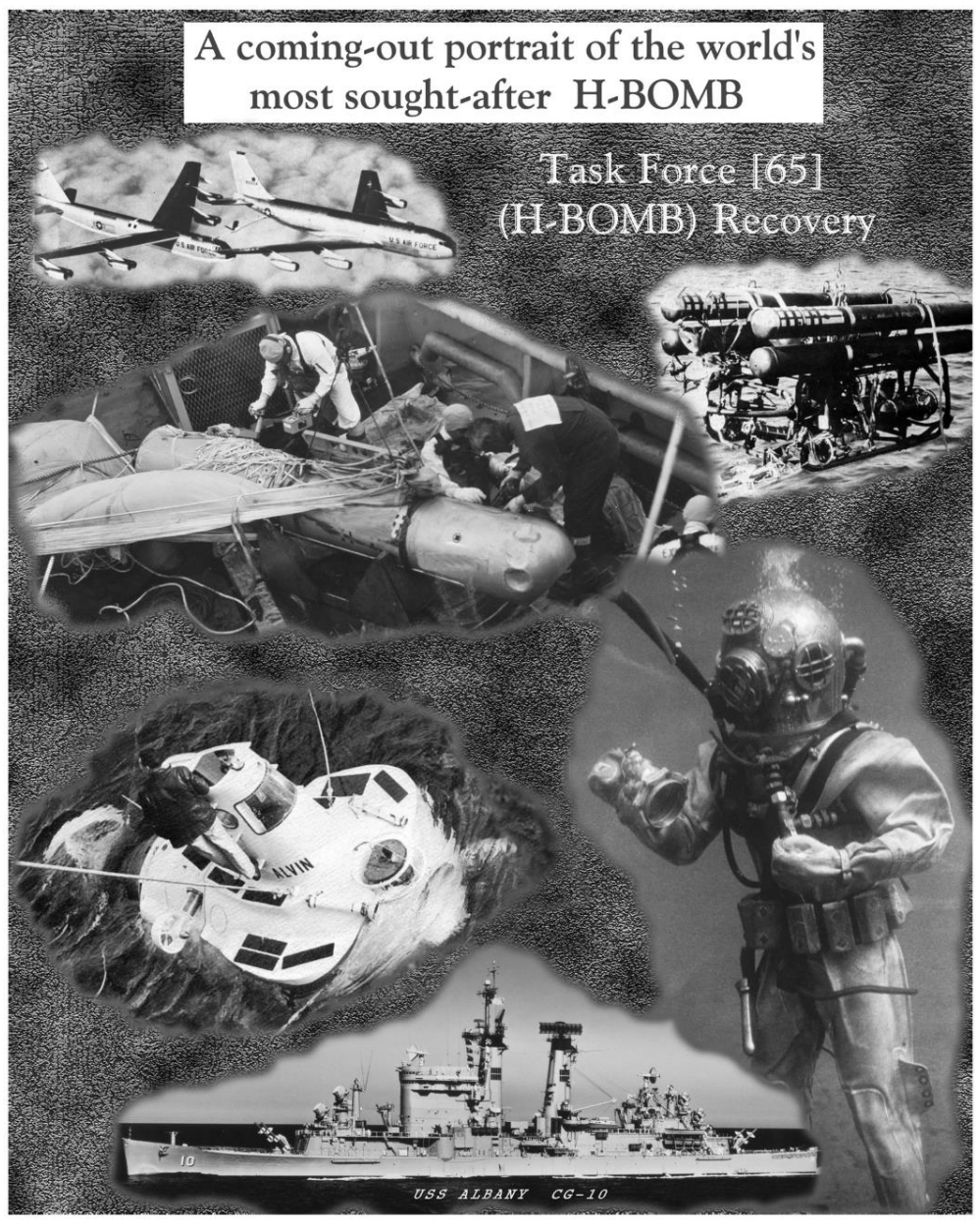


PALOMARES, Spain
JAN. 17 to April 7, 1966

Task Force [65] {H-BOMB} Recovery

A coming-out portrait of the world's
most sought-after H-BOMB

Task Force [65]
(H-BOMB) Recovery



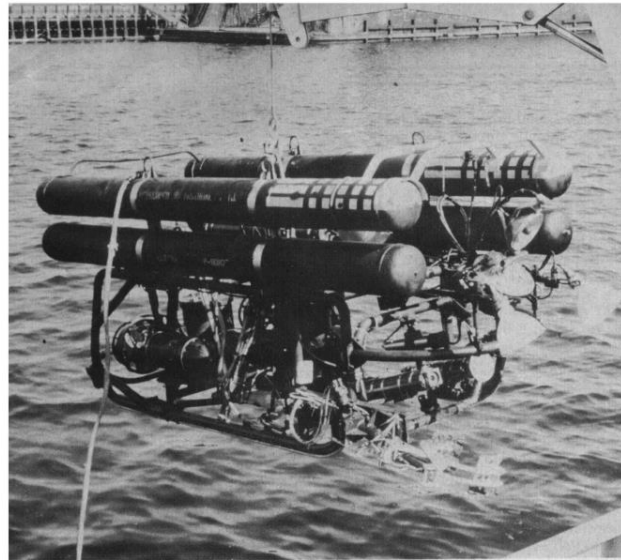
USS ALBANY CG-10



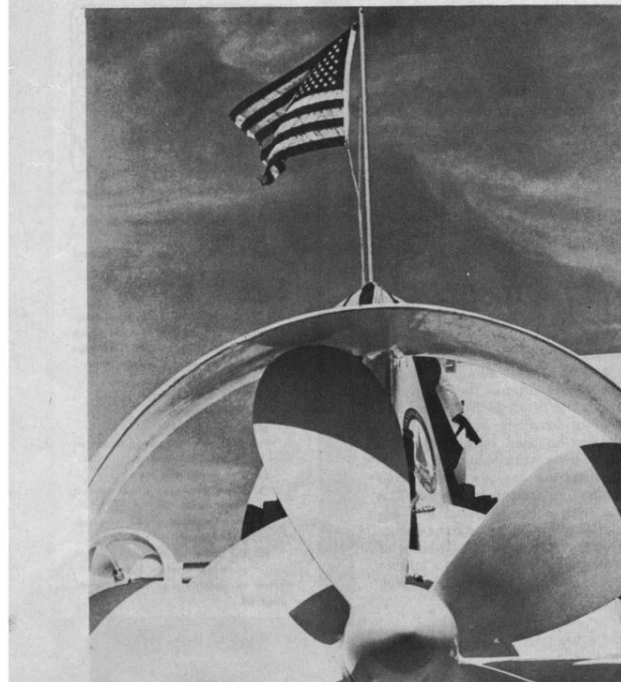
L to R Sr. Don Antonio Velilla, Chief of Spanish Nuclear Energy Board in Polomares, Brigadier General Arturo Montel Touzet, Spanish Coordinator for the Search and Recovery Operations at Polomares, Spain, RAdm. William S. Guest, Commander U.S. Navy Task Force 65, and General Delmar E. Wilson, Commander 16th Air Force

The Missing H-BOMB

This is no ordinary case of lost and found. A U.S. B-52 bomber, carrying nuclear weapons, collides with a KC-135 refueling plane over Almeria, Spain, on Jan. 17. Eight of 14 crew members die, and an H-bomb dislodges from the bomber and falls into the Mediterranean Sea, panicking Spaniards who fear a radiation leak. The Navy's job is to locate and recover the bomb. "We're not looking for a needle in a haystack," says a Navy spokesman. "This is looking for the eye of the needle in a haystack." For weeks, the Navy's underwater probes find nothing -- except for such items as ancient cannonballs and a piece of the B-52's wing. Finally, on April 7, the missing H-bomb is hauled aboard the submarine rescue ship Petrel after being located at a depth of 2,500 feet, five miles offshore, by an experimental midget submarine called Alvin -- on its very first assignment. The minisub finds the 21-foot, 13-ton bomb still entangled in a parachute. And except for a few nicks, it is intact.



TEAM MATES—Navy's CURV, designed to retrieve torpedoes, secured lines to H-bomb that was located by the deep-diving sub *Alvin* (below).



MISSION ACCOMPLISHED

TASK

The following narrative portrays the Navy's role in the operation earlier this year off Palomares on the Mediterranean coast of Spain. The report is concerned with the numerous Navy activities working under the direction of the Commander, Task Force Sixty-Five.

The over-all task, ashore and afloat, included elements of the U. S. Air Force and the U. S. Embassy, in addition to representatives of industry who offered their services in the assignment. It is appropriate here to pay tribute to the extensive cooperation of Spanish officials and the work of many civilians; indeed, teamwork was the keynote culminating in successful achievement of this mission in the face of many hardships.

CONTACT NUMBER 261, resting in wooden chocks on the fantail of USS *Petrel* (ASR 14), was still partially shrouded by its gray cargo parachute. On its perch the large, cigar-shaped bomb presented a rather unspectacular appearance, considering that for previous weeks it had been the object of a search involving more than 3000 men in 23 ships.

As the submarine rescue ship moved slowly along the starboard side of USS *Albany* (CG 10), then reversed and backed closer to the cruiser, the thermonuclear bomb came into close camera range for news photographers on board the Task Force 65 flagship.

This was the first public exhibit of a thermonuclear weapon. The bomb picture was flashed around the world by news media as evidence of its successful recovery.

The event marked the culmination of an 80-day drama in which man's fortitude and ingenuity defied the formidable forces of Nature in two dimensions, above and below the sea, in the most exacting U.S. Navy deep sea search and recovery operation ever conducted.

PRECIPITATING this all-out U. S. effort, a B-52 jet bomber crashed after colliding with its KC-135 refueling tanker over southern Spain

FORCE SIXTY-FIVE

on 17 January. The four hydrogen bombs carried aboard the B-52 fell to earth from about 30,000 feet, but there was no nuclear explosion because the bombs were unarmed.

Three of the bombs were recovered in the farm country near Palomares, but an extensive search of the area failed to turn up the fourth.

Six days after the crash, TF 65 was formed to prosecute a sea search for the missing bomb and to locate aircraft wreckage which had fallen into the sea.

There are few meaningful analogous situations that might be concocted to describe the challenge which faced Task Force personnel. It's not enough to say they were looking for the proverbial needle in the haystack because there were so many complicating factors.

Like the land area in the vicinity of Palomares, the adjacent sea bottom is mountainous and falls off to great depths. Add to that the tremendous pressures and darkness encountered below 500 feet, the difficulties of navigating precise search patterns to insure that the entire area is scanned (even with arc lights, visibility ranges from 20 feet to zero, depending on the state of the sea), and many other difficulties, and the magnitude of the task becomes difficult to calculate.

Nevertheless, Rear Admiral William S. Guest, USN, arriving as on-scene commander from his post as Deputy Commander, Allied Forces Southern Europe in Naples, Italy, had a job to do. Although the unarmed bomb did not present any danger, the United States was determined to locate and recover it.

The Navy spared no effort to provide the best talent and equipment available for the search of the seaward areas. Some of the best qualified oceanographers and scientists in the U. S. joined Admiral Guest's staff, as well as experienced submarine officers—several of whom participated in the deep sea searches for USS *Thresher* (SSN 593) in 1963 and 1964.

At the outset, 15 ships were assigned to TF 65, including submarine rescue ships, fleet tugs, minesweepers, combatants and some sup-

port types. As the search progressed, some of these rotated and others were added.

Additionally, the force eventually included about 100 of the Navy's best frogmen and deep sea divers, as well as the latest equipment available—some proven in naval operations and some experimental and fresh off the drawing boards. Some of the equipment was provided by civilian contractors who are specialists in underwater operations.

Meeting with the press after several fruitless weeks of searching, Admiral Guest emphasized the fact that, although the sea is the Navy's medium, many difficulties were inherent in the task at hand.

FIRST, the exact geographic point at which the aircraft collided was not known. Officers skilled in operational analysis were assigned to the TF 65 staff from Washington. Based on several calculations, they helped establish the search areas of highest probability. The rugged underwater terrain in these areas greatly complicated the use of electronic and acoustic search equipment.

Such being the case, it was necessary to resort to purely visual search in these areas, using deep submer-

CONTACT NUMBER 261 looked like this in underwater TV photos taken by naval research submarine *Alvin*.



gence craft. Under such conditions, when visibility averages about 10 feet, this requires patience and painstaking, time-consuming effort.

On the subject of contamination or radiation, Admiral Guest explained that daily tests of sea water, collected from various depths, confirmed that there was no radiation present. Coring samples of mud, taken from the bottom in widespread locations, were likewise negative. He assured the press that there was no hazard to health or safety in the area.

He concluded by stating that he did not expect a short, quick operation; that it might take TF 65 a considerable period to accomplish its mission.

Six days later, shortly before noon on 15 March, *Alvin*—the Navy's smallest manned deep submergence research craft—located an object with an attached grayish parachute at latitude 37-11.3 north, longitude 01-41.1 west, on a 70-degree slope at a depth of 2550 feet. The location was about five miles offshore.

Alvin, barely two years old, was one result of the Navy's efforts to increase its knowledge and capabilities in the area of deep submergence and was produced under Navy contract. Its normal job was to perform scientific assignments, under Office of Naval Research contract, by the Woods Hole Oceanographic Institution.

The Search

LEADING UP TO THE NAVY'S unique task—and memorable accomplishment—is a chronology of events which reflect, in the words of Secretary of Defense Robert S. McNamara, the "determination, dedication and professionalism" of all hands concerned with the recovery.

The day following the crash, USS *Kiowa* (ATF 72) arrived in the area to offer any possible assistance. On 21 January, two minesweepers—USS *Pinnacle* (MSO 462) and *Sagacity* (MSO 469) arrived with an explosive ordnance disposal (EOD) team and commenced a search of shallow waters off the coast of Palomares, where three Air Force aviators had been picked up by Spanish fishermen. The Navy, by

this time, had been asked to prosecute an area search within the 100 fathom curve, and the decision was made for an all-out Navy effort in the recovery operation.

On 22 January, Rear Admiral Leroy V. Swanson, USN, Director of Fleet Operations Division in the office of the Chief of Naval Operations, was designated as the CONUS coordinator for the search. His post was CNO flag plot. The following day, Task Force 65 was organized by the Commander Sixth Fleet in the Mediterranean.

Immediately, stock was taken on all available people, ships and equipment, in the Navy and in civilian industry, that could be brought to bear on the problem.

Meanwhile, it was necessary to establish high probability search areas. Fishermen who had rescued downed aviators were taken to sea on board *Pinnacle* to relocate the pick-up areas. One spot where a lone aviator was recovered was over five miles off shore from Palomares; another spot, where two aviators were picked up, was closer to shore but somewhat west of the coastal town. Even closer to shore was a large semicircular area where wreckage debris was being recovered by Navy units.

ANOTHER pertinent clue was obtained when investigating officers checked into a story that yet another Spanish fisherman had observed what he described as a "half man" in a parachute land in the sea. This fisherman told his story to the investigating team, then relocated the approximate area where he believed he had seen the object land.

All these factors strengthened the Task Force's belief, based on other calculations, that the bomb was in the sea.

It was not until 21 February that precise calculations were completed and the Task Force promulgated a chart of the high probability areas. However, the areas which were eventually designated as being of highest probability, had been considered as such from the beginning. The early search had been concentrated in those areas to the greatest extent possible with the equipment available.

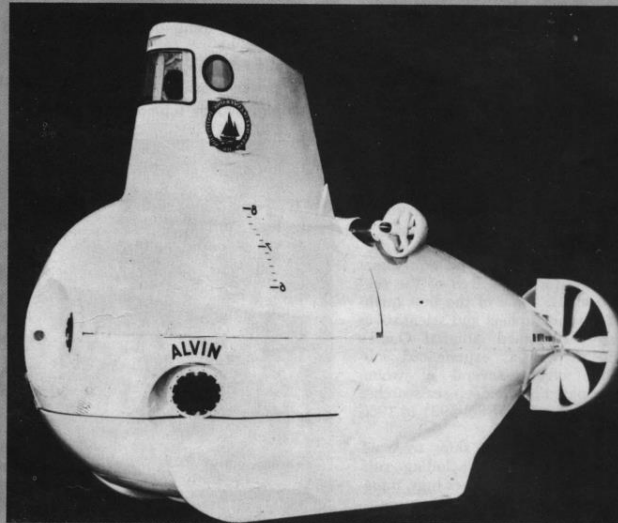
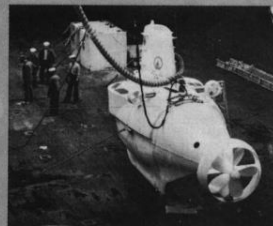
The boundary lines of the initial search area, when drawn on a map, formed a long triangle, the base of which extended along the shore area where wreckage debris was found, with the apex being the point where one aviator was recovered furthest from shore. The final search areas

were largely contained within the initial triangle. These were subdivided and designated, in order of highest probability, areas A1, A2, B and C.

THE FIRST DAYS of TF 65's existence were primarily devoted to organizing and planning the search, although shallow water operations were already underway. All available resources were ordered in or contracted for. Stage one involved divers and small vessels; stage two included the arrival of large ships and deep submersibles.

The task force eventually had ships capable of providing necessary communication and command facilities, repairs and refueling.

Between 24 and 30 January, *uss MacDonough* (DLG 8) spent a few days as TF 65 flagship, being relieved by *uss Boston* (CAG 1) on 30 January; the remaining elements of Mine Division 84—*uss Skill* (MSO 471) and *Nimble* (MSO 459) arrived. (These were relieved on 21 February by MinDiv 85, including *uss Rival* (MSO 468), *Salute* (MSO 470), *Notable* (MSO 460) and *Ability* (MSO 519). *uss Ft. Snelling* (LSD 30) arrived with additional frogmen on board; the



gasoline tanker *uss Nespelen* (AOG 55) was on the scene; and *usns Dutton* (T-AGS 22) chopped to TF 65 to perform a hydrographic role.

Navy Scuba divers were covering areas within the 80 foot curve. MSOs covered deeper areas, using sonar gear, as their capability permitted. *Pinnacle* arrived at Cartagena, Spain for installation of ocean bottom scanning sonar (OBSS)—a recent development provided by a civilian contractor.

Information on the sea bottom in the search area was almost non-existent when TF 65 set up operations. Answers were needed to such questions as "Would the bomb sink in mud or muck on the sea bottom." *Dutton* commenced a bottom contour survey, from which charts were produced which described the bottom topography in detail.

LACK OF ADEQUATE survey information in the beginning also necessitated the establishment of an accurate navigation system as a point of departure to sweep the search area precisely. The answer to this problem was three Decca high fix navigation stations, along with Navy Lorac team support, with which optimum



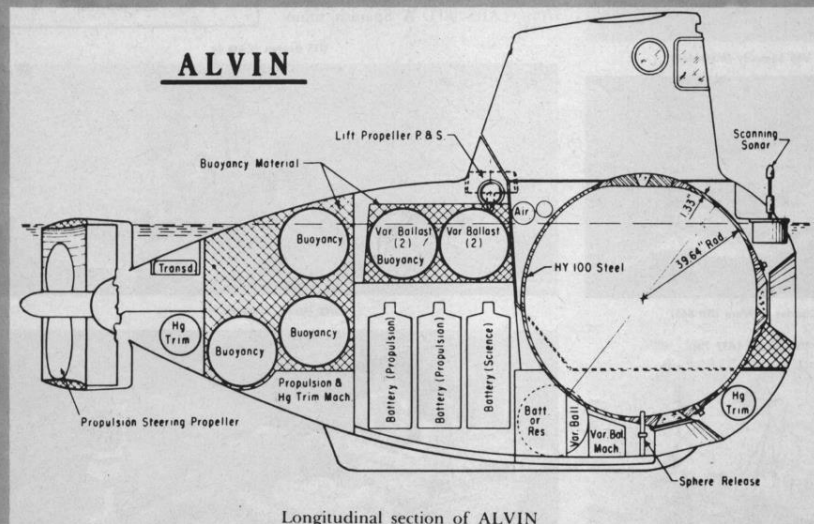
THE WORD—RADM William S. Guest, USN, talks with press on board an LCM.

navigation error was reduced to about 15 feet.

Other equipment arriving at this time included an underwater television system and a vehicle called Deep Jeep, from the Naval Ordnance Test Stations at China Lake and Pasadena Calif. The TV system was the

same one used in the Sealab II experiment in underwater living last year.

Also, a stalwart in ensuing operations, the submarine rescue ship *uss Petrel* (ASR 14), arrived on 2 February, giving the task force a deep diving capability with its hard hat divers. A flight brought additional



Longitudinal section of ALVIN



USS Tringa (ASR 16)



USS Petrel (ASR 14)



USS Salute (MSO 470)



USS Sagacity (MSO 469)



USS Charles R. Ware (DD 865)



USS Kiowa (ATF 72)

divers, including Navy aquanauts who had participated in Sealab.

During the second week of February the search operations began to jell. Until that time they were hampered by the lack of precise navigation facilities and deep submergence craft. On 12 February the *Decca/Lorac* installation was completed. Two days earlier *Alvin* and *Aluminant* had arrived, the latter a civilian industry-owned deep submergence aluminum submarine.

Cubmarine, another civilian-owned vehicle, capable of operating at moderate depths, arrived with its support crew, including Jon Lindbergh, son of the famous aviator. The following ships also joined the task force: USS *Cascade* (AD 16); *Luiseno* (ATF 156); *Charles R. Ware* (DD 865) —later relieved by *Wallace L. Lind* (DD 703); *Tringa* (ASR 16); and *Hoist* (ARS 40). A Spanish mine-

sweeper joined the force to restrict fishermen from the search area, and was very helpful in this role.

Finally, when USNS *Mizar* (T-AGOR 11) arrived on 19 February, she rounded out the force's capabilities with her underwater photography sled and sounding equipment.

Mizar went to the Med direct from the Philadelphia Naval Shipyard, where she had just undergone outfitting of the special equipment. On board were a group of Naval Research Laboratory technicians who, until the special assignment, were scheduled to shake down the new equipment in southern waters.

Participating Navy Ships not pictured:
USS *Pinnacle* (MSO 462); USS *Notable* (MSO 460); USS *Nimble* (MSO 459);
USNS *Dutton* (T-AGS 22); USS *Wallace L. Lind* (DD 703)

USS Boston (CAG 1)



USNS Mizar (T-AGOR 11)





USS MacDonough (DLG 8)



USS Luiseno (ATF 156)



USS Neepelen (AOG 55)



USS Albany (CG 10)



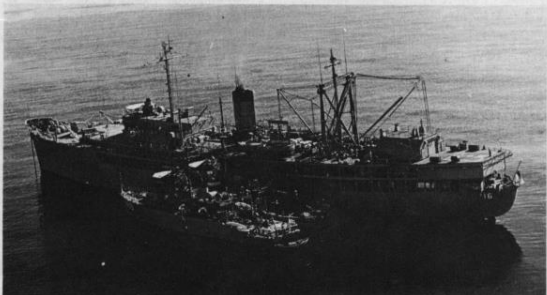
USS Rival (MSO 468)



USS Fort Snelling (LSD 30)



USS Skiff (MSO 471)



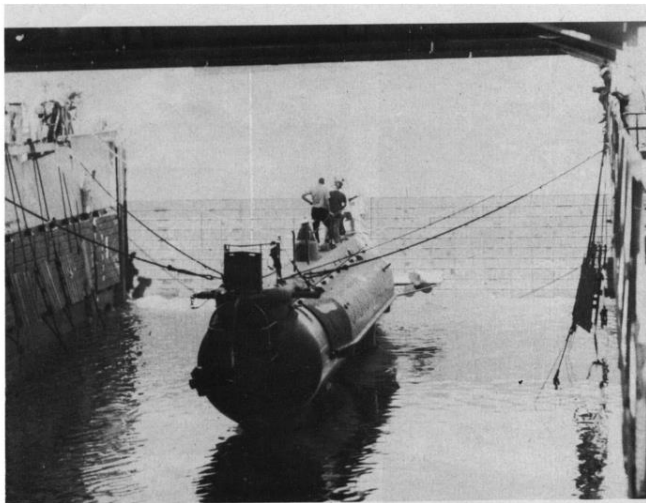
USS Cascade (AD 16)



USS Hoist (ARS 40)



USS Ability (MSO 519)



HELPING HUNT—DSV *Alviner* rests in LSD between dives in search of bomb.

Instead, they were to put it to a more practical test.

WITH VARIOUS capabilities now dovetailing, it was possible to launch a full-scale, precise search.

MSOs established several sonar contacts which were followed up by either Scuba diver (up to 80-foot depths), hard hat diver (up to 200

feet), *Cubmarine* (up to 600 feet), *Alvin* or *Alviner* identification. Each object was given a number, and over 300 were checked out before the search was completed. The OBSS sled towed by *Pinnacle* also established several contacts. At one point early in the search, OBSS equipment located an object, evaluated as being about 10 feet long and

TOP SIDE—Dock landing ship *USS Fort Snelling* (LSD 30) and other Navy ships participate in the big hunt for the thermonuclear weapon in Spanish waters.



two feet in diameter, on the sea floor in deep water. Hopes that the bomb was at last found were high, but the object, when photographed by *Mizar*, turned out to be a 10-foot length of pipe.

Mizar continued photographing large areas of the sea bottom. *Alvin* and *Alviner* were operated from the LSDs, with *Alviner* also supported by its mother ship, *Privateer*. *Alvin*'s three civilian pilots from Woods Hole Oceanographic Institution in Massachusetts, which operates the vessel for the Office of Naval Research, were all ex-Navymen. They maintained a rigorous schedule, pushing *Alvin* to its utmost limits of endurance.

By the first week of March, TF 65 had pulled about 175 pieces of aircraft and classified equipment from the sea. Some of these were major sections of aircraft wings, plus one wing tank. Others weighed as little as a few ounces and were only a few square inches in size, indicating the thoroughness of the search.

Primary efforts were directed toward the concurrent search in Areas A1 and A2, until the search in the latter area was considered complete at the end of February. Area C had also been scrubbed by this time, after a more accurate fix was made on the reported location of one of the rescued aviators.

On 27 February *Alviner* identified two pieces of wreckage about two and one-half miles from shore in Area A1. This was the first discovery of debris in this area.

The Recovery Efforts

BUT THE FIRST REAL BREAK occurred on 1 March at 2400 feet in Area A1.

Alvin was engaged in what is termed a contour search. That is, the two-man craft would comb a specified area, as recorded on a grid chart in the Task Force operations center, maintaining a specified depth (in this case, 2400 feet). The bottom along the course at this pre-designated depth was visually examined for possible evidence of the missing bomb.

The complicated technique of knowing what areas had and had not been searched was tied to the sophisticated navigation systems ashore, as well as the grid charts.

The job was tiring, dangerous and difficult. Even with *Alvin*'s bright arc

lamps, visibility was a maximum of 20 feet from either port. When currents or other disturbances stirred up the eight-to-ten inch layer of sediment on the bottom (which looked like gray cement), visibility could grind down to zero and remain that way for up to 14 hours.

ALVIN WAS thus chugging along at about two and one-half knots on 1 March when its pilot sighted a track on a slope in the sea bottom which looked as though a torpedo had skidded through the mud. The *Alvin* pilot tried to follow, but lost the track.

Evidence pointing to area A1 as the most probable area was increasing.

The diligent *Alvin* crew finally hit pay dirt on 15 March, on a slope at 2550 feet in area A1. Cautious optimism gave way to joy as information relayed to the surface more or less revealed that the bomb had been found. However, task force members could not say so with any assurance until positive identification could be made on the surface.

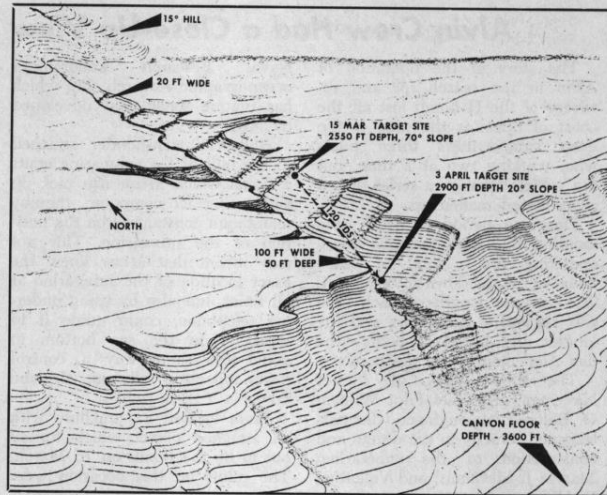
Unable to recover the bomb at the time, *Alvin* simply maintained station until *Aluminaut* arrived. *Alvin's* batteries were in need of a recharge by this time. The change of watch became the first deep inner space rendezvous of two vehicles.

Aluminaut, carrying an external transponder, pushed its nose into the mud and remained in the area for the next 22 hours. During this period the task force staff members were pooling their collective knowledge and ideas on how to go about recovering the bomb. The transponder enabled *Mizar* to establish a refined fix on the bomb's location.

On 16 March *Alvin* returned to the underwater location, carrying a long stake in its mechanical arm. Attached to the stake was a light line, buoyed at the bitter end. *Alvin* stuck the stake in the mud near the bomb, and a line to the surface marked the spot.

THE INTENTION was to use the light line as a messenger for a heavier line, which would in turn be secured to the bomb. After a day of high winds and heavy seas, the attempt failed on 18 March when the stake pulled out of the bottom.

On 19 March another scheme was frustrated by high winds which continued for the next three days.



SEA STORY—Chart shows the rugged sea bottom where H-bomb was found.

Meanwhile, the staff worked out another scheme and fabricated a device they called *Poodle*. It was designed to attach lines to the parachute by means of grapples. Misfortune spoiled this operation.

HARD-HAT HUNTER—Navy diver inspects piece of wreckage found while searching at 200 to 400 ft. underseas.



Alvin had planted a strobe light and two pingers near the site, which helped the deep submergence craft to navigate near the parachute-covered object. On 24 March, *Alvin* succeeded in attaching one of three lines to the parachute.

Since the bomb lay precariously on a 70-degree slope, it was decided that the first step must be to drag it to more level ground before attempting to secure it further. The danger of disturbing it, and sending it plunging down a ravine 3600 feet deep and out of reach, was too great to take chances.

Unfortunately, when the attempt was made, the line parted, and either in rubbing across the fluke of an anchor which was part of the recovery rig, or as it came up over the granite cliff in the area, the bomb slid out of sight. It was lost again.

Navy Calls on CURV

SIX DAYS AFTER THIS setback, another noteworthy event took place. A C-141 cargo plane landed in Spain with a cargo from the Naval Ordnance Test Station, Pasadena, Calif. On board was another hero of this story, a device called CURV—a Navy cable-controlled underwater research vehicle (see centerspread)—accompanied by 12 technicians.

Alvin Crew Had a Close-Up View of the Bottom

The story of the operation of *Alvin* in the search for and recovery of the H bomb lost off the coast of Spain is the saga of the deep submersible's three pilots who, working two at a time, put the vehicle through a series of unprecedented maneuvers.

During a period of nearly two months, *Alvin* completed 34 dives, operating for a total of 222½ hours at depths down to 3000 feet. The average length of each dive was six and a half hours and the longest dive lasted 11 hours—the day *Alvin* first found the bomb.

The three pilots, all former Navymen, are Chief Pilot William O. Rainnie, an engineer who participated directly in the design and construction of the submarine; Marvin J. McCamis; and Valentine P. Wilson.

All three are employed by Woods Hole Oceanographic Institution, which operates *Alvin* for the Office of Naval Research in carrying out a broad program of undersea research as well as special Navy missions.

Alvin had barely completed its full-scale tests in which the vehicle had reached its design depth of 6000 feet, and was being prepared for scientific operations when the call came that it was needed in Spain. *Alvin* was taken to Spain and began operating on 14 February.

Also on the scene was the *Aluminaut*, a privately owned aluminum submersible operating under contract to the Navy for this operation. Working with the two submarines to provide navigational guidance was *Mizar*, the

Naval Research Laboratory's oceanographic research ship which has unique sonar gear developed by NRL.

A special transponder attached to the hull of the submarine emits a signal which *Mizar* can pick up and, using its computer, thereby maintain a constant fix on the position of the submarine. This not only meant that *Mizar* knew the exact location of the submarine at all times, but also by using undersea telephone, could guide it to locations on the sea bottom in about the same way a control tower operator talks an airplane down in a thick fog.

Alvin located a parachute with an attached object which turned out to be the bomb on 15 March. The pilots on this occasion were McCamis and Wilson.

The *Aluminaut*, which is larger than the 22-foot *Alvin* and has greater submerged endurance, was then sent down to stand by so *Alvin* could surface to have its batteries recharged.

It acted as a marker until *Mizar* with its special navigational equipment could pinpoint the position. *Mizar* guided the *Aluminaut* to the general vicinity of *Alvin* and the bomb site, and then the pilots of the submarines, using voice communication, accomplished the first rendezvous by two inner space research submersibles, meeting within less than 50 feet.

Another first was accomplished the next day, when *Alvin*, carrying a three-eighth-inch line in the claw of its mechanical arm, brought it down from the surface to the bottom and anchored it there. An

anchor fluke on the end of the line was drilled into the bottom by *Alvin* spinning its claw, which can be turned in a complete 360-degree arc.

This line, however, was not destined to assist in the recovery. An ensuing attempt was made to drag the parachute, with its attached object, up the steep slope on which it lay. The attached line parted, and contact with the object was lost.

Alvin then began its second search for the bomb. The *Mizar* guidance system enabled *Alvin* to return to the original site quite readily. In addition, the pilots themselves had become familiar with the terrain and were able to maneuver with more assurance. They finally came upon the parachute, but with no indication that the bomb was under it.

The pilots on this second sighting were Rainnie and McCamis. The *Aluminaut* again came down for a rendezvous with *Alvin* to serve as a marker.

The next day *Alvin* returned. At this time *Alvin* placed an electronic device on the parachute to serve as guidance for CURV (Controlled Underwater Recovery Vehicle) operated by the Naval Ordnance Test Station, Pasadena, Calif., which was brought into operation.

Throughout the entire period, *Alvin* functioned with only minor mechanical corrections. *Alvin* has returned to Woods Hole, where it is being completely checked out before proceeding with the work for which it was designed—ocean science research of the deep bottom.

CURV was developed by NOTS for recovering small objects, such as spent practice torpedoes, from the ocean floor. Its original depth capability for recovery was 2000 feet, but Admiral Swanson's Washington advisory group had foreseen the necessity for a recovery vehicle that could operate at 3000-foot depths. Consequently, they had asked that CURV control cables be modified and tested to this depth. This had been done shortly after the first recovery attempt.

Alvin had resumed its meticulous

search for the bomb, commencing with a radial pattern around its previous location. Then, on a contour search at 2800 feet, while investigating some mud slumps, the *Alvin* pilot again sighted the parachute on 2 April.

Although it was thought that the bomb was dragged some distance up the slope before the line snapped on 24 March, the new location was some 250 feet further down the slope (at a depth of 2800 feet) near a widening ravine, within a few hundred feet of a canyon extending

to depths of over 4000 feet.

Operations were touch and go from here on. *Alvin* attached acoustic pingers to the parachute shrouds on 3 April to mark the bomb's location.

Meanwhile, the CURV crew were testing a procedure which they were planning to use to attach lines to the parachute. After a successful trial away from the bomb, CURV was guided from topside while it hooked a nylon line into the apex of the parachute on 4 April. Two days later a second nylon line was attached.

THE DRAMA intensified during this period. After the first line was secured, *Alvin* moved in to inspect the situation. Tension on the line was causing the parachute to billow in the strong underwater currents, and the *Alvin* pilot unknowingly guided his craft almost inside the trap formed by the billowing chute. He responded quickly and reversed direction.

Constant contact was maintained with Object Number 261, however. With two of the desired three lines attached, the task force commander proceeded as deliberately as possible to effect the recovery.

Technical difficulties presented by the first such recovery of an object in deep water were compounded by recurrent bad weather on the surface. Caution could be exercised only to the point where the situation could be kept at status quo.

However, should unusually bad weather threaten to interrupt operations this time, or should the bomb commence to slide further down the slope, the recovery team was prepared to take immediate action to raise it.

Early on 7 April CURV descended to attach the third and last line. This began a final three-hour drama. The purpose of this third line was to act as a "lazy line" to enable them to locate the bomb if it were dropped again, and to prevent the two lines already attached from twisting and becoming fouled.

At 0515 Admiral Guest, aboard *Petrel*, was awaiting word that the third line had been attached so he could order the bomb hoisted. But the word was not so good. CURV was now caught in the parachute and could not be maneuvered. Faced with this situation, the admiral directed that the two lines already attached to the parachute be brought aboard *Petrel* from their buoys, and that the hoisting operation begin.

ALVIN was launched immediately and sent to a safe position on the bottom where she could track the hoisting operation on her sonar.

Then, about 0700, the moment of truth arrived. The parachute and its cargo and the entangled CURV all left the bottom. So smoothly did this take place that it was not known for certain whether the attempt was successful.

About 0800, with the entangled collection about 50 feet below the



EGG HUNT—Navy frogmen search for clues in shallow waters off Palomares.

surface, Navy Scuba divers entered the water to disentangle CURV and identify the object wrapped in the chute.

After attaching additional lines, the divers confirmed the hopes of the task force. It was the missing bomb which the parachute had so carefully and completely hidden from view for so long.

At 0845 the weapon was safely on board *Petrel*.

Navy and Air Force ordnance teams checked the bomb, which was only slightly dented. Then Admiral Guest flashed word of the recovery to his superiors.

The operation was a milestone in Navy deep sea recovery efforts; its successful outcome will be a lasting tribute to the members of Task Force 65.

—Bill Howard, JOC, USN

U.S. Navy Delivers a Fast CURV

HERE'S HOW *Curv* operates in its regular role.

A support ship is used to transport the *Curv* to the recovery area. Normal operation of the vehicle at sea requires a crew of five: a mechanic, two electronics technicians, a sonar technician, and a project coordinator. After the vehicle has been lowered to the ocean bottom, the sonar technician directs the vehicle's course. The electronics technicians control the vehicle and the claw. Control and monitoring is accomplished from the control console on board the ship.

Operation of the vehicle has been geared to provide an efficient and highly reliable search and recovery system. Under ordinary circumstances, the entire system is routinely checked out well in advance of a scheduled event.

After the general location of the target is established by standard range methods and the topside

checkout has been accomplished, the *Curv* is lowered over the side of the anchored support ship and submerged, then it is directed to the required position for recovery on the ocean bottom.

Search and recovery procedures are, briefly:

- Locate target using *Curv's* high resolution sonar with passive and active modes for cooperative and uncooperative targets, respectively.

- Classify target with TV camera and document event with 35-mm camera.

- Position and attach hydraulically-operated recovery claw on target to be recovered.

- Release and surface recovery buoy.

- Eject claw from *Curv*.

- Back off *Curv*, leaving claw attached to target.

- Surface *Curv* and it aboard the support ship.

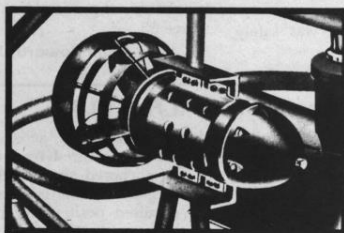
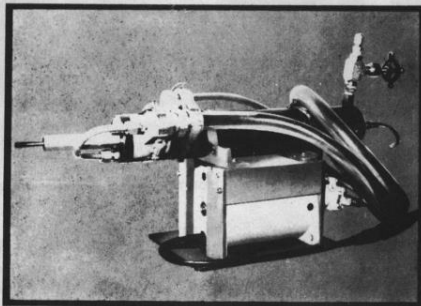
- Surface recovered.

NAVY'S CURV: What it is and how it works

The Cable-controlled Underwater Research Vehicle (CURV) was procured by the Underwater Ordnance Department, U. S. Naval Ordnance Test Station, Pasadena, California, where it was re-designed and developed by the Missile Branch for the purpose of deep-submergence search and recovery of hardware. It is a dependable and efficient device weighing approximately one ton and operating to a depth of 2,000 feet. It is designed for continuous service operation and is capable of recovering hardware weighing a maximum of one ton. The CURV searches and recovers faster than any other system currently available.

HYDRAULIC SYSTEM

The hydraulic system provides power to control the TV tilt and pan, the angle inclinators for the sonar transducers, positioning and ejection of the claw, and release of the recovery buoy. The system consists of an accumulator, a free-flooding motor, and a hydraulic pump. The hydraulic system is specifically designed for operation in a deep-recovery environment. It is pressure-compensated and the total system is charged to the ambient pressure to which it is subjected. The pressure differential created by the pump, therefore, produces the same working pressure on the hydraulic components at any working depth. The motor for the hydraulic system has an open-frame construction, freely admitting sea water to the inner portions of the unit and eliminating the necessity for seals.

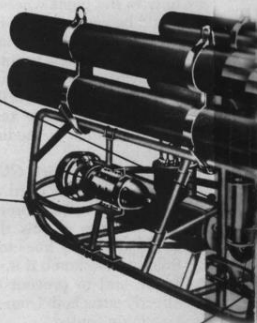
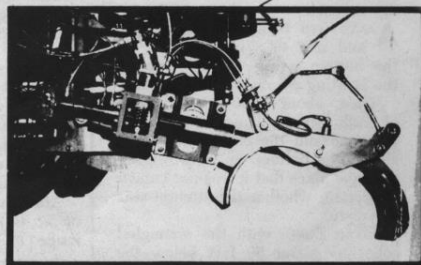
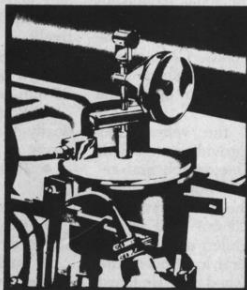


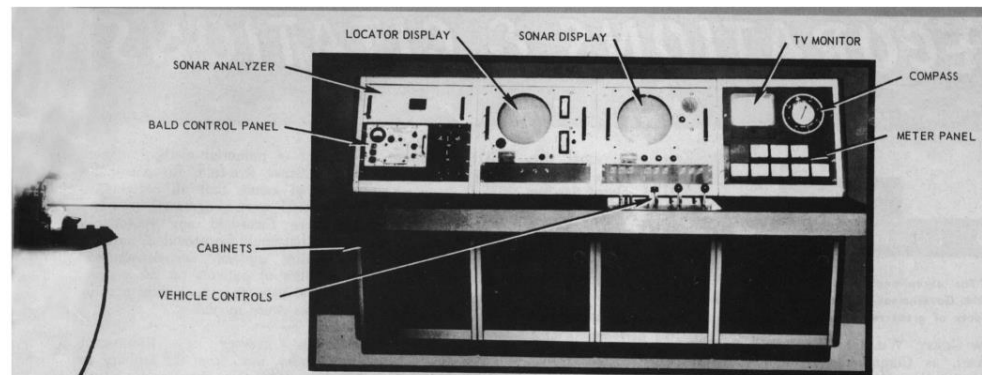
PROPULSION SYSTEM

The propulsion system propels the CURV in any desired direction in an underwater environment. The system consists of three screws (port, starboard, and vertical) each driven by a 440-volt AC, 3-phase, 60-cycle, 10-hp, oil-filled, and pressure-equalized motor capable of operation to 10,000 psi. The course and mobility of the vehicle can be controlled to a fine degree by proper operation of the motor controls.

SONAR

A SLAD-503 acoustic instrumentation system, containing a continuous-transmission, frequency-modulated, high-resolution sonar with active and passive modes, is used to search out the exact location of the hardware to be recovered so that the CURV can be steered on course until the hardware becomes visible on the TV monitor. The sonar is one of the four functional sections of the SLAD-503 system; the other sections are the locator, altimeter, and depthometer. The sonar provides a high degree of resolution and a 120° angular scan so that relatively small acoustically reflecting objects can be detected and delineated on the sonar display unit located in the control console aboard the support ship. The sonar assembly, mounted on the CURV, contains an electronic package, hydrophones, projector, and training mechanism.





CONTROL CONSOLE

The Boat-mounted Acoustic Locating Device (BALD) is an auxiliary equipment which is mounted on the support ship and used initially to determine the bearing of the hardware to be recovered. It is then used to locate and track the CURV. The controls and operating mechanism are contained in the BALD CONTROL PANEL. The bearing trace is shown on the LOCATOR DISPLAY.

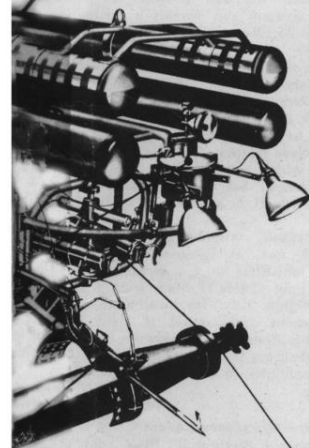
The SONAR ANALYZER analyzes frequencies from the sonar receiver and provides range and bearing in the active modes and bearing only in the passive mode. This information is transmitted to the SONAR DISPLAY. A speaker amplifier is also provided for aural presentation of target echoes.

The VEHICLE CONTROLS panel contains the switches and indicator lights used to control all hydraulic and electrical functions. It also contains the ON-OFF switches, indicator lights, and the variable auto-transformer controls for the three propulsion motors.

The TV MONITOR displays the video signal received from the underwater TV camera. The COMPASS is used to obtain the relative bearing of the CURV with respect to the support ship.

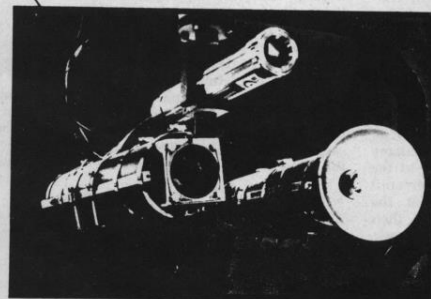
The METER PANEL contains two rows of meters which indicate the rpm's of the three propulsion motors, vehicle amperes, AC console voltage, and AC vehicle voltage. It also contains the leak detector.

The CABINETS house the electronic components located in the upper section of the console and the propulsion motor controls located in the lower section of the console.



CLAW

The hydraulically operated claw attaches to the object to be recovered. After release and surfacing of the recovery buoy, which is attached to the claw by a nylon guideline, the claw is disconnected from the vehicle by the action of an eject piston against a quick-disconnect mechanism thereby ejecting the claw from its housing. The claw assembly consists primarily of the claw, claw shaft, quick-disconnect mechanism, eject piston, and housing. A claw, clamshell scoop, and snare have been developed for the CURV to fit the varying sizes and shapes of hardware to be recovered.



OPTICAL EQUIPMENT

The optical equipment provides identification and documentation capabilities during recovery operations. Final identification of the object to be recovered is accomplished by use of an underwater, transistorized TV camera which has a diameter of 3 inches, a weight of 9 pounds, a low-power requirement of 465 ma at 12 v DC, a warmup time of 7 seconds, and an f/1.2 lens permitting a view angle of 45° when submerged. The image is transmitted to the TV monitor located on the control console aboard the support ship. Light source for the TV camera is supplied by two mercury vapor lights, each having a beam angle of 40°, a 250 W rating, and a 40-second warmup time.

Documentation is accomplished by a 35-mm deep-sea camera, which is 27 inches long and 5 inches in diameter and has an f/11 lens, corrected for underwater use, and a black and white or color film capacity of 500 frames. Light source for the camera is supplied by a strobe light.

Bomb Sought With New Navy Device

PALOMARES BEACH, Spain (AP) — The U.S. Navy task force off the southern coast of Spain readied new equipment today for another try at lifting a U.S. H-bomb from 2,500 feet of water.

Rear Adm. William S. Guest, commander of the task force, confirmed Sunday that a cable which was lifting the bomb had broken and the weapon had shifted position. He said it was still in the same area but the next recovery attempt would be "even more difficult and lengthy."

A CURV — controlled unmanned recovery vehicle — was flown from the Navy Pasadena, Calif., weapons-testing center where it was developed to recover spent practice torpedoes from deep water.

Officials said they expected the new equipment to be ready for its first trial by Wednesday, weather permitting. Winds swept the area Sunday, but the sea was calm and flat today.

The CURV is a propeller-driven vehicle with a strong clamp and cable, lights and an underwater television camera. The operator on the surface watches a television screen and by remote control steers the machine to its objective, secures the clamp to the object and then blasts the clamp and its cable loose from the vehicle to permit lifting of the object to the surface.

Officials said it was necessary to modify the clamp to fit the contours of the H-bomb.

The bomb fell into the Mediterranean after the B52 carrying it collided with a refueling plane Jan. 17. The bomb was found March 15.

Loss of the H-bomb was a painful embarrassment to the U.S. government despite its emphatic insistence that the bombs aboard the B52 were not armed and could not explode. Spain barred flights of nuclear-armed U.S. planes over Spanish soil, and the Soviets accused the United States of radioactive contamination of the Mediterranean. The United States denied the charge.

H-Bomb Recovery Effort Renewed

MADRID (AP) — A U.S. naval task force continued preparations today for another try at recovering a missing H-bomb off Palomares Beach on Spain's southeast coast, U.S. embassy official said.

The nuclear bomb, lost 76 days ago, is lying 2,500 feet below the surface of the Mediterranean.

Our Opinion

It Is Genuine Sea Monster

THE STRAIN in Spain was mainly on the wane concerning that longlost hydrogen bomb, the last of four ejected from a U.S. bomber when it collided with its refueling tanker.

Nevertheless, it was an immense relief to everyone living within a hundred miles of the accident, as well as to both governments involved, that the dreadful object was finally located under the waters of the Mediterranean.

It is a reminder that even in the absence of a nuclear war, we are surrounded by engines of incomprehensible death-dealing potential upon whose existence, paradoxically, the absence of all-out war is based.

It is also proof of the effectiveness of the fail-safe devices that have been built into these weapons. Their destructive power will not be released through mechanical accident but only through the deliberate decision of misguided or frightened men in the capitals of the world.

We have not learned to stop worrying and love The Bomb, but we are beginning to realize that because of it, for the first time in history, mankind must truly be the master of its own fate.

Little Research Sub Sinks; None Aboard

WOODS HOLE, Mass. (AP) — The sub was being launched from the mother ship, the catamaran Lulu. The hatch was open and she filled with water. Dr. Paul M. Fye, director of the Woods Hole Oceanographic Institution, which operates the deep-diving vessel, said prospects for recovery are good.

Alvin, which with Lulu cost \$1 million to build, sank in "Hydrographers' Canyons" 120 miles east of Cape Cod.

Alvin was being used to inspect buoy moorings and survey the ocean bottom under a Navy research program conducted by Woods Hole at an annual cost of \$2 million.

The submarine found in 2,800 feet of water the nuclear bomb lost in the collision of a U.S. bomber and a tanker plane off the coast of Spain.

Spain Rough Sea for Charlie

Finding the H-bomb that fell into the water off Spain's south coast last Jan. 17 was hard enough. Bringing the stubby, 2,800-lb. weapon to the surface turned out to be an even more difficult problem.

The bomb rested, half shrouded by its own grey parachute, on a steep 70° slope on the ocean floor. The danger was that it might slip farther down the incline into the craggy depths of a 3,000-ft. undersea valley in which the midjet submarines could not maneuver. With that consideration in mind, Rear Admiral William S. Guest, 52, commander of the 15-vessel Task Force 65, put into action Plan Charlie to re-

to members of the press and photographed—the first time in history that the U.S. was dropping the top-secret wraps that surround its current nuclear weaponry.

On the first try, Alvin accidentally nudged the bomb, and it rolled 20 ft. down the steep slope. On the second try, the bomb ominously rolled another 5 ft. down the slope. For a third try, the Navy attempted to snag the bomb's parachute with grappling hooks, but that failed too. All the while, the Navy's recovery operation was severely handicapped by high winds that roiled the Mediterranean.

Finally, at week's end the sea calmed, and little Alvin at last succeeded in slipping a line around the bomb without sending it tumbling down the underwater hill. Ever so gingerly, the U.S.S. *Heist* began to drag the bomb up the slope. The bomb had just begun to budge when suddenly the steel cable snapped. Fortunately, the bomb settled near its old position. Admiral Guest ordered his men to try again.

Admiral Reveals H-Bomb In Sea Lost Second Time

WASHINGTON (AP) — The United States lost the elusive H-bomb a second time for nine days during the great 80-day search off Spain — and was in danger of losing it forever in a yawning undersea canyon, it was learned today.

The 1.1 megaton device, retrieved from 2,900 feet deep in the Mediterranean Thursday, had shifted two weeks earlier along a widening ravine to within a few hundred feet of a canyon extending to depths of 4,000 feet — beyond the capability of retrieval equipment.

★ ★ ★
This exasperating development occurred when one-inch thick nylon line snapped as a surface vessel's winch dragged the bomb up a 70-degree slope toward level area.

The silvery, eight-ton bomb toppled 100 feet back into the underwater ravine and sank in the muck-filled bottom. There it remained hidden until April 3 when the miniature sub Alvin, after repeated groping about the black depths, sighted a piece of the weapon's parachute protruding from the mud.

Four days later, in the early morning hours in Washington, a cryptic message from Rear Adm. William S. Guest in Spain clacked off a Teletype machine in a Navy command post in the Pentagon:

"Target on deck of Petrel and identified as weapon."

The 10-foot long, 3-foot thick tube had been hauled up by the recovery vessel Petrel.

Then — and only then — was it definitely identified by serial number as the hydrogen bomb which spilled from a B-52 disintegrating after colliding with a refueling tanker six miles above Spain's coast Jan. 17.

★ ★ ★
On Friday the bomb was being displayed like valuable pirate treasure before newsmen and Spanish officials who could assure Spain's peasant folk the nuclear intruder had at last been apprehended.

The exact price of the unprecedented operation — unique not only from a technical standpoint but also because of volatile security and diplomatic aspects — may never be known. The Navy acknowledges the cost runs into the millions of dollars.

The sea search involved 18 vessels and 3,200 men.

Despite the massive undertaking — some 180 scuba and hard-hat divers were used — no one was injured.

The Alvin, however, had one scare. In an attempt to drag the bomb from a slope to a more secure area, the parachute billowed over the sub's portholes, rendering the crew not only blind but potentially trapped like a fish in a net.

"Those men could have been anchored down there to that bomb, and there would have been very little we could do to get them," one source said.

Fortunately the Alvin — which has barely 50 pounds thrust — was able to back out of its undersea trap, and its shak-

en crew proceeded cautiously from then on.

Navy officials said Friday that the H-bomb will be returned from Spain to the United States on the ship Cascade for intensive study.

★ ★ ★

It will probably be sent to an Atomic Energy Commission field laboratory, where it will be stripped and its nuclear components analyzed for the effects of 80 days submersion in sea water.

The weapon's plutonium and uranium components can be returned to the nation's nuclear arsenal for future use, provided they meet strict standards.

Secretary of Defense Robert S. McNamara messaged his appreciation to those who recovered the bomb, praising "the determination, dedication and professionalism" of all hands.

The recovery is a study in scientific achievement, and one which military officials already are studying for possible future application.

Sunken H-Bomb Reported Lost; U.S. Is Silent

MADRID, April 2.—(Reuters) —American officials here refused to comment today on reports that the U.S. Navy has lost the elusive American hydrogen bomb in the Mediterranean Sea off southeast Spain.

According to the reports, the bomb plunged out of sight at a depth of 2,500 feet into deep mud when a nylon hoisting cable broke last Saturday, the third break in three days.

The bomb, which the Navy describes only as an object attached to a parachute, fell into the sea Jan. 17 in the crash of a U.S. Air Force B-52 bomber after a collision with a refueling plane. Three other bombs were found on land.

According to the reports, the bomb is out of sonar range and prospects for recovery soon are poor. 4/3/66

Bomb Recovery Again Delayed, Perhaps a Week

PALOMARES, Spain (UPI) —Hope faded today for a quick recovery of the missing H-bomb that has lain in 2,500 feet of water since the Jan. 17 crash of a B-52 nuclear bomber.

Informed sources said the U.S. Navy was running into technical problems that might delay the recovery of the bomb for possibly another week.

Extreme caution was being taken to prevent the bomb from rolling into an underwater crevice which was reported to be so narrow that recovery would be practically impossible there.

March
3-31-66

H-Bomb Recovered From Mediterranean

MADRID (AP) — An American H-bomb missing since the crash of a U.S. nuclear bomber Jan. 17, has been recovered from the Mediterranean off Spain's southeast coast, it was officially announced today.

The bomb, which was lost when a B52 bomber and a tanker plane collided over Palomares Beach, was recovered by a U.S. naval task force which had been searching the sea depths for more than two months.

The bomb was located in 2,500 feet of water about five miles offshore on March 15 by the midget sub Alvin. It was found almost exactly where Francisco Simo, a Spanish fisherman, told the searchers he saw a strange object fall into the Mediterranean after the crash.

A U.S. spokesman said the bomb was pulled up by the small submarine rescue vessel Petrel. A 1,650-ton vessel, the Petrel is jammed with special equipment for underwater operations. The ship carries a crew of 85.

U.S. officials would not comment, but informants said that the successful cable hitch to the bomb was made by a torpedo recovery vehicle flown to the scene from Pasadena, Calif.

U.S. Embassy officials said the bomb was intact and not damaged.

The bomb, described as a 20-megaton hydrogen bomb, was

one of four lost from the B52 in the collision and crash in which seven airmen were killed. Eight other American airmen were killed in the crash of a C124 transport which was on a support mission for the search and recovery groups off Palomares Beach.

The other three bombs fell on shore and were quickly recovered. But two of them were damaged and left a residue of

radioactivity which was cleaned up by removing nearly 5,000 steel drums of earth and vegetation.

While the naval task force commanded by Rear Adm. William S. Guest of Rome, Ga., searched off the coast, more than 800 U.S. Air Force personnel recovered wreckage from the crash on shore and removed the traces of radioactivity. At the end of the search today, only a handful of Air Force personnel were in the shore detachment.

Admiral Is Decorated

WASHINGTON (UPI) —Rear Adm. William S. Guest, a native of Rome, Ga., has been awarded the distinguished service medal for commanding the recovery operations of the U.S. H-bomb lost off Palomares, Spain.

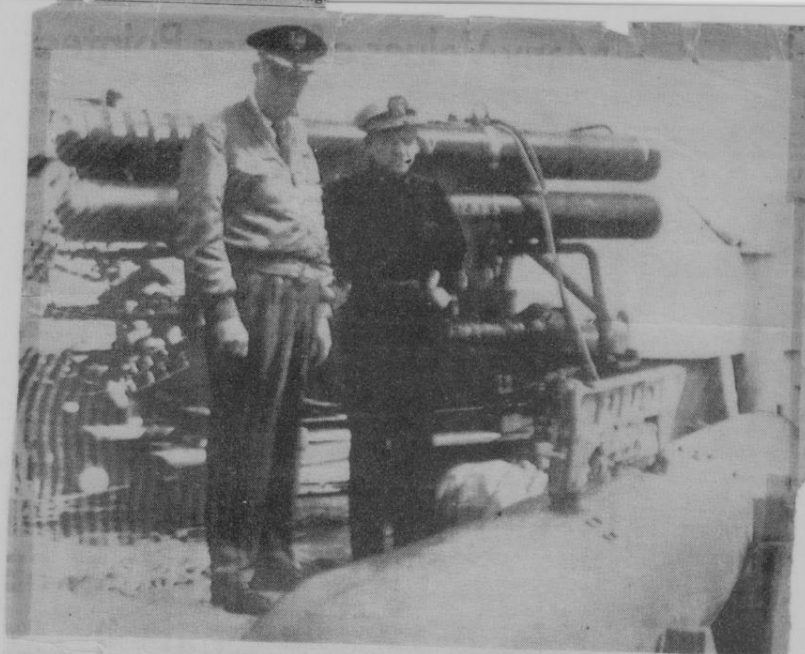
Recovers Bombs, Awarded DSM

MADRID (UPI) —U.S. Gen. Delmar E. Wilson, chief of the 16th Air Force, received the Distinguished Service Medal Friday for his services in recovering the four H-bombs lost in southern Spain in January. The bombs were lost following the Jan. 17 crash of a B52 nuclear bomber in the Palomares area of Spain. One of the bombs took three months to recover.



BOMB RECOVERED—Map locates area in the Mediterranean Sea off Palomares Beach, Spain, where a U.S. Naval task force recovered an American H-bomb.

(AP Wirephoto)



H-BOMB RECOVERED—Maj. Gen. Delmar Wilson (left) and Rear Adm. William S. Guest are shown today at Palomares Beach, Spain, inspecting the H-bomb that was recovered from the Mediterranean. The bomb had been lost since

January following a crash of two U.S. Air Force planes. Behind them is the torpedo grapple device which was used in the recovery of the bomb from 2,500 feet below the surface of the sea. (Sketch of recovery area, page S2)

AP Wirephoto by cable from London

Admiral Says Effort to Recover H-Bomb Almost Ended in Disaster

PALOMARES BEACH, Spain (AP) — The commander of a U.S. task force disclosed today disaster almost overtook attempts to recover an H-bomb from the depths of the Mediterranean.

Missing since the crash of a nuclear bomber last Jan. 17, the one-megaton bomb was hauled Thursday from 2,550 feet.

Silvery in color and about 10 feet long by 3 feet in diameter, the bomb rested on the deck of the recovery ship, the submarine rescue vessel Petrel. Reporters aboard the task force flagship, the cruiser Albany, could see it.

Rear Adm. William S. Guest, commander of the task force of about 3,000 men that recovered the H-bomb, told newsmen the CURV — an unmanned torpedo recovery vehicle — was the equipment used finally to tie up the bomb for delivery to the surface.

He disclosed that the effort almost ended in disaster on Wednesday when the CURV became entangled in the nuclear weapon's parachute.

It took two hours of maneuvering by the CURV controller on the deck of its mothership before the vehicle was freed.

"It looked for a while as if we were in real trouble," the admiral said.

The midget submarine Alvin, deep dives of which located the H-bomb last March 15, shared in the final recovery.

Guest said he was notified at dawn Thursday that the weapon had been secured and was ready for recovery. It required an hour after the signal was given for the Petrel to haul the bomb to the surface.

Guest estimated its weight at about eight tons.

The admiral said the bomb's position was on a precarious perch on a steep slope. Inspections by the Alvin on March 2

showed that in about 30 hours it had slipped from 2,500 feet down the slope to 2,550 feet, where it finally was tied up by the CURV.

Guest said the Alvin made "about 135 more dives than had been anticipated" in helping recover the nuclear weapon. He added that the submersible Alvinaut also performed excellently in the search.

The nuclear weapon appeared undamaged except for some dents at one end. Asked if the bomb was still ready for use, Guest said "Yes, except for those dents."

He said the bomb would be returned to the United States immediately but declined to say what ship would transport it.

Guest estimated its weight at about eight tons.

NEWSWEEK

SPAIN:

Sigh of Relief

When the bomba fell near the Spanish fishing village of Palomares and no one was killed, many of the women of the village were convinced that they had been spared by the intervention of their protector saint, the Virgin Carmine. But Father Enrique Arriaga, the parish priest of nearby Cuevas del Almanzora (Palomares is too small for a priest of its own) corrected his flock. "No, this miracle is too big for any one saint. It is the work of God himself," he said. And last week, on Holy Thursday, priests smiled their "I-told-you-so" smiles as the villagers of Palomares marched in traditional procession, joyfully calling to one another: "They have pulled it up, they have pulled it up." For on the very day be-

scattered plutonium and uranium over the countryside, and for weeks U.S. airmen crawled painfully through tomato fields, scraping up 1,600 tons of topsoil which were then shipped off in 4,810 steel drums to a nuclear waste burial ground in South Carolina. But even this massive effort paled alongside the search for the fourth, unrecovered bomb.

A Spanish fisherman, Francisco Sino, had seen an odd-colored parachute, with something "silvery" dangling from its shrouds, drop into the sea after the explosion. With that clue, a whole armada of search vessels crisscrossed 125 square miles of Mediterranean Sea, probing the deep and mountainous bottom with midget submarines and sonar detecting devices. But it wasn't until March 15 that the midget submarine Alvin sighted and photographed the bomb where it lay resting, still wrapped



Associated Press

Nuclear weapon: Navy men check the recovered H-bomb for contamination

fore Good Friday, the long-missing bomba was recovered from the sea.

To the U.S. Government, which had poured millions of dollars into a frantic search for the lost hydrogen bomb, the recovery was more than a miracle—it was a blessed relief from political embarrassment. Ever since January 17, when a B-52 nuclear bomber with four bombs aboard and a KC-135 refueling tanker collided over Palomares, the Soviet Union had spewed forth a continuous barrage of propaganda, the central theme of which was that the U.S. had contaminated the Spanish coast with radioactive material. And another by-product of the disaster was that Spain decided to bar any further flights of U.S. nuclear-armed planes over its territory in an effort to appease public concern.

Fortunately, three of the bombs were quickly recovered from the earth around Palomares. Two of them, however, l-

in its chute, on the slopes of an undersea canyon, five miles from the shore and only a mile and a half from the spot where Sino had said it would be.

Then began the delicate task of lifting the weapon to the surface. At the first attempt, the grappling cables snapped, and the bomb slipped hundreds of feet further down the side of the ravine. After that tumble, it lay hidden in deep mud for nine days before the Alvin finally spotted its grimy parachute half a mile below the surface.

CURV: Then, early last week, an improbable, electronically operated contraption called the CURV (for Controlled Underwater Recovery Vehicle) zigzagged gently down the ravine slope. Its steel claws reached out and gripped the bomb's parachute, which, almost as if in retaliation, enmeshed itself like a giant octopus around its captor.

of face, Rear Adm. William
of 1277A. Newsw

Guest, commander of the search force, watched the buoy attached to the CURV bobbing in the water, and ordered it to rise. Slowly, the CURV rose toward the surface. When it reached a depth of about 100 feet down, divers fastened stronger cables to the bomb itself. Then, at last, it was hoisted to the deck of the submarine rescue vessel, Petrel.

The following morning, Good Friday, while the villagers of Palomares offered their prayers of thanks, Admiral Guest, bleary-eyed from two days without sleep, threw a "coming out" party on his flagship, U.S.S. Albany. Alongside, in a wooden cradle on the deck of the Petrel, lay the bomb—shaped like a cigar, 9 feet long, silver-colored, dented and muddy.

For eighty days it had been that "unidentified object with a parachute" or "Contact 261" for which 3,000 sailors had searched with the single-mindedness of a man hunting a lost cuff link. Now, to prove to the world that the U.S. had found what everybody knew it had been looking for, Admiral Guest allowed newsmen to gape at the bomb and photographers to take the first pictures of a U.S. hydrogen weapon ever cleared for publication. But even so, there still were the inevitable skeptics. "La bomba?" who knows if it is la bomba?

'Ocean Offers Brand New Field'

Son of Lindbergh Studies Depths

By STEVE LOWELL

SEATTLE, Wash. (AP) — The Lindbergh pioneering drive seems to be as strong in son Jon as it was in his famed father, Charles, but it's in a different direction.

Instead of searching for new vistas in the air as his father did, Jon is seeking the future in watery depths. He's a commercial diver.

Why didn't he follow the path his father blazed in the sky?

"Aviation is in a different era than it was when my father was in it," Jon explains. "The ocean

Corp. bought the diving operations, and I went along with them."

Now he's Seattle manager for Ocean Systems, Inc., an affiliate of Union Carbide. Lindbergh explains the company is "interested in various fields of ocean development work — from research to contracting." His latest venture was helping the underwater search off Spain for a U.S. nuclear bomb lost in a B52 bomber crash.

Lindbergh figures he has spent only about 20 per cent of his time diving in recent years. The balance has been spent on running the company's submersible program, from ordinary diving to the use of diving bells and small submarines on jobs such as drilling for oil and inspecting undersea pipelines or cables.



offers a brand new field in many ways. It hasn't been developed. It contains vast quantities of unexploited resources. Diving is a tool in developing the potentials of the ocean."

★ ★ ★

Jon Morrow Lindbergh, who is 33, says he's been interested in the ocean as long as he can remember.

"I've always been close to it—lived around it, worked on it during summers."

He is a 1954 graduate of Stanford, where his major study was biology. During school he was in Naval Reserve officer training, and when he graduated he went on active duty in underwater demolition.

"It seemed like it would be interesting work," he said.

When he and the Navy parted company in 1957, he and three other men set up a firm which was primarily involved in commercial diving. That company, based in San Diego, Calif., lasted three years, then "the key personnel moved off to various corners of the world, so we sold out."

"I was involved in my own companies the next five years in commercial diving and industrial blasting. We learned the basic techniques in Navy demolition work. Then Union Carbide

Off the Oregon and California coasts he's worked as a trouble shooter on oil drilling rigs. Recently he was in charge of divers who helped install a pipeline 240 feet under the surface of Puget Sound, and early in the fall he helped repair a power cable which runs across the floor of the sound from Anacortes to the San Juan Islands.

One of his divers, Joe Staley, a former Navy underwater demolition expert, went along with a University of Washington oceanography team recently to explore the top of Cobb Seamount, a peak submerged in the Pacific off the Washington coast. The university plans to erect a tower on the peak. It will reach above the surface and radio information about the ocean and the weather to shore-based scientists. Staley was along to assist university divers.

★ ★ ★

Jon likes skiing, fishing and skin-diving, and he'd like to be able to spend more time with his wife, Barbara, and their youngsters, Kristina 11, Wendy 9, Lars 7, Lief 5, and Erik, 1. Their home is on a secluded inlet on Bainbridge Island, across the sound from Seattle. But "I've been too darned busy for anything but work."

In 1964, Lindbergh and Robert Semitt spent 48 hours 43 feet down in the Atlantic off the Bahama Islands to prove man can work at that depth. They lived in a large rubber diving

bell but swam in and out to take photographs and gather specimens.

As for close calls, Lindbergh says, "I've had narrower scrapes on the highway than in diving."

"In this work you learn to avoid dangerous situations. You don't take wild chances. There is a certain hazard operating underwater, so you have to pay some attention to keeping the element of hazard low."

★ ★ ★

The incident that sticks most clearly in his mind was a dive in the Pacific off San Diego "quite a few years ago."

"We were diving for anchors off an island in about 130 feet of water. I got a case of bends. It bothered me quite a bit — paralyzed one arm and one side of my face. We didn't have any decompression chamber, but it only lasted 15 minutes. Apparently it was a bubble in a nerve. I don't know. Very fortunately it just went away."



LUCKY LINDY II — John Morrow Lindbergh, assisted by two colleagues, sits in a midge submarine after returning from an undersea survey off the coast of Washington. The son of the famous American flier has chosen his own field in which to carry on the family pioneering tradition. (AP Newsfeatures Photo)



Rear Admiral Guest was appointed Commander Task Force SIXTY FIVE on 23 January 1966 to assist the U.S. Air Force in conducting aircraft salvage operations in the Palomares area. His normal assignment is that of Deputy Commander, Naval Striking and Support Forces Southern Europe, a NATO command.

During his thirty years of commissioned service Admiral Guest has served in almost every type of naval ship. As a Naval Aviator for 27 years, he has participated in many salvage operations involved in crash investigations and aircraft salvage.

Admiral Guest served in combat assignments during World War II and the Korean Conflict. More recently he was a Task Group Commander during the Tokin Gulf incident in August of 1964.

Admiral Guest holds the Navy Cross, Combat Legion of Merit, Combat Bronze Star, Air Medal, Navy Commendation Medal, Presidential Unit Citation and Navy Unit Commendation. His thirteen battle stars represent 13 major battles of World War II and he is credited as being the first World War II carrier-based aviator to sink an enemy ship.

Jan.17,1966 at 10:22am on a Monday morning 2 planes collided over PALOMARES in southern Spain.

A B-52 Stratofortress whose engines have the POWER of 8 LOCOMOTIVES and a KC-135 TANKER with 40,000 Gallons of Jet Fuel collided during REFUELING.



The BOMBER closed in a little too quickly.
The Boom had failed to find its ORIFICE.
Instead, the nozzle struck the BOMBER'S
Longeron, the taunt metal spine of the plane.

In the Aerodynamic stress set up by the
proximity of the B-52'S great wings under
the TANKER'S soaring tail fin, the sharp,
sudden contact broke the Bomber's Back-
Bone and snapped it into Pieces.

Fire raced up the Boom to the Tankers
vast sloshing tanks, The flames spurted
through the crumbling B-52.

All 4 members of the Tanker crew were
CARBONIZED even before the debris
of their plane hit the ground 30,000 feet
below.

The 2 planes \$11million weighing nearly 800,000 pounds were falling helter-skelter onto land and sea more than 10 miles along each side.

8 of the 14 crew members died in the collison.

1 Of the H-Bombs landed pretty much intact.

2 of H-Bombs conventional TNT charge blew-up on impact and created a small creater and did spread a small amount of Radioactivity.

The conventional detonation of such a bomb inevitably causes a plutonium cloud. The amount of contamination that results depends on the wind and the amount of dirt which captures the Plutonium Powder.

The three Bombs 2 in pieces and 1 Whole, were trucked to San Javier, Flown to Torrejon and then back to the U.S.A.

#4 H-BOMB WAS STILL MISSING.

The Search began in water about 5-6 miles off shore. This is where fisherman Simo Orts spotted an unusually large and Grayish Chute go down with what to him looked like a {dead-man} but it sank Right-a-Way.

On MARCH 15th 2 weeks after they had sighted the Track in the loose soil that the Bomb made as it was moved by the current.

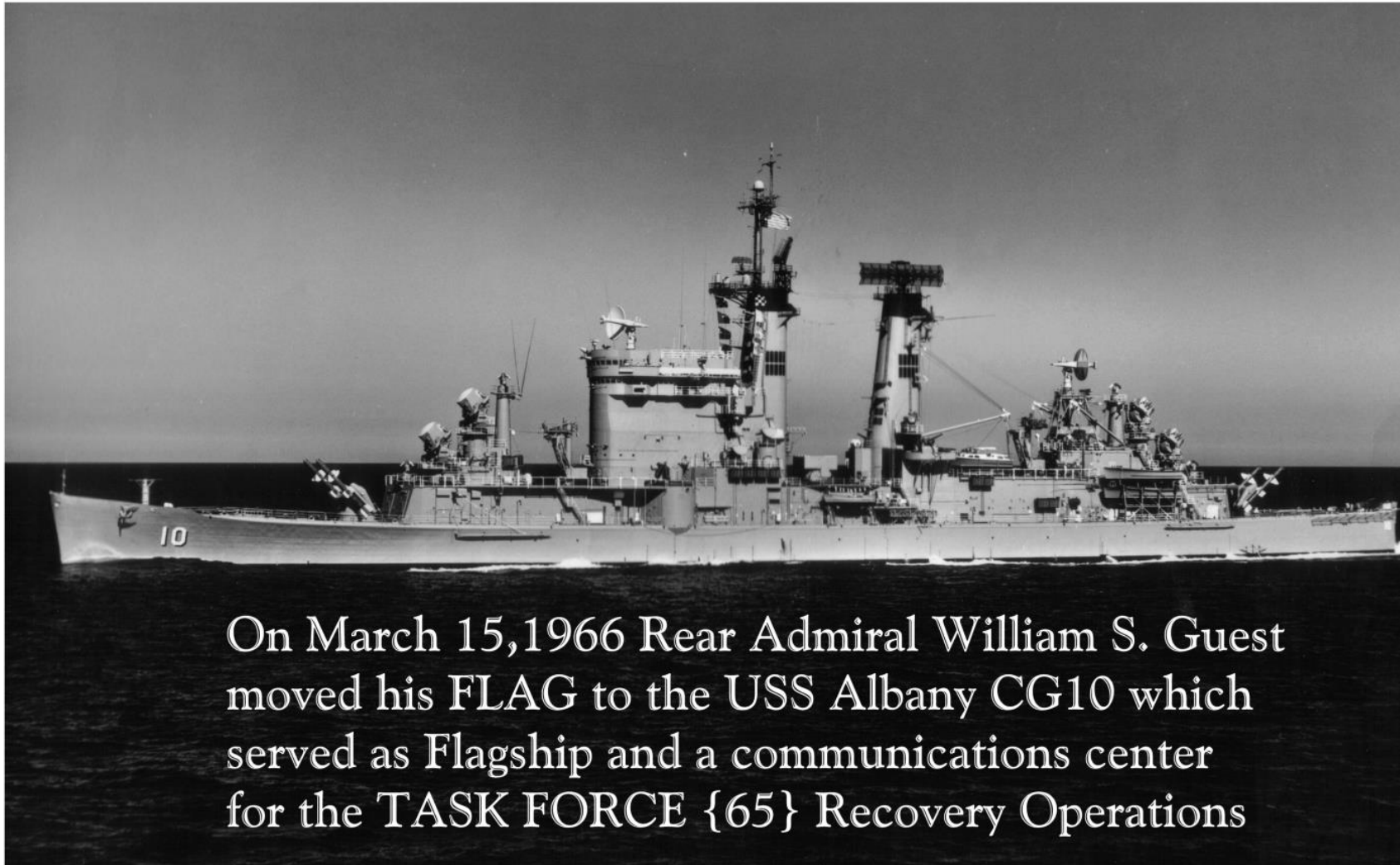
It was 11:35am when ALVIN first sighted the Bomb. They had been submerged for 10hrs 20min almost the extreame limits of her power.

Cleaning up Contaminated Soil and packing it into Barrels





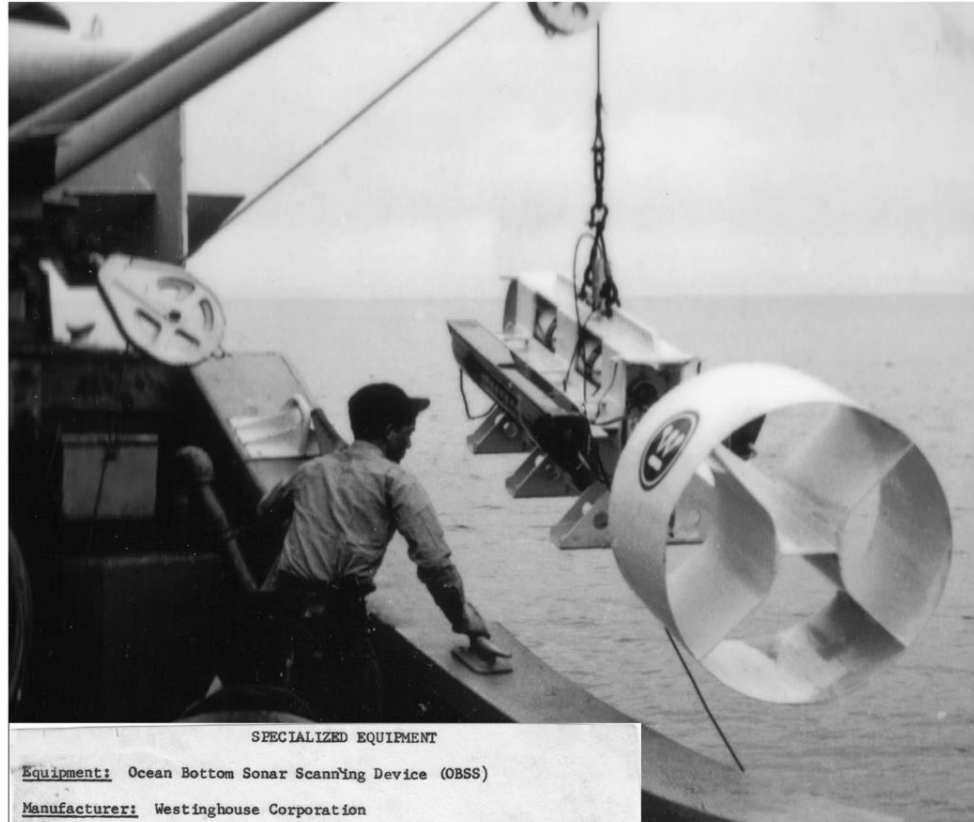
March 15, 1966 USS Boston is relieved by the USS Albany
to serve as TF 65 FLAGSHIP



On March 15, 1966 Rear Admiral William S. Guest moved his FLAG to the USS Albany CG10 which served as Flagship and a communications center for the TASK FORCE {65} Recovery Operations



USS Kiowa (ATF 72) Recovers some wreckage



SPECIALIZED EQUIPMENT

Equipment: Ocean Bottom Sonar Scanning Device (OBSS)

Manufacturer: Westinghouse Corporation

Concept: The OBSS is a towed sonar device, operating below the layer depths and close to the ocean floor. It scans over about 200 feet on either side of the device producing a visible pattern of highlights and shadows using the bottom itself as a contrasting background for visual emphasis.

Capabilities:

Maximum Depth: 20,000 feet

Field of Scan: 260 feet on either side of tow track

Speed: 1 knot

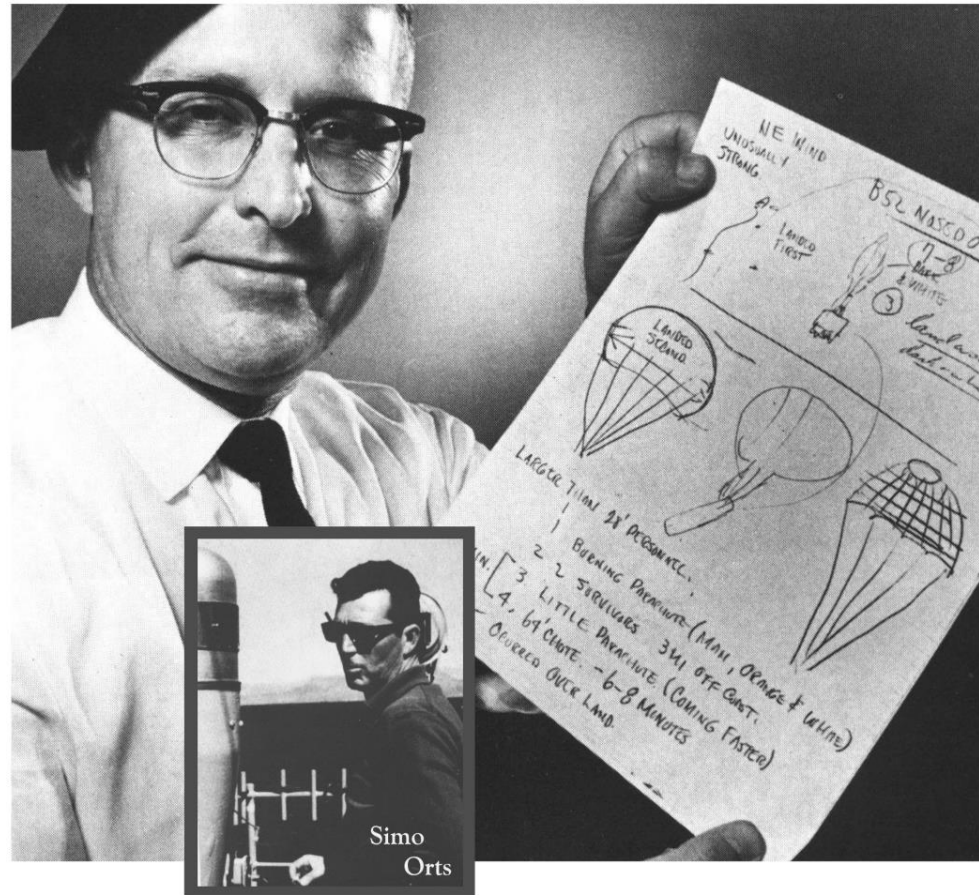
Mission: The OBSS is used to locate contacts on the sea floor and to confirm contacts reported by other means.

Sonar Scanner
is lowered into
sea off Palomares
Beach to look for
wreckage and the
the lost WEAPON

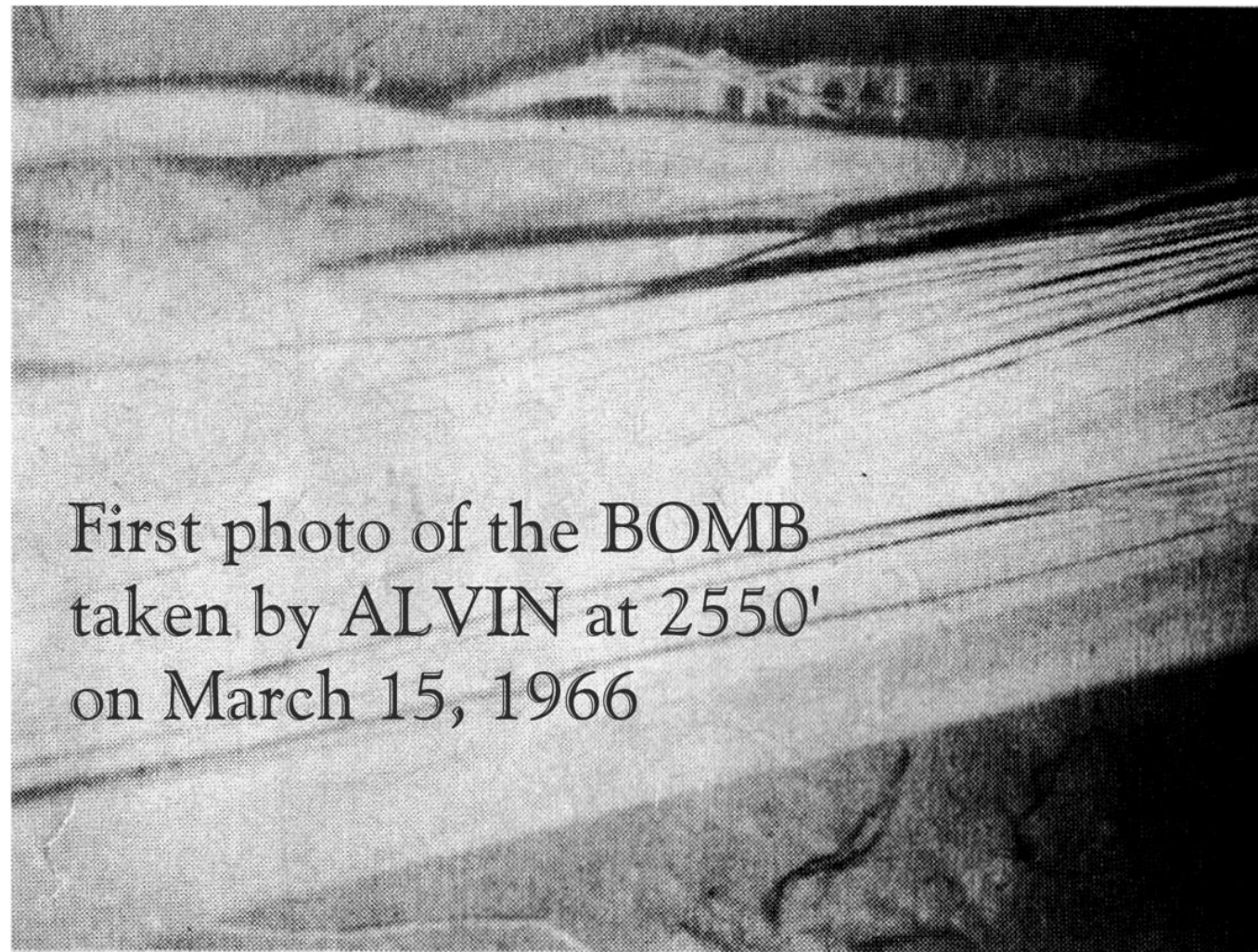


Rear Admiral Guest and
his TEAM go over mounds of
DATA and calculations, trying
to track where the WEAPON
may have landed





Randall Maydew, of Sandia Corp. shows the sketches he made which were corrected by Simo Orts, a Spanish fisherman. It was a test of Simo's perception and showed that the parachute with a "dead man" which he saw sinking was almost certainly carrying the 4th H-bomb.



First photo of the BOMB
taken by ALVIN at 2550'
on March 15, 1966

First recovery attempt came on March 24th.

Using Basic seamanship a Device called the POODLE {Spider looking contraption} was mounted on a stout line above a Heavy Anchor which the Mizar managed to drop within 80 feet of the BOMB.

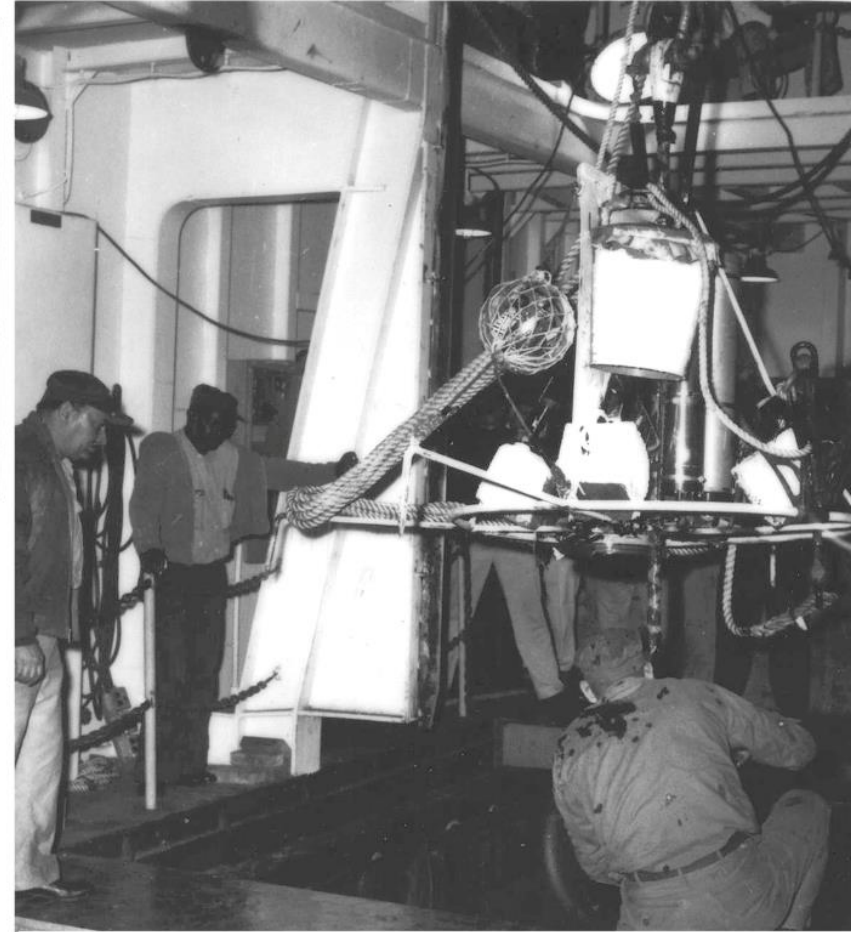


Poodle being
rigged onboard
the Mizar

USNS MIZAR

Oceanographic
Research
Ship





Poodle{spider device} being rigged onboard the MIZAR for the FIRST recovery attempt on March 24,1966

Jon Lindbergh, son of the famed Aviator Charles Lindbergh, climbs into the Submersible PC-3B of the Perry Cubmarine Ocean System Inc. It was used to help search for wreckage and the missing H-BOMB

SPECIALIZED EQUIPMENT

Equipment: CUBMARINE PC-3B Submersible

Owner: Ocean Systems, Incorporated

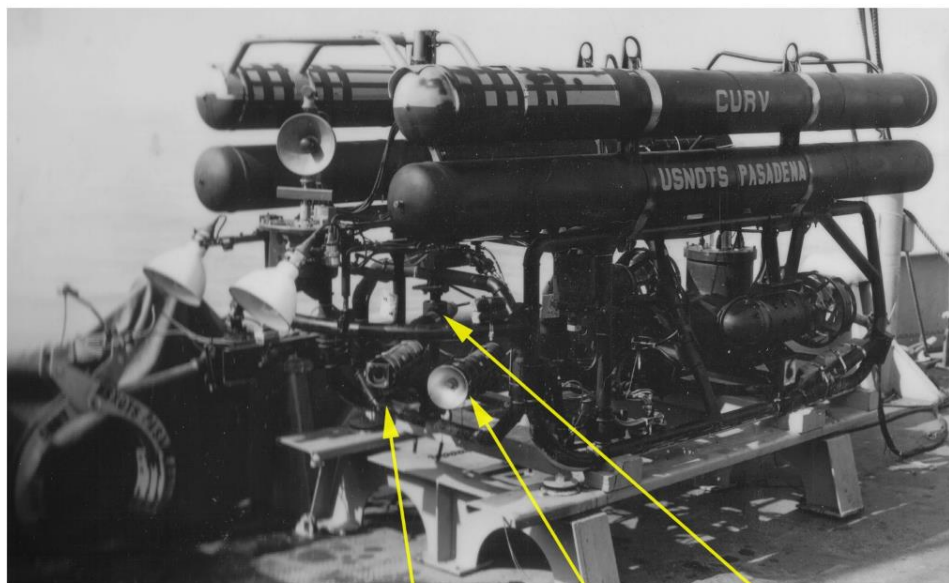
General: The PC-3B is a self-propelled, two-man submersible vehicle capable of diving to depths of up to 600 feet for periods of up to six hours at a speed of 2 knots.

Specifics:

Length:	22 feet
Beam:	3.5 feet
Height:	6 feet
Weight: (Dry)	6,350 pounds
Lifting ability:	500 pounds

Equipment: Underwater telephone; capability of releasing marker-bouys; gyro compass; and fathometer.





CURV [still camera] {strobe lite} [TV camera]



Checking the
Modified
HOOK
on
CURV

★ ★ ★ SEA STORY ★ ★ ★

Chart shows the rugged sea bottom where
H-BOMB was found

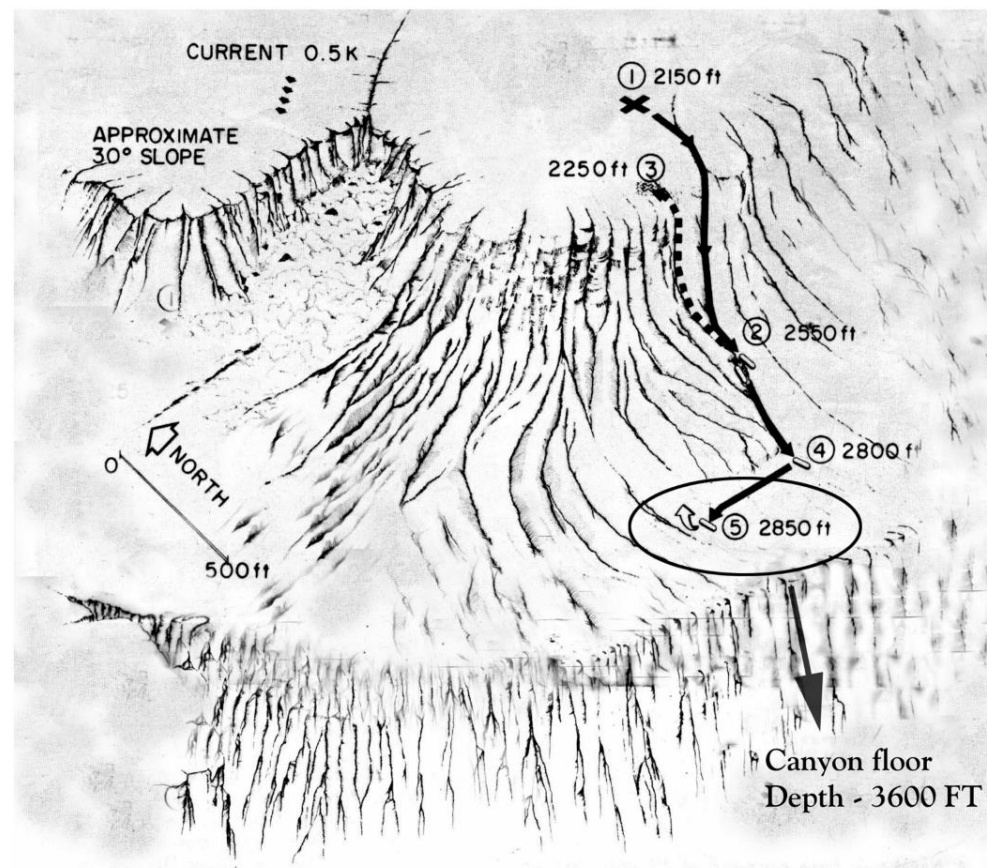
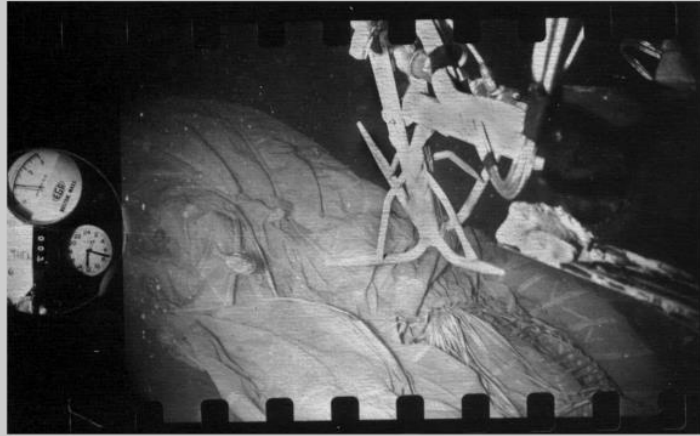
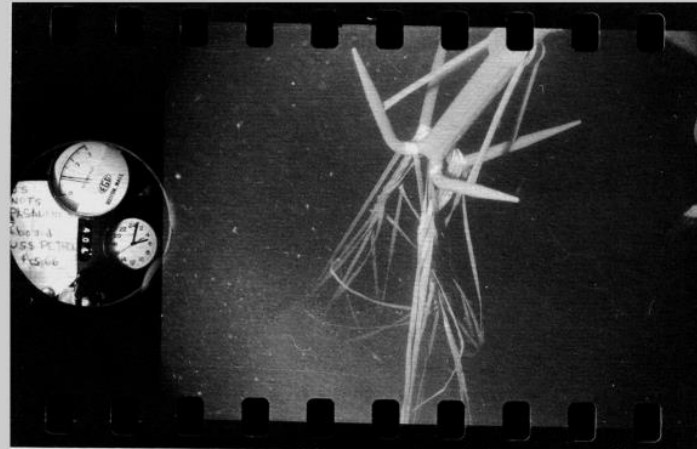


Figure 1. Artist's conception of bottom terrain off Palomares, Spain. Position 1 is original resting point. Position 2 is point where *Alvin* first sighted the weapon after following the track on the bottom. Position 3 is where weapon was brought on the first lift attempt.

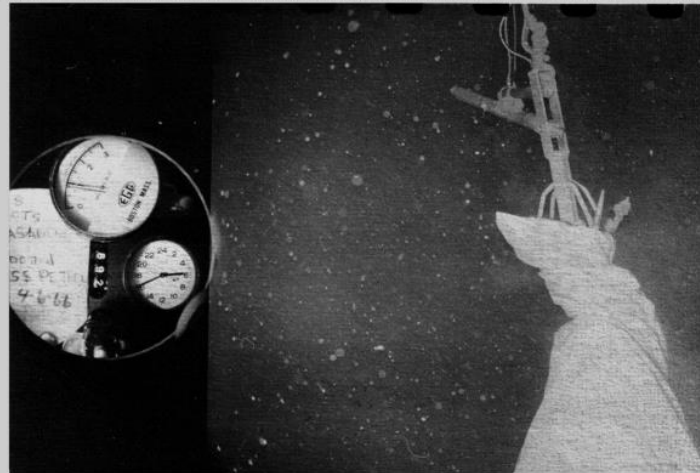
Position 4 is the point where weapon came to rest after first lift attempt failed due to line failure. Position 5 is point where weapon was picked off the bottom in final successful recovery.



CURV approaches the BOMB and its parachute, looking for an area to attach CURV's modified lift line hook



Using CURV, an unmanned, cable controlled underwater recovery vehicle, the FIRST lift line is attached to the parachute 4/5/66



On 4/6/66 CURV attached a second lift line into the parachute of the BOMB



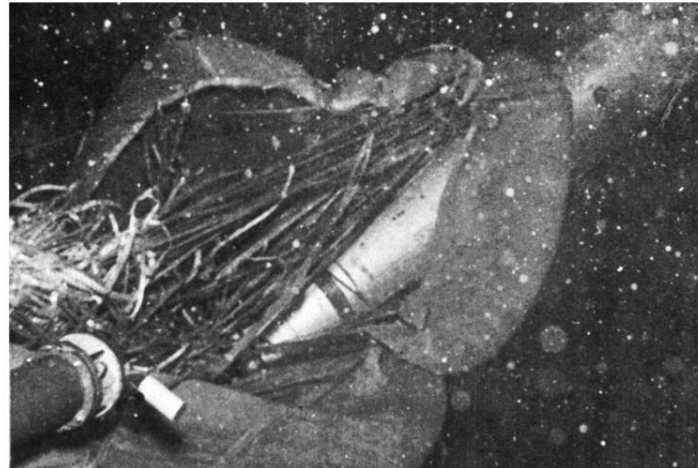
At about 0315 4/7/66 while trying to attach a third lift line CURV was now caught in the parachute and could not be maneuvered

The only thing left was to keep pulling with the 2 lines and praying, that it would all come up. Shortly before dawn on Thursday, APRIL 7, NUMBER 4 BOMB began the ascent from its hiding place.

FOR an hour and forty-five minutes the lift continued foot by foot. THERE was still the unanswered question of whether the BOMB was intact, and it mattered gravely to the final stage of recovery.

Scuba divers were sent down when the BOMB was 100feet below the surface.

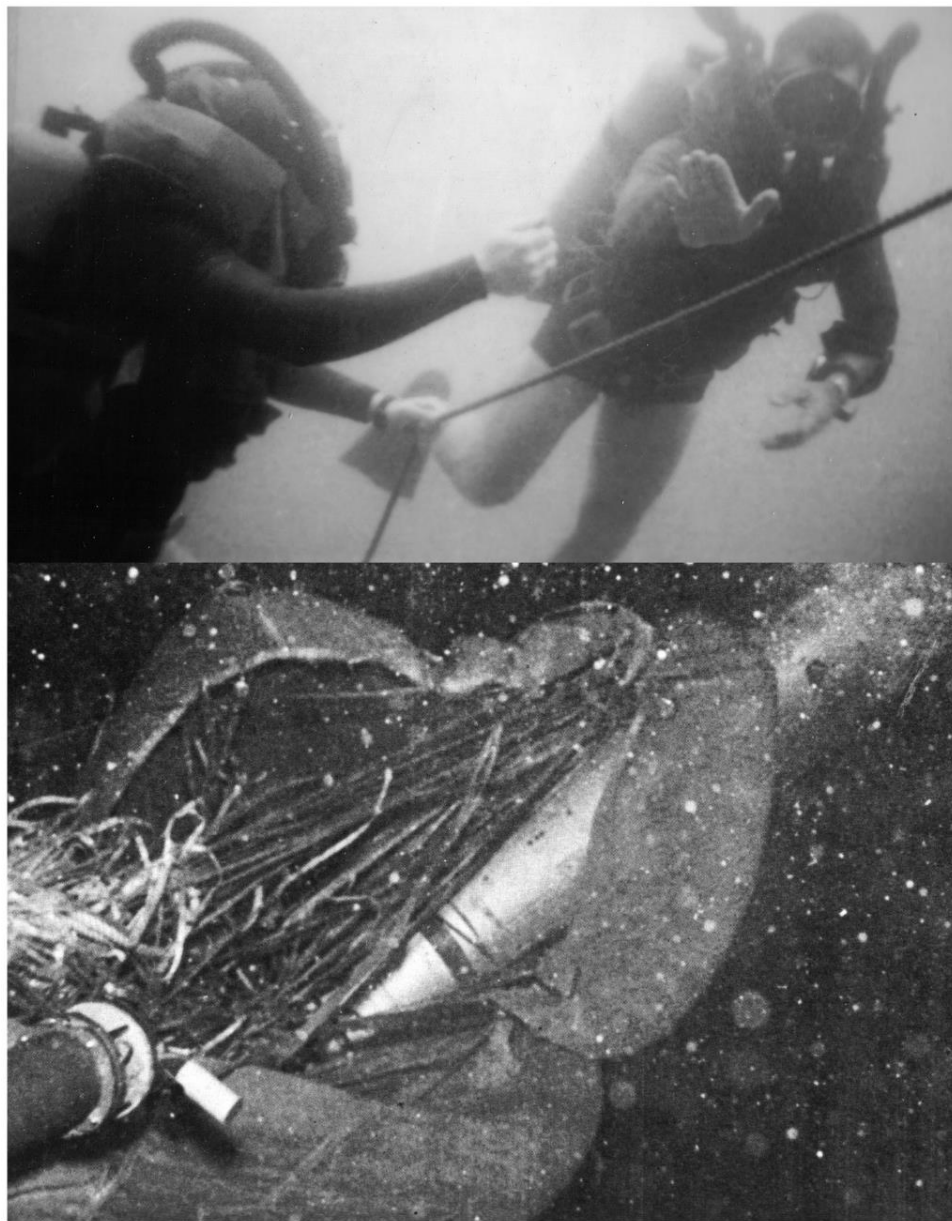
H-BOMB
100 feet under
U.S.S. Petrel





Everyone watches
as the BOMB
nears the surface
April 7, 1966

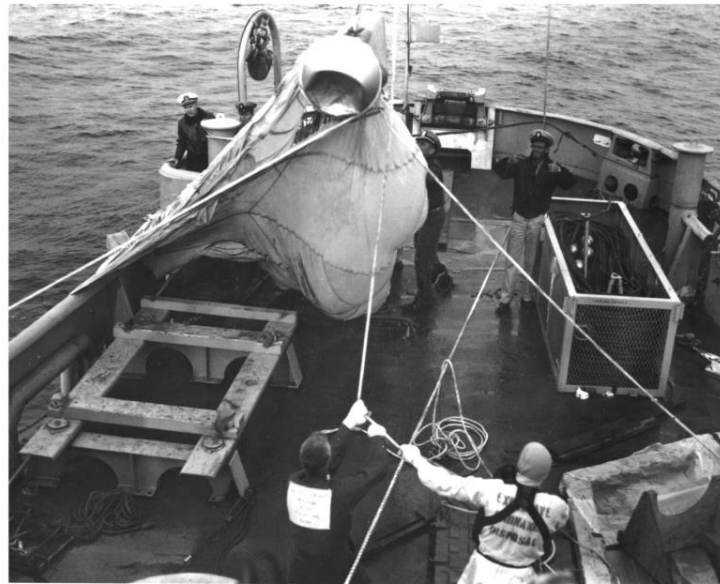


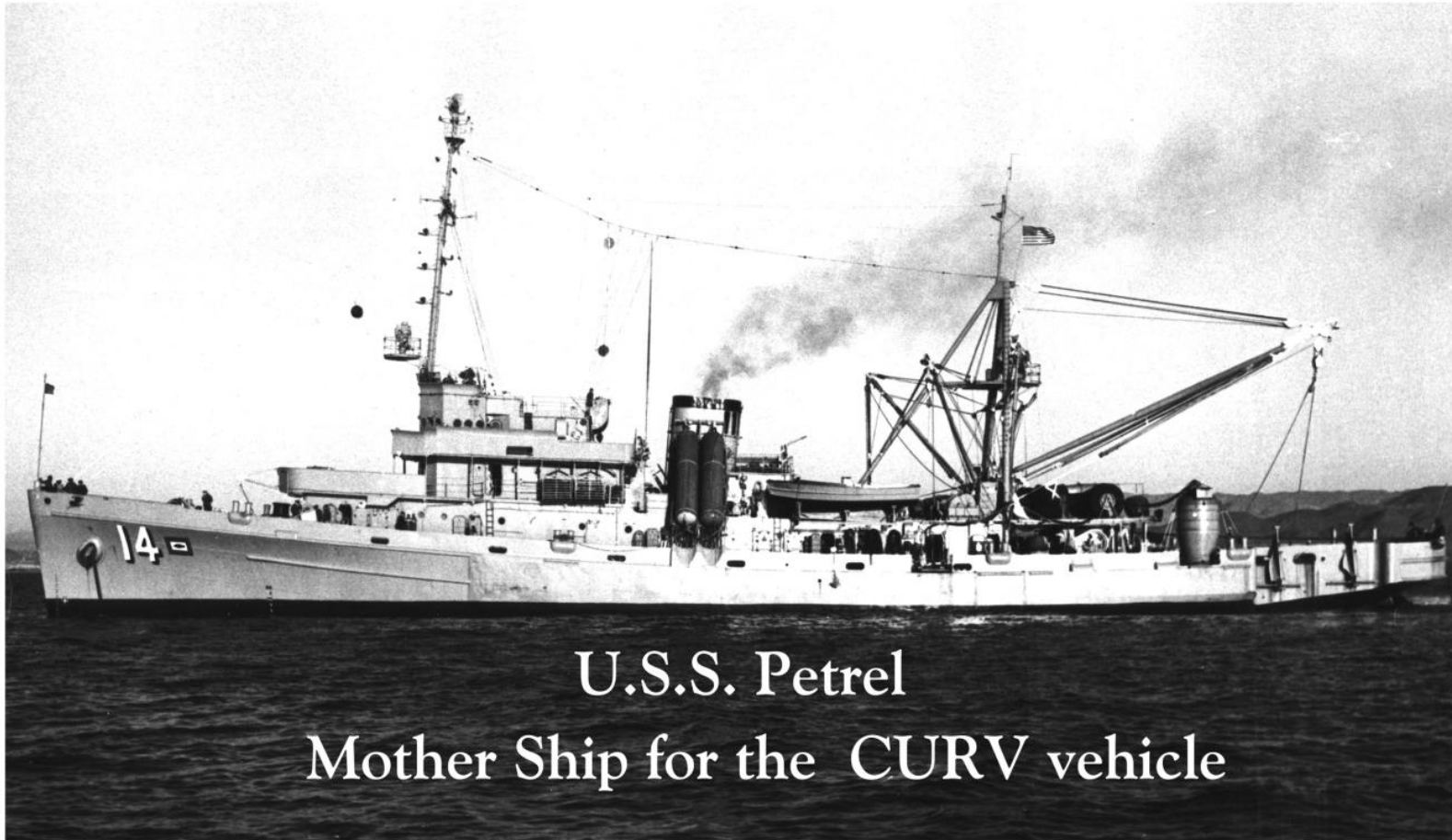


H-BOMB when it was 100 feet under Petrel, Scuba Divers went down to check for Radation and secure with wire straps

The Admiral sent scuba divers down to to wrap wire straps around the weapon, attaching them to heavy lines from the PETREL.

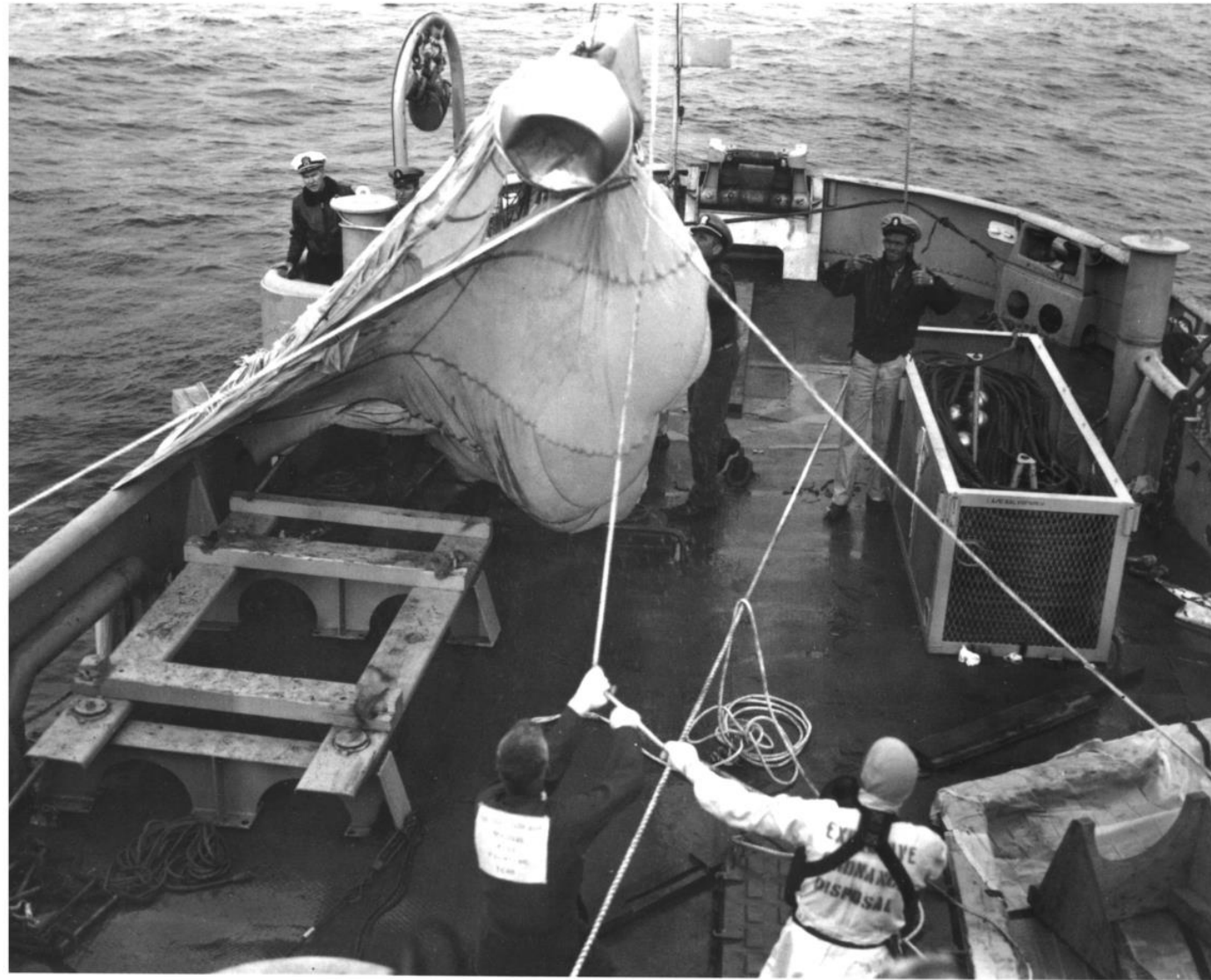
The parachute and CURV were cut away and recovered separately. AT 8:45 on Holy Thursday morning the missing H-BOMB was lowered tenderly onto the PETREL'S deck.





U.S.S. Petrel
Mother Ship for the CURV vehicle

On April 7, 1966 after CURV secured 2 lines into its parachute, the H-BOMB was brought onboard the Petrel and rendered SAFE.



H-BOMB is lowered onto USS Petrel 8:45am April 7, 1966



EOD Team {Explosive Ordnance Disposal}
checks the WEAPON and goes through the
RENDER SAFE procedure



Maj. Gen. Wilson and Rear Adm. Guest
inspect the H-BOMB, CURV is in the background

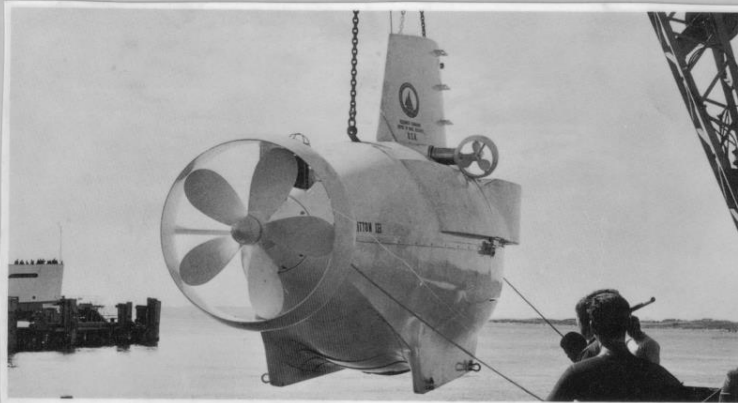
General D.E. Wilson
Commander 16th Air Force

LCDR Moody
EOD Team

CAPT H.C. Page
CTF 65 C/S

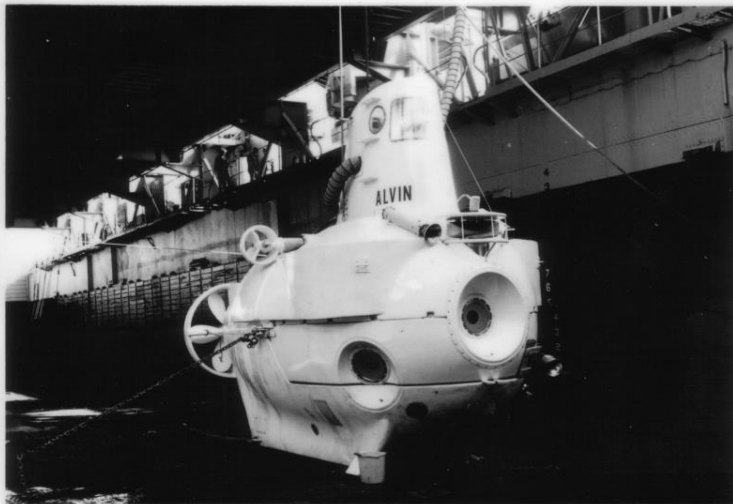
RADM W.S. Guest
< CTF 65 >





Alvin. Operated by the Woods Hole Oceanographic Institution, *Alvin* was completed in 1965 and certified for material safety by the Naval Ship Systems Command the same year. *Alvin* is designed to work in depths of 6000 feet and played a key role in the Palomares operation in the search for the lost nuclear weapon. The vehicle has a novel catamaran hull barge for a support

ship. This type support ship is now being designed as ARS to support Deep Submergence Research Vehicles. Two updated *Alvin* type vehicles are under construction at the Electric Boat Division of the General Dynamics Corporation. One vehicle will be used by the Office of Naval Research and the other by AUTECH.



A coming-out portrait of the world's most sought-after H-BOMB



U.S.S. Petrel with H-BOMB displayed on her deck
passes in review for reporters onboard U.S.S. Albany



USS HOIST (ARS-40)

Carl Brashear

Master Chief Boatswain's Mate U.S. Navy (Retired)



★ ★ ★ USS *Hoist* (ARS-40). While on board the latter in 1966 for the recovery of a nuclear weapon off Spain, Brashear was badly injured in an accident; as a result, surgeons amputated his left leg below the knee. He refused to submit to medical survey boards attempting to retire him as unfit for duty. After demonstrating that he could still dive and perform his other duties, he served in Harbor Clearance Unit 2, Naval Air Station Norfolk, Experimental Diving Unit, submarine tender *Hunley* (AS-31); USS *Recovery* (ARS-43), Naval Safety Center, and Shore Intermediate Maintenance Activity Norfolk. In 1970 he qualified as the first black master diver in the history of the U.S. Navy. Master Chief Brashear's memoir also includes material on his post-retirement employment and a candid description of his treatment in the Navy's alcohol rehabilitation program.

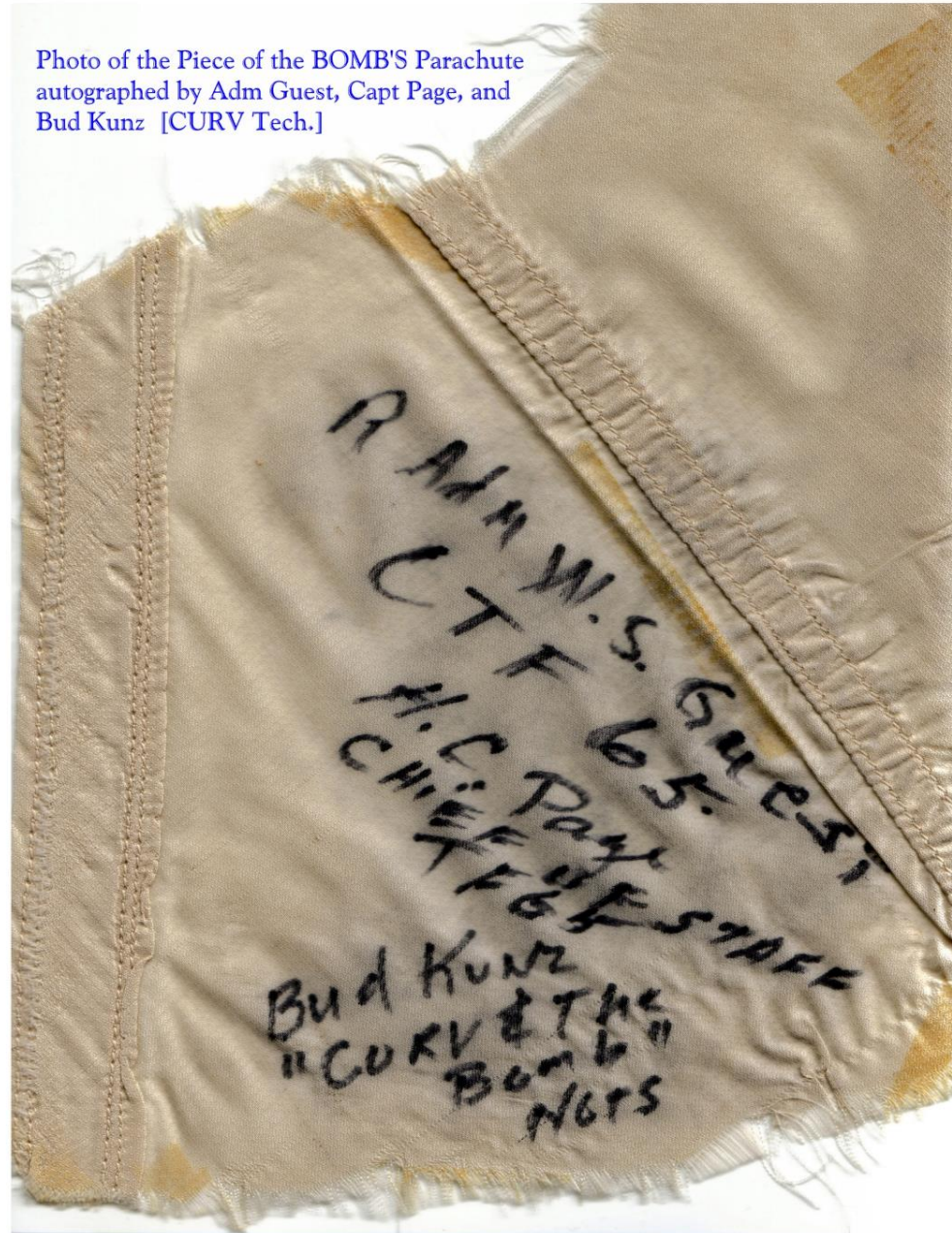
FILM {MEN of HONOR} inspired by the life of Carl Brashear

Contaminated Soil is BURIED



Barrels of contaminated soil shipped back from Spain are buried forever in the Atomic Energy Commission's "cemetery" near Aiken, South Carolina.

Photo of the Piece of the BOMB'S Parachute
autographed by Adm Guest, Capt Page, and
Bud Kunz [CURV Tech.]



Task Force (65) [H-BOMB] Recovery

on Deck of the U.S.S. Petrel April 7, 1966

U.S.S. Albany CG10
Ship's & FLAG Photographer
Richard A. Clarke





TASK FORCE 65
FLEET POST OFFICE
NEW YORK 09501

002:WSG:my
1650
Ser: 121/66
21 APR 1966

From: Commander, Task Force SIXTY-FIVE
To: Richard A. CLARKE
Via: Commanding Officer, USS ALBANY (CG-10)

Subj: Letter of Commendation

1. On 23 January 1966 Task Force 65 was formed by Commander Sixth Fleet to assist the U.S. Air Force in recovering wreckage which had fallen into the sea as a result of a mid-air collision on 17 January 1966 between a U.S. B-52 bomber and a KC-135 tanker off the coast of Palomares, Spain. Final and complete recovery was concluded on 7 April 1966.
2. As a member of Task Force 65 from 15 March to 10 April 1966, you skillfully performed your photographic tasks with determination, professional competence and efficiency. Your outstanding contribution to the operation was displayed with sustained enthusiasm, drive, and dedication to a job which was continuously marked by long, tedious hours of work under difficult circumstances. Your loyal devotion to duty and the timely and proficient manner in which you carried out your daily tasks were most creditable.
3. It is with great pleasure that I commend you on a job "WELL DONE".

W. S. GUEST
Rear Admiral, U.S. Navy



FLAGSHIP
OF



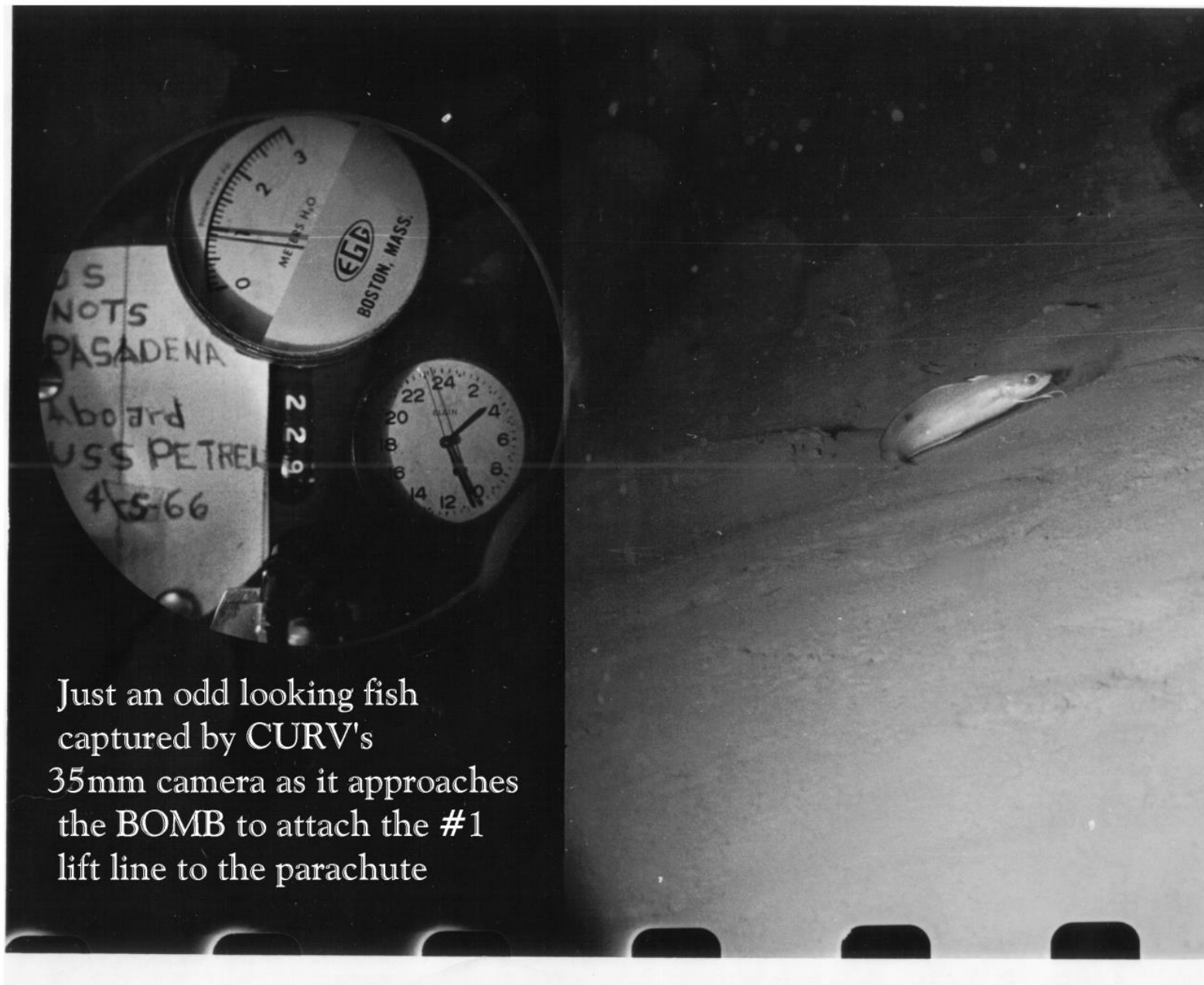
COMMANDER CRUISER DESTROYER
FLOTILLA TWELVE





Richard Clarke (989) 288-2009
7997 S. Byron Rd.
Durand MI. 48429





Just an odd looking fish
captured by CURV's
35mm camera as it approaches
the BOMB to attach the #1
lift line to the parachute

