NEWS FROM
U. S. NAVY
MILITARY SEA TRANSPORTATION SERVICE
ATLANTIC HEADQUARTERS
PUBLIC AFFAIRS OFFICE
58TH STREET AND FIRST AVENUE
BROOKLYN, NEW YORK 11250

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31 October 1968

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(ATLANTIC HEADQUARTERS, MILITARY SEA TRANSPORTATION SERVICE, U.S. NAVY, BROOKLYN, N.Y.) -- JO1 SAM HERZOG, Navy Journalist in the Public Affairs Office of the Atlantic Commander, Military Sea Transportation Service (COMSTSLANT), rode the U.S. Naval Ship MIZAR (T-AGOR-11) during the initial two weeks of her search for the nuclear powered submarine SCORPION (31 May - 13 June 1968). Following is Journalist Herzog's account of the beginning of the search for SCORPION:

THE MIZAR GOES ON A HUNT

By JO1 Sam Herzog

What would you want if you were given the job of looking for a brooken needle in a four square mile haystack from a helicopter? Having a good helicopter, acurate navigation, a magnet and a camera would be some of the most desirable tools for a search like that.

A similar problem faced the USNS MIZAR (T-AGOR-11) as it searched the mid-Atlantic for the missing submarine SCORPION, and the ship had the tools for the job.

The MIZAR scurried out of the Norfolk Naval Base on Sunday, June 2 under orders from the Commander-in-Chief of the Navy's Atlantic Fleet to join in the search. The ship, with its Master, Captain James D.

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Hobbs, its officers and crew, and the scientific team, with its Senior Scientist, Dr. Chester L. Buchanan, and his team members, are performing a key function in the continuing search for the remains of the lost nuclear submarine.

The MIZAR's pecular qualities and spaces, coupled with the scientific equipment and instruments, make the ship unusually well qualified for this particular type of hunt. In 1964 the MIZAR was the first ship to locate and photograph the remains of the USS THRESHER in 8,400 feet of water off the Massachusetts coast. The MIZAR team also played a key role in the search for the lost nuclear device off Palomaris, Spain, in April, 1966.

Designated an oceanographic research ship (T-AGOR), the MIZAR started its MSTSLANT career as a polar supply ship with an icebreaker type bow and a cruiser type stern and ice station controls mounted in a tower near the bow. Outwardly she has changed little. The cargo booms amidships have been replaced by a large trapazoidial "house" ca-led the wellhouse. However, internally many changes have been made. There is now a large "hole" in the bottom of the MIZAR, extending from her main deck down through her hull. The "house" covers this "hole" which is then covered at deck level by two hydralically operated doors. The carro hold now contains large reels of heavy cable and line instead of the Arctic supplies it once carried. Other cargo spaces have been converted into quarters for the scientists- a photo lab, an electronics lab, an electronics technician's shop, a navigational aids room and a control center. Completely air-conditioned, the spaces are never empty as the scientists work in two teams, each team working 12 to 14 hours a day.

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Designated BLUE and GOLD as are the Navy's Polaris submarine crews, the work day is divided logically along the meal-time hours. On this particular mission, the BLUE team, headed by Senior Scientist Buchanan, works from midnight to 7 a.m. and from noon to 5 p.m. The GOLD team, headed by Research Physicist(Electro-Acoustical) Robert B. Patterson, works the other 12 hours. Both these men are Naval Research Laboratory employees(NRL) as are nine more of the scientists. The Naval Oceanographic Office(NAVOCEANO) provided the other four scientists who round out the 13 man scientific team. Along with Captain Hobbs and his 40-man crew, they comprise the MIZAR team which left Pier #2 in Norfolk, Virginia, on Sunday morning, June 2, to search for the SCORPION.

This was not in any sense a routine voyage and consequently there was more than the usual amount of rush and confusion to get the ship loaded with stores and equipment and get it out to sea. Added to that was the fact that the ship had only pulled into Norfolk on Wednesday, expecting a yard period and most of the scientific gear had been removed for further test and evaluation.

Crewmen like Robert Leonhardt of Babalon, Long Island, an Ordinary Seaman who had to cancel his plans to go home on leave and see his oldest son, an Air Force Sergeant, who was coming home on leave from Vietnam, were effected as well as scientists like Physicist Robert B. Patterson who had just finished a cruise on the MIZAR and was looking forward to some time at home with his family in Washington, D.C.

But the attitude of all concerned was one of dedication. As the First Officer, Mr. Sixto Mangual of New Bedford, Mass., said, "When I told my family we are going out to try and find the SCORPION, my son says to me, "you hurry up and find them and bring them home!" But Senior Scientist

"Buck" Buchanan was not as optimistic. As he briefed the scientific team with the ship leaving the Norfolk harbor he remarked that if the submarine had been lost in the area the MIZAR was being assigned to, that there was almost no hope of recovering her intact. But he also pointed out that the techniques and equipment on board had advanced since the THRESHER search and would get a real test in the coming search.

A following sea pushed the MIZAR out into the Atlantic for the first four days, keeping the decks clear of traffic except for the two intrepid scientists who had to climb out on top of the wellhouse and hook up one of the antennas. But inside the ship was a flurry of activity as scientists and crewmen searched for gear and equipment hurriedly brought aboard in Norfolk. Many items like schematics, drawings, parts and spare parts had been left behind in and on desks, file cabinets and even at home in the rush.

Hour after hour "Buck" Buchanan and Bob Patterson attempted to put the missing pieces together with the help of NRL's home office in Washington, while other team members put together the many complex parts and circuits of the "fish."

The "fish" is a 1400 poind metal cage approximately eight feet long and three feet high with a magnatometer perched at the end of a two foot tail. Mounted in the open "body" of the "fish" are two powerful strobe (electronic flash) units, side-looking sonar, bottom-looking sonar, battery cases, a motion picture camera and a TV camera. All of this equipment is linked to a control cyclinder which relays commands from the laboratory to the individual units and transmits data from the units to the lab. This is done via the steel cable that not only lowers and raises the fish from the ocean depths, but also acts as the "fish's"

umbilical cord. In the MIZAR's number one hold are two spare reels of cable, each reel over four miles long!

The cyclinders that house these sophisticated pieces of electronics gear are thick-walled, specially constructed steel cyclinders, designed to stand the pressures over three miles down!

On the way out to the search area, the equipment, from its circuit-board compenents, tiny transistors, capacitors and resistors, to the oscilliscopes, meters, and computers are check and rechecked, aligned, balanced and tested separately and as they are placed in the overall system.

Belying the apparent confusion in the lab spaces is a "Plan Of the Day" (POD) issued by Dr. Buchanan which sets forth the many jobs to be done that day in order of importance. This is one of the many places where the team concept manifests itself.

When John P. (Jack) Campbell, an Oceanographic Technician, see a note calling for a test run on the ship's sonar, he simply starts running the test and tells the GOLD team captain, Bob Patterson, the results. This is duely noted for Dr. Buchanan to see when his BLUE team takes over. A POD note to recharge the battery cells is noted by H. Bernard (Bernie) Lindstrom, a Mechanical Engineer, and any team member knows what Bernie is doing by simply looking at the POD. But each team member does more than his share as Electronics Technician Charles Griggs helps Motion Picture Technician Gloss Worthington load his underwater camera and Research Geodesist Leslie L. Cunningham and Explosives Supervisor Jason H. Taylor cut out a bais-relief map of the bottom area they are searching. Electronics Engineer Lloyd S. Greenfield programs the sonar computer and

then helps Electronics Engineer Frank E. Acker check a component in the control cyclinder. MIZAR Chief Electrician Joseph L. Davi helps Bernie Lindstrom check out a power line while another scientist tries to find batteries to power a crewmember's short wave radio.

As the weather clears the crew moves on deck to check out the cable winch and ready it for the operation, check out the hydrallic doors in the wellhouse and the pullies which guide the cable. The "fish" is readied for its first dip in the water--this one with the bottles empty--as last minute course corrections come to the bridge from the Navigational Aids Room, bringing the ship to the search starting point. With the ship barely moving, the "fish" is lowered down the hole into the water until it approaches the bottom, over 1500 fathoms down! The "fish" is then brought up and the water-tight integrity of the bottles is checked. Then there are a series of brief "swims" with the "fish" as each individual cyclinder is loaded with its assigned instrument and checked out.

After each "swim" minor adjustments and repairs are made and the final problems are eliminated. During one of these "swims", there was a graphic example of how great the water pressure is and what it can do. One of the bottles, fortunately empty, developed a leak and before the caps came off, equaliziang the pressure, the almost one inch thick cyclinder had caved in at the middle like an empty soda can that has had its sides crushed in.

As we approach the operating area everyone is on the lookout for debris and several false alarms are caused by floats from fishing nets that have floated many thousands of miles on the ocean's currents.

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As we reached the search starting point a strange sight appears on the horizon--a ship. It is the first ship that has been seen since leaving the Norfolk area although several Navy P3V's have been spotted flying overhead. The ship is identified as the Navy's oceanographic survey ship COMPASS ISLAND which dwarfs the MIZAR. The COMPASS ISLAND is finishing a map of the ocean bottom to help guide us in our search and some added help in the person of five Westinghouse scientists and their equipment. The MIZAR's Chief Steward,Charlie Wright Jr., does a little fast shuffling and the berthing and feeding of the new men is arranged. Ship's Purser Ernest E. Becker, who had veen taking the weekend sun, makes the appropriate entries on the sailing list as First Ofricer Mangual and Boatswain Herbert Hill make sure their equipment is brought aboard and properly stowed.

Captain Hobbs and Dr. Buchanan coordinate the lowering of the fish into the water while Second Officer and Navigator Lawrence F. Flynn takes the ship down the path charted by Les Cunningham.

Even the navigating of the ship is a team effort. In addition to compass and sun readings taken by the ship's officers, the Navigatinal Aids team from NavoceanO gives ship's position readings by using the Navigational Satellites and the newly instituted OMEGA system. As the NavSats pass a certain known point, they transmit data which is fed into a computer along with the ship's speed and bearing, current and wind data and time.

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This data is converted by the computer into degrees, minutes and seconds of longitude and latitude. OMEGA uses four stations to give ships continuous readings accurate to within yards in any kind of weather.

As sonar makes a bar graph of the ocean bottom the fish is travelling over and the side-looking sonar feeds its contacts through a computer, the motion picture camera is taking a series of photographs at timed intervals controlled in the lab. The 114^{o} angle of the camera's lens enables it to photograph a wide area of the bottom relatively free from distortion. Light for the camera is provided by two electronic flash units located on the front and back of the fish and controlled by the same impulse that controls the camera trigger. These quartz bulbs are capable of standing the great ocean pressures while giving off a brilliant, clear light so necessary in deep water. In scaning an area where the shallowist point is over 1500 fathoms, you must realize that there is almost no light whatsoever near the bottom and much of the bottom is shrouded in total darkness. Thus the strobes, powered by the fish's bottled batteries, provide the first light ever to shine on this mysterious ocean bottom.

The fish stays down until the batteries run down and/or the film runs out and except for the daily garbage run outside the search area, the ship continues to move slowly along its assigned path.

As the fish is lowered and brought up, the cable is constantly being checked for breaks in the outer sheathing cable. All cable breaks are quickly wrapped with tape to prevent the strands from

unravelling and each taped section is watched carefully for signs of wear.

A small device suspended from the bottom of the fish tells at what angle the fish is moving in the water in relation to the ship's beam.

Ready to lower the fish into the hole, it is first raised up to the top of the wellhouse until it fits snugly against the bottom of its silvered cradel. Then the deck-level doors slide ponderously open, revealing foam-capped, translucent blue water rising and falling within the well. Even the red-leaded sides of the well glow as the crystal blue water covers the slowly decending fish and its cradle. As the duo reach the bottom of the well, the fish "swims" free of the cradle and begins its cable-tow descend toward the dark ocean depths. The hydralic doors slide shut leaving only the unreeling cable in view.

In the Lab, the pings of sonar mingle with the whir of computers, the clatter of typewriters, the clicking of counters, the flashing of light across oscilliscope faces and the winking of digital clocks. Eyes flash from the TV screen monitoring the cable, coming off the cable drum , to the counter indicating the amount of cable, out to the o'scope screen showing the relationship of the fish to the ocean bottom. On charts in the lab, Navigation Center and the bridge, colored, sharp pencils and compasses keep tabs on the slow moving ship and its fish-like apendage. In the engine room, men work dilligently to keep the twin screws turning at precisely the rpm's relayed through the bridge from the lab. Film glides slowly through the processing

tank while in another room team members peer carefully as already developed images roll ever-so-slowly past.

The search is not a matter of hours, days or weeks. It bears little relation to time, rather it is a series of charts, graphs, photographs and taped impulses and the constant spinning of ship's propellers. The flickering of numbers on the digital clock only provide a reference number in coordinating the stream of data and the flourescent lights of the lab and sleeping quarters erode the concept of day and night. The sight of bare-chested Les Cunningham coming down from the main deck into the lab from his off-watch exercise makes one aware of the passing time.

Meals provide a welcome break as well as signaling the end of one shift. A well-balanced menu offering a variety of main courses with vegetables and potatoes or rice prepared to taste are a trademark of the MSTSLANT ships and despite the MIZAR's small size there is no cutback on the quality or quantity of well prepared meals. The same is true of the living and working spaces throughout the ship, freshly painted, clean and well lit. The crewmembers smile when this is remarked upon and remind you of the letter a young sailor sent to his mother after sending several weeks aboard his first ship. In this plaintive missive he reminded her of how he had chosen the Navy because its ships were always so clean and neat. "Now I know who keeps them this way," was his message.

Safety, especially shipboard safety, is something you are constantly aware of and there are written and physical reminders throughout the ship. The first thing that catches your eye on

the bridge is a large sign which states "SAFETY FIRST, SCHEDULE SECOND--YOUR SCHEDULE IS FLEXIBLE, YOUR SHIP IS NOT." Crewmen painting passageways or chipping paint on deck wear protective goggles and all outlets and plugs are three-pronged (the third prong is for grounding). Handrails, lifejackets and helmets are in evidence throughout and drills are coordinated with the scientists who, along with the crew, appreciate the seriousness and necessity for the "just-in-case" breaks into their work.

A crew's lounge is slowly taking shape in the compartment just forward of the galley, but the major work will have to wait until the ship's next yard period. The MIZAR was concerned for many years with keeping its crew warm as it travelled to the polar regions but many of its past four years as an oceanographic research ship have been spent in much warmer climes. The lab and adjoining scientific spaces are already air-conditioned as are the scientists' quarters and the crews' spaces will be converted during her next yard period.

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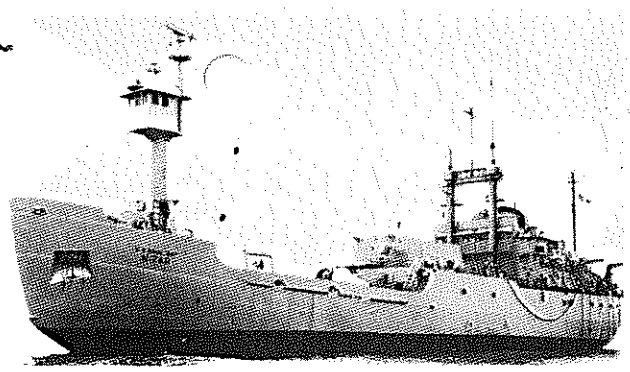
Teamwork helps Mizar find sub

Highly touted NMU crew and crack scientists track down lost sub Scorpion



Every morning seven men meet in a downtown building in Washington where they spend the greater part of each day going over hundreds of photographs. These men belong to a team of Navy experts whose job it is to piece together—from studying the photographs—exactly what happened to the ill-fated nuclear-powered submarine Scorpion. The photos were taken on the floor of the Atlantic Ocean about 10,000 feet beneath the hull of the naval oceanographic research ship Mizar.

Of course, the pictures may never reveal how the $40 million Scorpion met its doom. But the fact that the Mizar was able to pinpoint the location of the wreckage is as much a tribute to the skill and patience of the crew as to the efficiency of the highly sophisticated electronic equipment carried by the ship. "It was like looking for a contact lens in a haystack," said Chester L. Buchanan, chief scientist on the Mizar.

"The fish." The Mizar had played a key role in locating the attack submarine Thresher which sank in 8,400 feet of water off New England in April, 1963 and had been instrumental in locating the hydrogen bomb lost off the coast of Spain in 1966. In all probability, the 3,500-ton Scorpion never would have been found with the equipment used to search for the Thresher. Now the Mizar is equipped with a $75,000 "fish" that can spot objects on the ocean floor. The fish, a nine-foot long metal rack laden with detection gear and dragged by a three-quarter-inch cable 25 feet above the ocean bottom, is launched and retrieved through a 10-by-22-foot well in the ship's bottom.

Uses sonar beams. Suspended from the tail of the fish is a magnetometer, an instrument that measures the intensity of a magnetic field and senses the presence of metal objects. Sonar beams sweep out from the sides of the fish to locate underwater objects. During the first 18 weeks the Mizar searched for the Scorpion, she located only a bottle, a can and a metal plate. No one knew whether the plate was a part of the Scorpion but it led the Mizar to try again in the same area.

The ship searched a regular pattern, zigzagging across the Scorpion's projected track at a speed of little more than a mile an hour. She sailed first 40 miles on one side of the track, made a sharp turn and went 40 miles on the other side. In 145 days of searching, Mizar's cameras took more than 200,000 pictures—12,000 in the immediate area of the Scorpion. On her last try in the month of October the instruments showed that she had made contact. Photos developed in the early morning hours of October 30 confirmed that the Mizar had indeed found the Scorpion within three to five miles of where the metal plate had been spotted.

Crew cited by skipper. Capt. James D. Hobbs, skipper of the Mizar, paid tribute to the "skill and patience of every man aboard this ship. When you think of the infinite care and attention that must go into an operation of this kind, you cannot find enough words to salute a crew that makes a success of the job," Hobbs said. For coming through in fine style in the Scorpion operation, the officers and crew of the Mizar were presented with the first "Hard Charger" Award by Vice Admiral L. P. Ramage, Commander, Military Sea Transportation Service. The citation commended the skipper and crew for their accomplishments in locating the Scorpion, Thresher and the H-bomb.

The Mizar is an unusual ship, having been built originally as an ice-breaking supply ship for Arctic and Antarctic waters. She underwent a conversion to her present "search and research" use because of the Thresher disaster. Her 35-man unlicensed crew has been 90 per cent NMU since 1963, the year after Executive Order 10988 was signed by the late President John F. Kennedy. The Mirfak, her sistership, is also manned by a crew made up largely of NMU members and still operates as a resupply ship for MSTS vessels operating in the Arctic and Antarctic.

Great team. The scientists and seamen make a great team working together to accomplish their mission. The ship's crew has to navigate the vessel along precise headings so that the scientific crew headed up by chief scientist Buchanan can feed data into the computer aboard which will tell them exactly the area covered in the search. "I don't want to sound like a mutual admiration society," said Captain Hobbs, "but I have never sailed with a finer bunch of men."

The skipper, whose home is Baltimore, has a background of 20 years at sea, coming up the hawsepipe entirely in the service of the Military Sea Transportation Service. He is considered one of the most knowledgeable ships' officers in the field of Arctic seaborne operations. Bosun Herbert Hill, who has been aboard the ship for several years, regards the skipper as the kind of commanding officer the men "really put out for, because he knows what being a seamen is like."

If the mystery of the submarine Scorpion is ever unravelled, it will mainly be due to the fine cooperation and excellent seamanship found on board the Mizar during the time it took to track down the whereabouts of the lost sub.