UNDERSEA WARFARE

U.S. Submariners... Because Stealth Matters

Fall 2002

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Legacy to Innovate

Experimentation:
The Key to Change

UUVs: Experimenting
With Future Capabilities

Simon Lake:
Designer, Visionary

POST 9/11: FOCUSING ON FUTURE CAPABILITIES

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Petty Officer 3rd Class John A. Long of Homer City, Pennsylvania, raises a replica of the original Navy Jack aboard USS *Minneapolis-St. Paul* (SSN-708) during morning colors on 11 September 2002 to honor those lost in the attacks on America one year earlier. By direction of the Secretary of the Navy, all U.S. Navy ships will fly the Navy Jack in place of the Union Jack for the duration of the war on terrorism.

Photo by JOSN Benjamin Keller, COMNAVSUBFOR Public Affairs

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UNDERSEA WARFARE

THE OFFICIAL MAGAZINE OF THE U.S. SUBMARINE FORCE

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UNDERSEA WARFARE is the professional magazine of the undersea warfare community. Its purpose is to educate its readers on undersea warfare missions and programs, with a particular focus on U.S. submarines. This journal will also draw upon the Submarine Force's rich historical legacy to instill a sense of pride and professionalism among community members and to enhance reader awareness of the increasing relevance of undersea warfare for our nation's defense.

The opinions and assertions herein are the personal ones of the authors and do not necessarily reflect the official views of the U.S. Government, the Department of Defense, or the Department of the Navy.

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We need to lead the way in transforming our fleet from one that can deliver brute force to one based on information and communication technology and precision-guided munitions – one that is ready to deal with 21st-century threats.

Even before the terrorist attacks on America more than a year ago, our leadership realized the need to transform our forces into a single cohesive and cooperative team with the flexibility to respond to new types of threats. September 11th brought into focus the requirements for precision strike, intelligence, and the ability to operate stealthily under the sea. I firmly believe our Submarine Force is able to meet these new threats because of our superb training and the think-on-your-feet mindset that has always been essential for conducting business in our environment. Few other of our armed forces use the element of surprise like we can, and in the asymmetrical war on terrorism, bringing the battle to the enemy must rely upon catching him unawares and at his most vulnerable.

To do this, we need to lead the way in transforming our fleet from one that can deliver brute force to one based on information and communication technology and precision-guided munitions – one that is ready to deal with 21st-century threats.

The 20th-century Navy sailed in open oceans, and its primary mission was to defeat deep-water adversaries on the same terms. Today we are focusing on primarily projecting power ashore, controlling the shoreline, and contributing to the joint warfight.

Our leadership understands how important cooperation will be in the war on terrorism and beyond, not merely within service communities, but among the Navy, Marine Corps, Army, Air Force, and Coast Guard. SECDEF Donald Rumsfeld has asked us to justify all procurement programs by demonstrating how our weapons systems fit into a joint concept of operations. I believe we are well on our way toward that goal because of our community's inherent ability to respond quickly and effectively to new mission requirements.

Demand has risen for submarines to operate in the Southwest Asia littorals, and our new USS *Virginia* (SSN-774)-class is ideally suited to meet this call. We look forward to delivery of *Virginia* in 2004; in these pages, you can read of the keel-laying of the next member of the class, *Texas* (SSN-775).

Another part of our transformation toward flexibility appears in the proposed FY 03 defense budget. The four *Ohio*-class TRIDENT ballistic missile submarines (SSBN) planned for conversion to guided-missile-launching strike submarines (SSGN) will enable delivery of up to 154 Tomahawk missiles each. ADM Vern Clark, the CNO, calls that "just the tip of the iceberg." Each SSGN can also support sustained operations with 66 Special Operations Forces and their equipment, or carry up to 102 SOF personnel in surge conditions.

We put another piece of technology transformation to the test in early August in Hawaii. As part of Millennium Challenge 2002, the Advanced SEAL Delivery System (ASDS) flawlessly executed her first operational exercises involving submerged, covert delivery and recovery of SEAL forces. Using ASDS allows us to conduct long-range, covert missions to insert and extract special operations forces, reducing exposure to cold water and the associated physical and mental fatigue of the special operations team.

The Submarine Force also is working closely with other communities in the Navy to train like we will fight. In this issue, we have a report from USS *Chicago* (SSN-721) on its role during RIMPAC 2002, demonstrating how the move has been made away from traditional carrier battlegroup operations. This exercise focused heavily on anti-submarine warfare (ASW) and demonstrated teamwork among all elements of the Navy, including surface ships, submarines, tactical aircraft, and amphibious forces.

In late August, the Navy and our partners at Raytheon successfully completed the first 550-mile fully-guided test flight of the Tactical Tomahawk (TACTOM) missile system in California. This new generation weaponry offers in-flight re-targeting capability and an ability to "loiter," or circle around a target area, until a command is issued to strike. Other options on this new weapon include a battle damage assessment capability and the transmission of in-flight health and status reports. TACTOM is ideal for an SSGN to use with its vertical-launch cells, and our top designers are working on a way to launch this new weapon from torpedo tubes. TACTOM is scheduled to augment our fleet capability by 2004.

During recent testimony to Congress, Secretary of the Navy Gordon England said the ability to transform is at the heart of America's competitive advantage. I would add that our Submarine Force is uniquely positioned to lead the way in a transformation that will enable waging war against both symmetrical and asymmetrical threats with clear purpose, confidence, and a focus on the future.

RADM Paul F. Sullivan, USN
Director, Submarine Warfare

CALL to WAR

A Proud Legacy of Innovation Inspires New Ways to Fight and Win

by RADM Richard P. Terpstra, USN

Surprise attack on American soil... An enemy we did not know well or understand... An enemy who knew more about us than we did about him... An ongoing revolution in warfare... The need to take the fight to the enemy.

The Old and the New

Many things have changed since a Great Generation rose up to challenge and defeat worldwide enemies bent on intimidation and the destruction of all who opposed them. Surely, World War II tested the character of our nation and demonstrated the importance of innovation and the continuing need for improving the way we fight in the face of unexpected threats and an unpredictable enemy. While times have changed, and technology has accelerated rapidly since the 1940s, lessons and principles of the past still beckon during this current conflict and conflicts yet to come. These lessons call upon the greatness of those in service today to act now at best speed. The global war on terror – and it is a war – or the next war against whatever foe may confront us, challenges us to think differently. I believe we can learn a great deal from the aggressive and sometimes risk-embracing mindset of our World War II warriors. Whether through technical and tactical means or sheer tenacity, new and important ways to fight and contribute to the war effort came quickly to those heroes – because they had to!

While some of this discussion may fall under the academic or policy realm of "transformation," my intent is not to add to the multitude of voices touting the need to transform our military capabilities – that chorus is loud and sometimes confusing – but it's right-on! *Rather, my goal is to challenge each wardroom to discuss new ways to fight and to call your attention to warriors of the past and the way they waged war.*

Joint Warfare Solutions

It's fitting to preface this discussion by noting the importance of joint warfare. The war on terror highlights the absolute necessity for sharing intelligence, situational awareness, and operational strengths. In order to connect the dots and preempt the enemy, the importance of the network as a weapon cannot be overstated. Against a shadowy enemy operating as an organization that knows no borders, nothing short of an all-source, collaborative, joint and inter-agency full-court press will suffice to preempt terrorist acts and keep us on the offensive. Organizations which work in isolation will become increasingly irrelevant. Both successes and tragedies in Operation Enduring Freedom can be traced directly to battle-space situational awareness – or the

lack of it – with the latter resulting in fire on unintended targets. Sharing the operational strengths of different forces – making the sum of the whole much greater than the individual parts – is at the heart of joint warfare and central to finding new ways to fight and win.

Legacy of Innovation

You may have noted that I have not yet referred to submarines or submariners. This discussion applies equally to all services and all branches, but since I'm more familiar with submarine history and its inspirational examples of innovation, it's a good place to begin.

When strategists prior to the outset of World War II considered likely submarine mission areas and capabilities, most would *not* have included: counter-communications operations; capturing and interrogating prisoners; shore bombardment with both naval gunfire and rockets; anti-surface warfare – boarding and seizure, radar-directed surface attacks; harassment and diversionary operations; and landing-party sabotage in enemy territory. Yet, in just over three and a half years, each of these missions had been conducted successfully. Notwithstanding the strategic strangulation inflicted by our Submarine Force on the island nation of Japan, our innovative forefathers delivered a great deal more than expected. According to plans in effect before the war, submarines were to serve as scouts, combat auxiliaries supporting the surface fleet, and coastal defenders. Starting slowly with virtually no combat tradition or experience – and limited by many technical and operational problems – our submarines went on the offensive. The key word is *offensive*. In the end, aggressive, well-trained submarine crews, staying on the attack, resulted in unprecedented success and victory.

Near Term Discussion

Forward 50 years to a different world with constrained budgets and a non-traditional enemy – what lessons apply?

Our Submarine Force leadership has established a clear and powerful vision in the form of Submarine Joint Strategic Concepts. (See the *U.S. Submarine Force Mission and Vision*, published by the Director, Submarine Warfare (N77), or their web site: www.chinfo.navy.mil/navpalib/cno/n87/future.html). Team Submarine, SUBTECH, the Submarine Future Studies Group, and supporting industry are at work on many critical new capabilities, including our centerpiece, the well-designed USS *Virginia* (SSN-774)-class submarine. With that near-term focus in mind, I offer some areas for discussion, while acknowledging a great deal of ongoing research and development.

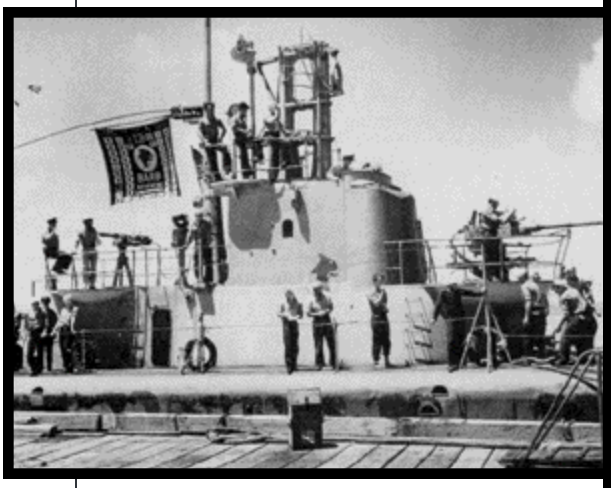
Extending the range, quality, and accuracy of sensors is vital. In the littoral, one of the most powerful methods of accomplishing this is through the use of Special Operations Forces (SOF). Much notoriety was given to the example of SOF on horseback in Afghanistan calling in precision air strikes. But imagine submarine-delivered SEAL forces directing attacks of submarine, air, or surface-launched weapons. The SSGN will be the most effective method of employing SOF in 2007, but my hope is that we move ahead now at best speed in this partnership. When properly networked, the joint Navy-SOF combination can provide tremendous synergy and many new war-fighting possibilities.

Another method of sensor extension that seems promising is small, expendable, low-cost, unmanned aerial vehicles (UAVs). These devices, equipped with micro-sensors and communications packages, could be pre-programmed and launched or controlled from a submarine by any number of methods and deliver a unique, close-in quick-reaction capability for providing critical information not available from other sources. A "high look" used to mean six more feet of periscope sticking out of the water, but UAVs could give us several thousand. Networked with other surveillance and strike platforms, this concept has great potential for the joint expeditionary force.

A great deal of promising research and development has gone into unmanned undersea vehicles (UUVs). Dr. Edward Whitman's article on the subject in the Summer 2002 issue of UNDERSEA WARFARE is an excellent primer. Another concept that will yield additional capabilities is the small, *manned* undersea vehicle. Think of all that can be accomplished by the Advanced Seal Delivery System (ASDS). I think we should be considering and assessing some unconventional uses of that asset.

In the weapons arena, I believe that the capability to attack small, shallow-draft, high-speed surface craft will become increasingly important to the joint expeditionary force. Because of its inherent strengths, a submarine may be best-positioned to kill these threats to naval forces under many circumstances. By adapting existing small missiles for submarine use, I also believe we could significantly add to the power and effectiveness of sea-basing by providing a first line of defense.

Submarine mobility, on-station time, access, and large electric-power availability portend great potential for information operations, directed energy weapons, and space-systems support. I suggest that study and investment in these key areas could provide near term capabilities that are not otherwise achievable and give combatant commanders many new and effective options.



The bravery and ingenuity of the crew aboard USS *Barb* (SS-220) during World War II should inspire all submariners to consider new ways to fight the war against terrorism, as well as future conflicts that call the U.S. Submarine Force to battle.

As a final thought, the submarine's advantages in an anti-access environment provide many reasons to team with other joint force platforms in scenarios where weapons, sensors, or communication devices can be delivered close-in by other platforms and then controlled or activated at a later time by an on-station submarine. This approach will allow the sea-based force to quickly deliver capabilities where needed, reduce most threats, and keep the others more at arm's length for added reaction time.

"Raise a Rumpus"

So began a personal message from VADM Charles Lockwood, World War II COMSUBPAC, to LCDR Gene Fluckey Commanding Officer of USS *Barb* (SS-220) at the start of that boat's War Patrol 12. The account of that mission, which earned her crew a Presidential Unit Citation and her

(continued on page 29)

EXPERIMENTATION: THE KEY TO TRANSFORMATION

by Floyd D. Kennedy, Jr.

Secretary of Defense Donald Rumsfeld views experimentation as a means to transform the U.S. military into an effective fighting force for the 21st century, and United States Joint Forces Command spends hundreds of millions of dollars each year on it. Additionally, each service spends tens of millions annually on service experiments. VADM John Grossenbacher, Commander, Naval Submarine Forces (COMNAVSUBFOR), has declared experimentation to be a necessary cost of doing business in today's armed forces. What is experimentation, and is it something new? What is its scope?

Many will argue that experimentation is nothing new for the military. And it's not, if we define it simply as coming up with new ideas and seeing if they work. Probably the best naval examples of this are the Naval War College war games focused on defeating the Japanese Navy and the Marine Corps development of amphibious doctrine, both accomplished between the World Wars. What is new are the efforts being made to institutionalize an experimentation process, DoD-wide, to keep coming up with new ideas and testing them, and making that process a prerequisite to resource allocation.

The least appreciated aspect of today's experimentation is its scope. That scope is, in a word, comprehensive. It extends from the here and now of tactical development and evaluation (TAC D&E) to the there and then of what used to be called the Revolution in Military Affairs (RMA), so far into the future that nothing is sacred. TAC D&E takes existing or prototype systems and tests concepts for better applying them to today's warfighting challenges. The RMA takes technologically feasible capabilities and tests concepts for applying them to tomorrow's projected challenges. The first is the practical application of today's capabilities to refine both their performance and our ability to employ them. The second borders on science fiction, and facilitates our thinking on what we want to be able to do 20, 30, or even 50 years into the future. Most experimentation lies somewhere between these two extremes, focused five to 15 years into the future, on systems that are prototypes; systems that are programmed but not yet available; or systems that are planned – plus the operational concepts to employ them in the nation's interests.

Why Experiment?

We experiment to learn. And we learn to transform the force from what it has been, to what it needs to be for the 21st century. If we don't learn, the experiment is a failure. Often, the imperative to "conduct an experiment" can be so overwhelming that the objective becomes simply having an experimental event. Conducting such an event is not worth the resources expended if we don't learn from it. And, paradoxically, we often learn the most from a failure.

Failure is easier to accept when we're examining concepts, as opposed to production systems that have enormous resources already sunk into their development. That's the whole point behind experimentation: we learn through a series of experiments what we really want to do; how generally we should do it; what specific technologies should be operationalized to help us do it; how those technologies should be packaged into systems; how those systems should be operated to maximize their capabilities; and how those capabilities should be integrated with others of the same or different services, or even coalition partners. Experimentation therefore feeds requirements at every step of the process. Production systems will have a minimal probability of failure if they've survived rigorous experimentation throughout their development. Conversely, if we wait to experiment with systems until they're almost ready for fleet introduction, the incentive to distort results to avoid system "failure" can be

high. We need to prevent that, and we do it by experimenting throughout a system's development.

Secondary benefits of Submarine Force experimentation include demonstrating to others what undersea systems can do for the joint force, teaching ourselves about the context within which we do what we do (i.e. the greater naval and joint worlds), and influencing the course of future joint operations. But these are secondary to our focus on testing, refining, and winnowing our undersea warfare concepts, and learning from that process.

Concepts

The experimentation process requires a vehicle on which to focus assessment. In most cases, that will be a concept of some kind. There are operational concepts that are "big picture" and tell generally how we would like to approach a problem (e.g., how undersea platforms can contribute to joint fires). At the other end of the spectrum, there are system concepts that tell in as much detail as possible what kind of package we'd like to have to solve a specific problem (e.g., a mine-hunting UUV for in-stride mine countermeasures, which communicates in real time and can attach explosive devices to mine-like objects that it detects). In between there are concepts of operations (CONOPS – sometimes called concepts of employment) that tell how specific systems would contribute to solving a problem identified in an operational concept (e.g., the SSGN CONOPS). All three examples exist, and the Submarine Force has assessed them in experimentation venues.

Concepts should always be "works-in-progress." They're never finished. Elements of concepts can be accepted and institutionalized as tactics, techniques, and procedures (TTP), doctrine, or requirements, but the concept itself must remain free to evolve through the experimentation process to ensure continued improvement in overall force capability.

The overarching operational concept that should inform all others belongs to Joint Forces Command. Entitled "Rapid Decisive Operations," it has several subordinate functional warfighting (operational) concepts on assured access, joint intelligence/surveillance/reconnaissance (JISR), information operations, and the common relevant operational picture (CROP).

The Navy Warfare Development Command (NWDC) has a Concepts Department, the products of which are available at http://www.nwdc.navy.mil/Concepts/Concepts.asp. Their capstone concept is Network Centric Operations, with supporting "integrating" (operational) concepts for assured access, effects-based operations, forward sea-based forces, and information and knowledge advantage.

Within the Submarine Force, we are in the process of developing and refining concepts for undersea platforms to contribute to the operational concepts of both JFCOM and NWDC. Of course, we're also constantly developing system and employment concepts to enhance undersea platform capabilities across the board; our SUBTECH process and Payloads and Sensors effort are two prime sources for such concepts. Our two current operational concepts are "Submarines in Joint Access" and "Submarines in Joint Fires."

Venues

Places we can do our concept testing, refining, and winnowing are as varied as the concepts themselves. For operational (big picture) concepts, war games such as each service's "Title 10" games provide the most appropriate venue. These games are designed to help the individual services fulfill their Title 10 responsibilities of organizing, training, and equipping their forces for employment by Unified Commanders around the world. For CONOPS in which we have a piece of hardware, whether a prototype system or another system that's emulating the one we want to examine, the Fleet Battle Experiments run by NWDC's Maritime Battle Center may be the most appropriate venue. For system concepts, where we want to focus on a prototype to ensure it works as advertised, a limited objective experiment tailored to that system and its immediate operating environment will probably enable us to learn the most.

We can create our own Submarine Force venues or ride along on the venues of others. Those we create ourselves are severely limited by the resources it takes to plan and execute them, so are typically minor events like a seminar or seminar war game in preparation for another organization's major event. And there are plenty of other events from which to choose. The Army, Navy, and Air Force all sponsor "Title 10" war games in which future concepts are assessed for their respective services. The three services also put on major and limited-objective experiments. Joint Forces Command's J9 Experimentation Directorate sponsors both major events (like this year's Millennium Challenge 02) and minor experiments.

All these venues provide the Submarine Force, and the Undersea Experimentation Working Group that monitors potential venues, with the opportunity to test our concepts. The trick is to identify well in advance those venues that provide us with the best opportunity to learn from testing our ideas, then to engage the planners of those venues to ensure our experimentation objectives can

U.S. Air Force photo by SSGT John Houghton

Photo by PH2 Michael R. McCormick

(top) Inside the Integrated Battlespace Arena (IBAR), Michelson Laboratory, China Lake, California, warfighters keep a close eye on screens showing a real-time picture of theater air assets and a live feed from a Predator surveillance aircraft on July 30 2002, during Millennium Challenge '02.

(bottom) The U.S. Third Fleet Command Ship, USS *Coronado* (AGF-11) embarked U.S. Air Force GEN Richard Myers, Chairman of the Joint Chiefs of Staff (left), and members of his staff during the Joint Military Experiment, Millennium Challenge '02 in San Diego, California. *Coronado* provided the headquarters for the command of maritime and joint forces during the experiment.

be achieved. We have been doing exactly that in a systematic way since mid-1999.

Results

Over the past three years, we have examined the scenarios, force structures, and command and control architectures of projected venues and identified several within which we could examine elements of our operational concepts on "Submarines in Joint Fires" and "Submarines in Joint Access." In addition, NWDC identified several initiatives involving undersea platforms that it wanted to examine in its Fleet Battle Experiments (FBEs) and Limited Objective Experiments.

Photo by PH2 Dawn C. Montgomery

A Battlespace Preparation Autonomous Underwater Vehicle (BPAUV) is being lowered into the waters of coastal California from the deck of the High Speed Vessel *Joint Venture* (HSV-X1) during Millenium Challenge '02.

Fleet Battle Experiments

Though NWDC evaluated some new prototype systems onboard submarines and emerging developments in network connectivity in FBE-Echo and again in FBE-Foxtrot, the submarine community's first focused exploration of one of our operational concepts took place in FBE-Golf (April, 2000). For FBE-G, we examined two initiatives that we drew from our concept of Submarines in Joint Fires: Guided Missile Submarine(s) in Joint Fires, and SEAL (Sensor) to SSN (Shooter) Execution. Real-world events precluded live-forces play in the Mediterranean, so we focused on a combination of CONUS live play and a virtual submarine that we established at Naval Undersea Warfare Center (NUWC) Newport. This combination allowed us to examine the connectivity, information, and internal-to-the-pressure-hull procedures necessary to conduct mutually-supportive tasks between SEALs ashore and submerged submarines, as well as to validate several procedures for submarine participation in pre-planned fires executed via an air tasking order. Many of the insights we gained from these efforts have been incorporated within our concepts of operation in support of the war on terror.

For FBE-Hotel, conducted under Commander Second Fleet auspices in August and September 2000, we focused on an initiative examining the plausibility and utility of a Theater ASW Commander, and reachback from a forward-deployed battle group to the Theater ASW Commander's headquarters at CTF-84. We determined that both a Theater ASW Commander executing an offensive ASW campaign, and integrating that campaign with the defensive ASW requirements of a carrier battle group commander through reachback capabilities can be highly desirable, and are quite feasible. We're following up on those findings with a more detailed initiative in FBE-Juliet, ongoing in the Pacific as this is being written.

NWDC executed FBE-India in May and June of 2001 in coordination with Commander 3rd Fleet. For this event we stood up a virtual SSGN (vSSGN) at NUWC, and operated it as an integral element of the live forces participating in the Pacific. LCDR Erik Burian's article in the Winter/Spring 2002 issue of UNDERSEA WARFARE documents the vSSGN's performance during this FBE.

As mentioned above, FBE-Juliet is at this writing underway in the Pacific. We have numerous initiatives within this FBE including submarine fires from both the vSSGN and an SSN emulating an SSGN in the Southern California OPAREA – see the vSSGN Weapon Loadout on page 7. More will be reported on this FBE in a future issue of UNDERSEA WARFARE.

Global War Games

Since 1978, the Naval War College has conducted an annual war game to examine operational and strategic concepts for employment of future naval forces. This "Global War Game" is conducted for the expressed purpose of helping the Department of the Navy execute its Title 10 responsibilities for organizing, training, and equipping Navy and Marine Corps forces for employment by Unified Commanders. Since 1978, the other service departments have also initiated war games for the same purpose. Collectively, these games are known as Title 10 war games.

In Global 00, we participated to a limited extent, focusing on ASW issues. For Global 01, we made a major commitment to both the Global operational game and an overlaid technology "Innovation Game," focusing on a variety of undersea warfare issues, including the undersea component of NWDC's expeditionary sensor grid concept, SSGNs in land attack, surface warfare, and special operations roles, and SSNs in mine warfare, ISR, and ASW roles. Global 01's Southwest Asia scenario provided a promising environment for examining our initiatives.

During Global 01's pre-hostilities phase, submarines clandestinely deployed an extensive netted undersea array that formed an essential component of NWDC's concept for an expeditionary sensor grid (ESG). This ESG, combined with an aggressive tagging program, kept the littoral ASW problem under control; the ESG also provided warning and localization data against the swarming small craft threat posed by Red. A *Virginia*-class dedicated ISR variant was integrated directly into the ESG and provided tremendous capability in support of the ESG as a whole. Global's concept for employment of undersea assets within the context of an ESG stimulated a great deal of innovative thinking among the operational game players, and among the Innovation Game participants. These insights have been informing decisions made within the SUBTECH and Sensors and Payloads efforts, as well as refining our developing concept for submarines in joint access.

Air Force Future Capabilities Game

The Air Force's Title 10 game alternates years between a Future Capabilities Game that looks 20 years in the future, and a Global Engagement Game that looks out ten years. Future Capabilities Game 2001 (FG01) took place last December, and we seized the opportunity to explore initiatives from both our joint fires and joint access concepts.

Unlike the Global 2001 game, which didn't pose an overwhelming anti-access problem, FG01 looked at the access-denial capabilities of a major peer competitor (Red) in the year 2020. Since Red's strategy was to execute a quick, punitive action against a neighbor with close ties to the United States,

Blue's principal measures of effectiveness became rapidly closing and overcoming Red's anti-access capabilities, and then supporting our ally's expulsion of Red forces.

Given the robust anti-access capabilities of Red, and the requirement to flow land-based forces, force-protection assets, and the associated logistics tail over great distances, we were able to examine thoroughly the access-enabling potential of submarines in multiple roles. Both SSNs and SSGNs operated well inside the Red integrated air defense system (IADS) and coastal defense cruise missile perimeters on ISR and SOF delivery missions. In addition, the SSGN, armed with a payload of various future weapons and sensors, stimulated (with decoys), suppressed (with jammers), and destroyed (with tactical ballistic missiles) elements of Red's IADS, creating attack corridors deep within Red's homeland for both manned and unmanned systems. This joint suppression of enemy air defense (JSEAD) was followed by SSGN-launched cruise missile strikes, as well as Navy and Air Force tactical aircraft strikes. Another payload employed on SSGN was a company-sized SOF unit that was used to execute a campaign to neutralize Red forces in an island group. We will explore further the contributions of various payloads in upcoming events to determine the best investments for scarce resources.

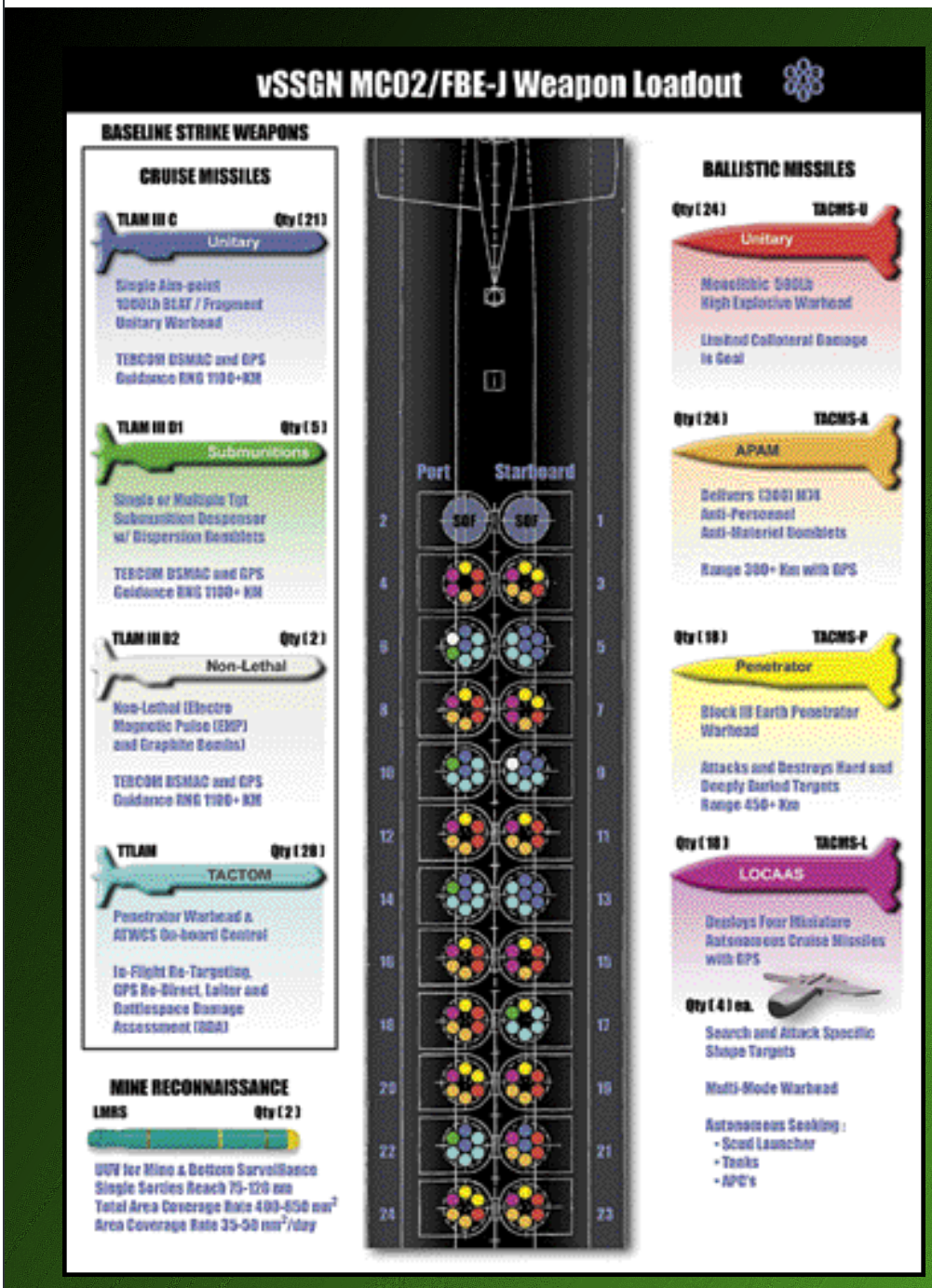
The Future

The coordinating agency for Submarine Force concept development and experimentation is the Undersea Experimentation Working Group (UEWG), co-chaired by representatives of Commander Naval Submarine Forces and the Director of Submarine Warfare. Members of the group include representatives from SUBLANT, SUBPAC, NAVSEA, NUWC, and NWDC. The group meets quarterly, or more frequently as circumstances dictate, to discuss concept development, identify appropriate venues for experimentation, and review what we've learned from recent experimentation. It reports to the COMNAVSUBFOR Chief of Staff and CNO N775.

The UEWG's near-term priority is refining operational concepts for submarine contributions to joint access and joint fires. Concepts of operations within these higher-level constructs include joint suppression of enemy air defenses (JSEAD), clandestine intelligence, surveillance, reconnaissance, and targeting (ISRT), mine reconnaissance and neutralization, littoral anti-surface warfare (ASUW), theater anti-submarine warfare, battlefield interdiction, and on-call fires. System concepts being explored include SSGN with payloads for JSEAD, interdiction fires, and littoral ASUW, and *Virginia*-class variants with off-board systems for mine countermeasures, ASW, ISRT, and onboard payloads for interdiction fires and littoral ASUW.

Projected venues in which we'll examine these concepts over the next year include Army, Air Force, Navy, and Special Operations Command war games, Fleet Battle Experiments, the Air Force's Joint Expeditionary Force Experiment, and NWDC limited-objective experiments. As this issue closes for press, we're already preparing for FBE-Kilo to be executed in Spring 2003, and the Air Force's Global Engagement VI war game, to be executed in November of this year. We'll report periodically in the pages of this journal on the results of these and other efforts.

Floyd D. (Ken) Kennedy, Jr. is the Center for Naval Analyses representative on the staff of Commander Naval Submarine Forces (N02EG). He served as CNA representative on the staffs of CINCUSACOM (joint interoperability) and Commander Naval Doctrine Command (concept development) prior to joining the SUBLANT staff in 1999. He retired from the Naval Reserve in 1999 after 30 years of active and reserve service.



The *Collins*-class Australian Submarine HMAS *Sheean* (SSG-77) joins a flotilla off the coast of Kauai, Hawaii, with numerous other international naval vessels.

FOCUSING ON ASW IN RIMPAC 2002

by JOCS(SW) Phil Eggman, USN

LCDR Scott Harrington sat in the wardroom of USS *Chicago* (SSN-721) with a big smile on his face, a look of relief perhaps. And why not? As Executive Officer, he and his crew had had their hands full this summer preparing for a change of command in addition to supporting Rim of the Pacific (RIMPAC) 2002, a major maritime exercise conducted in the waters off Hawaii, with maritime forces from Australia, Canada, Chile, Peru, Japan, the Republic of Korea, the United Kingdom, and the United States.

RIMPAC 2002 did not focus on the traditional carrier battle group scenario, but rather emphasized a heavy anti-submarine warfare (ASW) theme, while honing the tactical proficiency of participating units – surface combatants, submarines, tactical aircraft, and amphibious forces – in a wide variety of combined operations at sea.

Chicago supported the Multinational Force (MNF) during the work-up or familiarization stage – 1 to 10 July – and in the tactical phase – 12 to 15 July. On the last two days of the tactical phase, *Chicago* switched roles to support the Opposing Force (OPFOR) for the simulated war on 16/17 July. In addition to *Chicago*, USS *Key West* (SSN-722) supported the Bilateral Force (BIF) during the work-up and tactical phases. Foreign navy submarine assets from Australia, Korea, and Japan also participated. Harrington noted that the goal of this RIMPAC was to exercise ASW tactics with the participating nations in both familiarization exercises and set scenarios. "This is where we went out and tried to be stealthy; doing approaches on other ships and allowing them to get a good look at us," he said.

A typical familiarization day would have a submarine-on-submarine focus. For example, *Chicago* would move out and work with a South Korean boat, each submarine taking turns tracking the other while generating different kinds of radiated noise and trying a variety of evolutions, so each could get familiar with the other's operating modes.

Next *Chicago* would work with the surface ships and patrol aircraft. "For some units who had never exercised with a submarine before, this allowed them to learn what a real submarine looks like and sounds like," Harrington said. "On the surface we are very difficult to see, and when we're submerged? Well, hopefully we're very stealthy."

In the tactical phase, the scenarios were not quite so canned. "We had a beginning point, and an ending point," Harrington explained. "How the opposing force was going to get from one to the other was up to them. Our job during this phase was to go to periscope depth and perform an all-sensor search and try to figure out what the opposing force was doing. "We found the fleet's aerial screen of P-3 and helicopter anti-submarine aircraft was really quite effective," he continued. "We would try to get in front of the battle group, even if we didn't think they had us. We went deep and tried to get in front of them, but by the time we got back up, the fleet had reversed course and gone the other way."

According to LT Brian Guise, *Chicago*'s Communications Officer, the boat had some real challenges in the beginning of the exercise. "Our communications were not well aligned with what the battle group had, so we had to make some work-arounds getting our communications set up," he said. But his crew was able to come up with an alternate network using logistics links and satellite and UHF radio to communicate with the battle group commander in real time. *Chicago*'s Commanding Officer, CDR Daniel Prince, wanted to send immediate feedback on each evolution, which Harrington said enhanced RIMPAC's success after each engagement. The battle group commander knew immediately what worked and what didn't in trying to screen his surface action group. "Never underestimate the value of a good, one-page concise message," said Harrington, noting that Prince was probably the best writer he had ever worked for. "He could say more in one page than what a lot of guys would take five pages to say. He would write, 'this is what we saw, this is what we did, this is what worked, and this is what didn't. Why don't you guys try this?'"

The targets they especially wanted were the replenishment oilers USNS *Yukon* (T-AO-202) and USNS *Tippecanoe* (T-AO-199). "We were going to shoot out the oil cans and when the rest of the fleet ran out of gas, we would pick them off one by one."

"I believe by the end of RIMPAC everyone was more prepared to go to war against a submarine," Harrington added, noting that at least at the beginning of the exercise, conditions were poor for active sonar, and it offered no real performance advantage for the surface fleet. "All it really did was let us know who they were and where they were," he said, while admitting that they were not really after the warships anyway. The targets they especially wanted were the replenishment oilers USNS *Yukon* (T-AO-202) and USNS *Tippecanoe* (T-AO-199). "We were going to shoot out the oil cans and when the rest of the fleet ran out of gas, we would pick them off one by one."

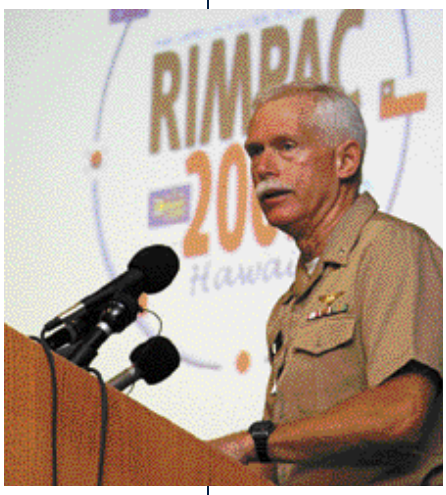
During the exercise, participating ships would know the assignment of an adversary's water space – large blocks of water, 50 to 70 miles square. *Chicago* would get an intelligence spot telling them that the opposing forces were – perhaps – to the northeast trying to go to the southwest. The boat would have a rough start time, and from there, it was up to them to decide on the best search tactic. "If they were going active, then we were going deep," Harrington said. "We could hear their active sonar pounding away from the northeast, and we could watch them from deeper water.

"Unfortunately for the MNF, the ship that we wanted to shoot most, the oiler, was always the loudest ship and the one we could pick up the easiest," he continued. "We would listen specifically for the auxiliary, and after we had worked with them a couple of times, we had some knowledge on how fast their shaft was normally turning, listening for a four blade screw, doing about a 78 shaft rpm, and we knew that was our prize."

What is the benefit of exercising with foreign navies?

"Well, it makes us think – provides us with new ideas on how ASW can work," said Harrington. "Sometimes having a really awesome platform like *Chicago* can exaggerate your sense of invincibility, and a nuclear submariner is tempted to think he has this advantage over any diesel submarine. But we saw these guys use the environment around them and do some pretty incredible things," he continued. "Diesels are very stealthy, and a diesel submarine operating quietly on its battery in the environments we work in can be pretty scary because you just don't know how close you can get to one and not even know it's there."

The crew aboard *Chicago* could not say enough about how impressed they were by their Australian counterparts. "I learned a ton from the Australians," said LT Mike Lowry, *Chicago*'s Combat Systems Officer. "Some of the tactics that they used were incredible," he continued. "We are used to just charging right in and punching the enemy in the eye, but they knew exactly what they could get away with, and they did it every time. They did all the right things. Knowing that there are submariners out there who are that good makes you very glad those guys are on our side."

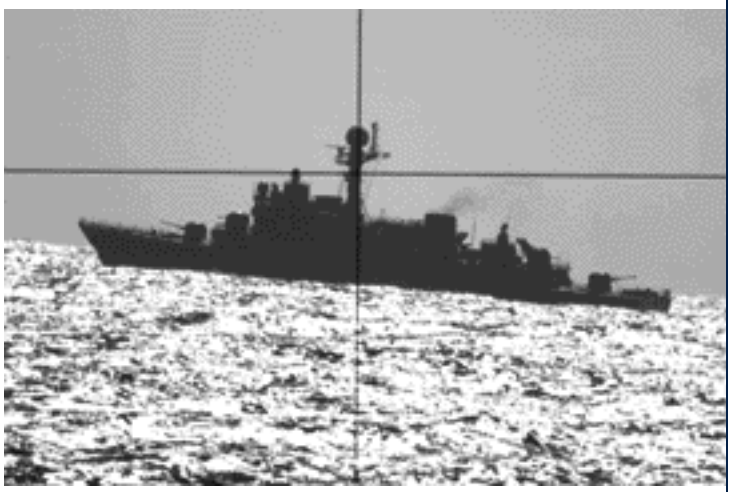


RADM John R. Hines, Jr., Deputy Commander, U.S. 3rd Fleet, addresses media and RIMPAC 2002 participants with opening remarks at Sharkey Theater, Naval Station, Pearl Harbor, Hawaii.

But LCDR Harrington observed that the submarines *Chicago* went up against were not their primary threat. Moreover, they were not even worried about surface ships, because the latter's excessive use of active sonar tended to mask the boat's movements.

"The mayhem factor is on your side when you are right in the middle of them, which is probably where they least expect to look for you. We would go up and take a look around and the skipper would say, 'Ahhh, this guy dies next.'"

Photo by PH3 Michael J. Pusnik, Jr.



(above) The Republic of Korea submarine *Nadaeyung* (SS-069) surfaces while conducting training exercises during RIMPAC 2002. This exercise was designed to improve tactical proficiency in a wide array of combined operations at sea, while building cooperation and fostering mutual understanding among participating nations.

(right) A Chilean ship is sighted through a U.S. submarine periscope.

Harrington felt that the real threat came from aircraft, because *Chicago* was operating in shallow water with a high probability of being visually detected from the air. He recalled one scenario in which three P-3s and two helicopters were prosecuting the boat relentlessly. "That was a nightmare to try and get through," he said. "We could never get a good solid look, 15 seconds maybe, because our periscope radar detector was just screeching, and all our early warning systems were going off. They got right around us. It is pretty intimidating when you see all the radars directed at you from all around, and you can hear the buoys splashing in the water.

"But there were also many times when the fleet didn't get by us," he added. "I think we had some pretty good hunting out there." For example, Harrington described the last approach of the tactical phase of the exercise when *Chicago* decided to penetrate the screen instead of just sitting on the fence and shooting from a distance. "We got inside, and sitting there were five ships," he said, clearly showing his satisfaction about getting inside the screen. "The mayhem factor is on your side when you are right in the middle of them, which is probably where they least expect to look for you. We would go up and take a look around and the skipper would say, 'Ahhh, this guy dies next.'"

"We felt like a shark in the middle of a school of fish," said Lowry. "We had them totally surrounded and there was nothing they could do about it."

"What do you do when the guy on your right blows up," Harrington said. "What do you do next? Turn left? Turn right? We got underneath their aircraft, let the screen guy go over, and up we went, and there we were with all those big, fat, juicy oilers."

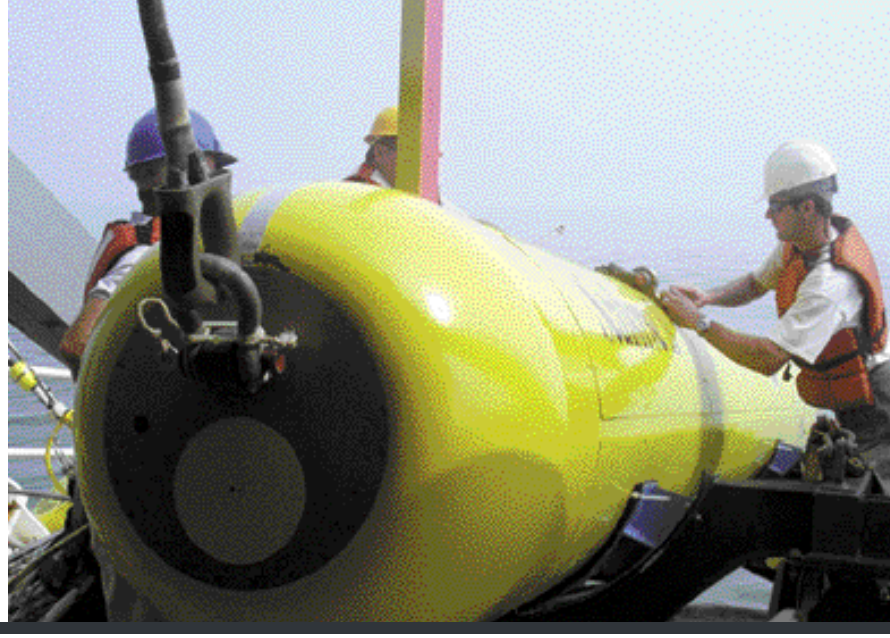
During the war phase, *Chicago* operated the same as during the tactical phase, working in a small block of water, with forces at opposite ends. "We would try to go from here to there, and our job was to get in front of the ships and not let them get by us," Harrington said.

During the war phase, *Chicago* also penetrated the screen. "I remember the amphibious dock landing ship USS *Duluth* (LPD-6) was on one side, and the oiler was on the other with the screen all around, and we were smack dab in the middle," LCDR Harrington said. "We shot the oiler and two escorts and then we shot *Duluth* from behind. With the gas can blown up, the rest of the fleet wasn't going anywhere fast."

"When we started out in this exercise, we knew that it was supposed to be a learning environment for everybody," said LT Guise. "Everyone got much better as we went along, because we were sending messages to each adversary saying, 'this is how we killed you this time,' and 'this is how we killed you that time,' or 'why we didn't kill you.' They were getting instantaneous feedback, and they kept getting better. It was good to see them get better, because we got better too."

LT Lowry agreed, noting that the P-3 operators continued to improve their ability to prosecute submarines beginning to the end. "I can guarantee you, from my standpoint as an operator, that the P-3s tripled their efficiency at submarine prosecution, while the surface ships doubled their ability to avoid being destroyed by a submarine," he said. "You could see it in the way they operated. Everyone got better at ASW – everyone."

JOCS(SW) Eggman is the Leading Petty Officer at COMSUBPAC Public Affairs.



(above) SEAHORSE engineers work on a module inside one of the SEAHORSE 2 bays.

(above right) SEAHORSE 2 is being prepared for launch from the IC-508 AUV Support Vessel.

SEAHORSES and SUBMARINES

Testing transformational capabilities with modern UUVs at NAVOCEANO

by Craig A. Peterson and Martha E. M. Head

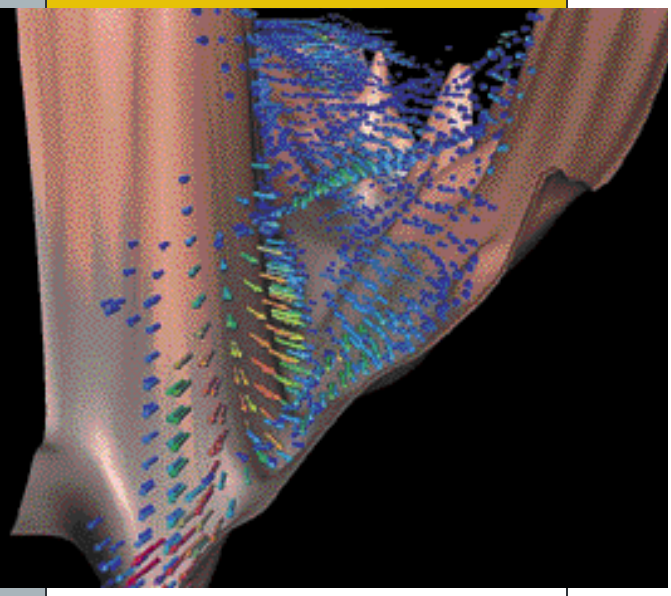
For the past 40 years, the Naval Oceanographic Office (NAVOCEANO) has been the Navy's primary source of environmental data and analysis products to support navigation and performance prediction for weapons and sensors. And similarly, NAVOCEANO will be the primary source of environmental information for supporting the operation of unmanned undersea vehicles (UUVs) in the future.

Located at the John C. Stennis Space Center near the Gulf of Mexico in southern Mississippi, NAVOCEANO has a 172-year history of military ocean survey. Ocean data is collected worldwide by a dedicated fleet of eight survey ships, supplemented by ships of the University National Oceanographic Laboratory System (UNOLS) fleet and airborne and subsurface craft. Complementing this array of platforms are drifting and moored buoys, as well as satellites. NAVOCEANO uses this information to generate environmental products tailored to the warfighters' needs, and we support virtually every current fleet operation. Examples of the environmental information NAVOCEANO supplies can be viewed on the Internet at http://www.navo.navy.mil.

SEAHORSE UUVs for Ocean Survey – and more

In a key naval transformation effort, NAVOCEANO has volunteered a fully-autonomous SEAHORSE-class UUV to the Undersea Technology Directorate of the Naval Sea Systems Command (NAVSEA) for use in the first of a series of Transformational Payloads and Sensors Demonstrations for the SSGN submarine conversion program. In the planned demonstration, the SEAHORSE UUV will be launched from an SSBN missile tube and will conduct a long-range, multi-mission mine countermeasures (MCM) operation. The demonstration will also feature an oceanographic survey.

As an example of why it is important to understand the details of the underwater environment in UUV areas of operation, this three-dimensional visualization of the current field at the Strait of Hormuz shows enormous variability in both speed and direction from surface to bottom. The viewer is looking from the Gulf of Oman into the Arabian Gulf, and although the maximum depth of the strait is only 105 meters, the vertical scale is exaggerated here by a factor of over 1,000. NAVOCEANO's Shallow-Water Analysis and Forecast System (SWAFS) generated this prediction.



SEAHORSE was introduced recently by NAVOCEANO as an economical, long-endurance, autonomous UUV for collecting oceanographic data. It followed a technology program at the Defense Advanced Research Projects Agency (DARPA) that was transitioned to the Navy several years ago. Low cost and rapid development were possible largely because, for oceanographic missions, some military standards for robustness could be relaxed. SEAHORSE was developed at the Pennsylvania State University Applied Research Laboratory (Penn State ARL), which was able to leverage substantial previous work in UUVs and UUV propulsor technology.

These fully-autonomous UUVs are force multipliers for oceanographic survey ships collecting high quality data in the littoral regions of the world. Intended to operate primarily from the Navy's USNS *Pathfinder* (T-AGS-60)-class military survey ships, SEAHORSE has a sturdy, yet adaptable, design and the long endurance needed for both demanding ocean conditions and deployment from either platforms of opportunity or even shore stations.

Penn State ARL delivered SEAHORSE 1, the vehicle planned for the SSGN Demonstration, to NAVOCEANO in October 2000. It executed its first operational survey from USNS *Bruce C. Heezen* (T-AGS-64) a year later. The vehicle is presently equipped with a 150-kHz side-scan sonar, a 300-kHz acoustic Doppler current profiler, a mast-mounted global positioning system antenna, and an inertial navigation system. SEAHORSE 2 was delivered in October 2001 and is currently in underway testing. Penn State is also fabricating a third operational vehicle, SEAHORSE 3.

SEAHORSE construction is modular to facilitate field maintenance, rapid mission turnaround, and payload flexibility. With an integrated afterbody for propulsion and hydrodynamic control, plus variable ballast systems fore and aft, the UUV can execute a variety of high-level commands, such as maintaining a constant depth, course, and speed; navigating between waypoints; and conducting search and survey patterns. Typical mission operating depths range from 15 to 1,000 feet, with endurance up to 72 hours. SEAHORSE vehicles are 28 feet long, slightly more than three feet in diameter, and weigh 10,500 pounds. Standard alkaline batteries (D-cells) power the vehicle, allowing a 300-mile range. NAVOCEANO plans to transition to rechargeable lithium-ion battery technology in the near future.

SSGN Mission Demonstration

NAVSEA will deploy SEAHORSE in January 2003 from a USS *Ohio* (SSBN-726)-class submarine. In addition to demonstrating the feasibility of launching a SEAHORSE-size vehicle from an SSBN's missile tubes, Experiment "Giant Shadow" will illustrate how the combination of Special Operations Forces, unmanned vehicles (both airborne and underwater), and an SSGN can provide the joint commander with new capabilities. The "Forward Pass Consortium" was selected by NAVSEA to conduct the demonstration. Consortium members are Raytheon Corporation, General Dynamics Electric Boat, Boeing, and Rite-Solutions. Besides NAVOCEANO, other participants in this demonstration include Penn State ARL and the Naval Undersea Warfare Center facilities at Newport, Rhode Island and Keyport, Washington.

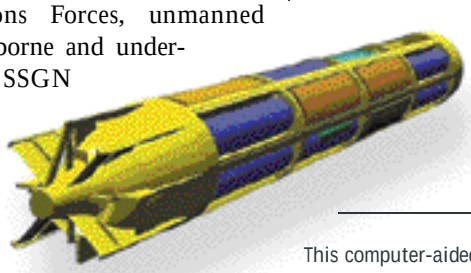
SEAHORSE will deploy vertically from a TRIDENTmissile tube on the SSBN, rotate to its normal horizontal configuration, and then swim up to 200 miles before launching a simulated mission payload at a predetermined point. Oceanographic data and side-scan sonar images will be collected during the mission. Then SEAHORSE will be recovered onto a T-AGS-60-class military survey ship, much as it would be in a conventional oceanographic mission.

NAVOCEANO's UUV Forerunners

NAVOCEANO has strong ties to government, commercial, and academic organizations with UUV interests. These ties facilitate an active, affordable program for oceanographic and bathymetric measurements.

For many years, NAVOCEANO has used tethered or towed unmanned vehicles for undersea exploration. Side-scan sonar, like the SeaMap system transitioned from a program at the University of Hawaii, is used for low- to medium-resolution surveys. Another example is the Towed Oceanographic Survey System (TOSS) developed at Woods Hole Oceanographic Institution (WHOI). TOSS is towed very near the sea floor (often just 5 meters above) for very high-resolution bottom mapping. It has side-scan sonar for acoustic images and both still and video optical cameras. For both of these systems, the towing cable provides mechanical control and maintains fiber-optic communications with the survey party.

In the late 1980s through mid-1990s, the semi-submersible ORCA vehicle, a diesel-powered, remotely-operated survey platform, provided NAVOCEANO some useful experience with vehicles that did not require a mechanical tether. The Naval Research Laboratory (NRL) and Chance and



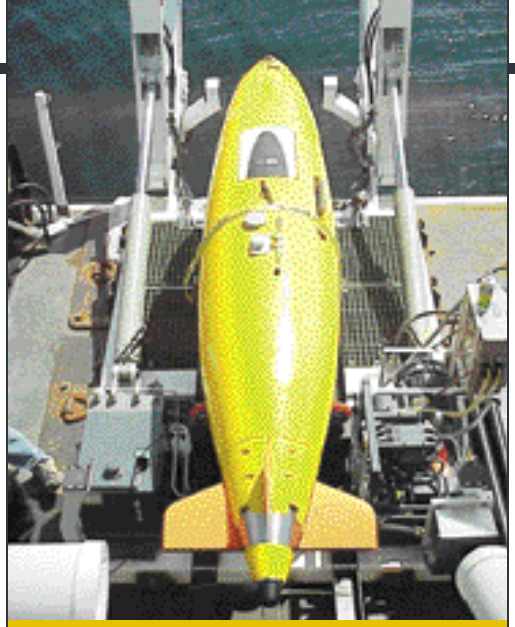
This computer-aided rendering of SEAHORSE shows its modular battery and payload bays. The vehicle is nearly 28 feet long by 38 inches in diameter and weighs nearly five tons. Mission range is 300 nautical miles, and endurance is 72 hours.

Chance, Incorporated (through an associated Cooperative Research and Development Agreement) led the adaptation of ORCA for oceanographic applications. The vehicle, though unmanned, was far from autonomous. It had to maintain "line-of-sight" radio communications with the mother ship, and since it operated at the surface, it had to be kept under constant visual observation to ensure the safety of local shipping. Later, the ORCA concept was adapted for the surface-ship Remote Minehunting System (RMS).

NAVOCEANO's first fully autonomous UUV was transitioned in the late 1990s from the discontinued Defense Advanced Research Projects Agency (DARPA) program mentioned above. The actual vehicle, designed and built at Draper Laboratories – and named *Lazarus* at NAVOCEANO – incorporated advanced technologies and offered long range and reliable autonomy. Although the DARPA vehicle's monolithic construction was not suitable for field maintenance aboard oceanographic ships, it served well on NAVOCEANO's Gulf of Mexico range to provide the experience that helped make the SEAHORSE class affordable and effective.

Currently, the SEAHORSE group of vehicles, including the SSGN demonstration's SEAHORSE 1, is the backbone of NAVOCEANO's untethered fleet. However, a semi-autonomous UUV, the Semi Autonomous Mapping System (SAMS), is also being acquired from WHOI. SAMS is an ou growth of Woods Hole's Remote Environ-mental Monitoring UnitS (REMUS) program and will operate primarily in conjunction with TOSS surveys. It is "full-ocean-depth" capable (i.e., to 20,000 feet) and has 12-hour endurance. SAMS could readily be converted for fully autonomous operation, but it is now designed for use within a coned-shaped volume of acoustic control transmissions under an oceanographic ship. Like TOSS, it will collect high-resolution side-scan images by working very near the bottom. SAMS has completed in-water testing with deployment from a T-AGS-60 platform. Its first operational survey with full operating capability will be in May 2003. Information on SEAHORSE and other NAVOCEANO UUV projects are also available on the Web site noted previously.

To maintain close ties with industry and academia, NAVOCEANO, along with its second-echelon command, Commander, Naval Meteorology and Oceanography Command (COMNAVMETOCCOM), and the Office of Naval Research, sponsor biannual Autonomous UUV (AUV) demonstrations on NAVOCEANO's Gulf of Mexico test range near Gulfport, Mississippi. These "AUV Fests" are planned to demonstrate the application of emerging AUV technology to military hydrography and oceanography requirements.



(above) The Semi-Autonomous Mapping System (SAMS) is a smaller, acoustically-controlled UUV capable of 12-hour mapping missions to a maximum depth of 20,000 feet. Here, it is prepared for launching from USNS *Bruce C. Heezen* (T-AGS-64).

(below) An earlier unmanned platform, the Towed Oceano-graphic Survey System (TOSS) is typically trailed behind a survey ship and positioned as close as 15 meters above the bottom to do high-resolution mapping.

Environmental Considerations

The forthcoming SSGN demonstration can also be expected to show in a realistic scenario the extent to which operational use of truly autonomous UUVs will require detailed knowledge of the ocean environment. Environmental information is necessary for advance planning, current operations, and post-mission data analyses. For the approaching demonstration, this background information includes sea surface environmental effects, as well as ocean currents from the surface to operating depths, tides, temperature and salinity profiles, and bathymetry. Other key information includes local-area fishing activities and hazards to navigation.

In general, safe, cost-effective operation of UUVs, whether for undersea warfare or commercial and academic applications, demands a minimal set of meteorological and oceanographic information in addition to bathymetry, coastal configuration, and hazards to navigation. This information for planning, conducting, and analyzing UUV operations should include analyses and forecasts of:

- Sea state and direction for launch and recovery
- Ocean current fields, including tidal currents and tidal cycles along the proposed track and at potential working depths
- Temperature and salinity (water density) along the proposed track
- Area overviews, including information about ocean fronts and eddies
- Weather in the area and weather approaching or otherwise affecting ocean conditions in the operating area
- Surf or river outflow for some operations
- Acoustic-propagation, if acoustic communications will be used at a distance
- Electromagnetic propagation, if radio communications will be used at long range

For nearly a half century, the Naval Oceanographic Office has provided the Navy's air, surface, and subsurface forces the environmental data and analysis they've needed to best carry out their missions in harm's way. That tradition continues as new technologies, such as fully autonomous UUVs, transform the Navy and expand its need for operational oceanography.

Craig Peterson is Director of the Ocean Projects Department at the Naval Oceanographic Office. He came to NAVOCEANO after a 30-year active-duty Navy career that included both flying helicopters and serving in the Navy's METOC (Meteorology and Oceanography) officer community.

Dr. Martha Head is an oceanographer at NAVOCEANO with broad program management experience in ocean acoustics, ocean modeling, remote sensing, and oceanographic databases.

IUSS Shines in SMART SEARCH 02

by ENS Teddy G. Tan, USN

Undersea warfare is an important element in achieving Maritime Dominance, and this summer's undersea warfare blockbuster was Smart Search 02. This coordinated, multi-platform exercise included participation by submarines, surface ships, and maritime patrol aircraft, with a featured role for the Integrated Undersea Surveillance System (IUSS).

Photo by ENS Teddy Tan, NOPF

Smart Search 02 took place over four days in mid-July off the eastern coast of the Carolinas. The exercise commenced with a simulated opposing force (OPFOR) submarine coming from the north to intercept a battle group transit and interdict a High Value Unit (HVU). The mission of the "Blue" force was two-fold – to locate and maintain track of the OPFOR submarine; and to ensure safe transit of the HVU through the battle group's operating area (OPAREA) without being compromised.

Under the control of Commander Task Force 84, various task groups, units and elements were assembled to execute this highly complex, multi-platform exercise. Playing the OPFOR – or "Orange" – submarine was USS *Augusta* (SSN-710) with appropriate acoustic augmentation. Blue theater assets included an IUSS team composed of two Surveillance Towed Array Sonar System (SURTASS) ships – USNS *Bold* (T-AGOS-08) and USNS *Prevail* (T-AGOS-12), with embarked military detachments (MILDETs), and the Naval Ocean Processing Facility (NOPF) Dam Neck in Virginia Beach, Virginia. Supplying land-based patrol aircraft were Maritime Patrol and Reconnaissance Aircraft (MPRA) squadrons VP-5, VP-45 and VP-16 from Jacksonville, Florida and VP-26 from Brunswick, Maine.

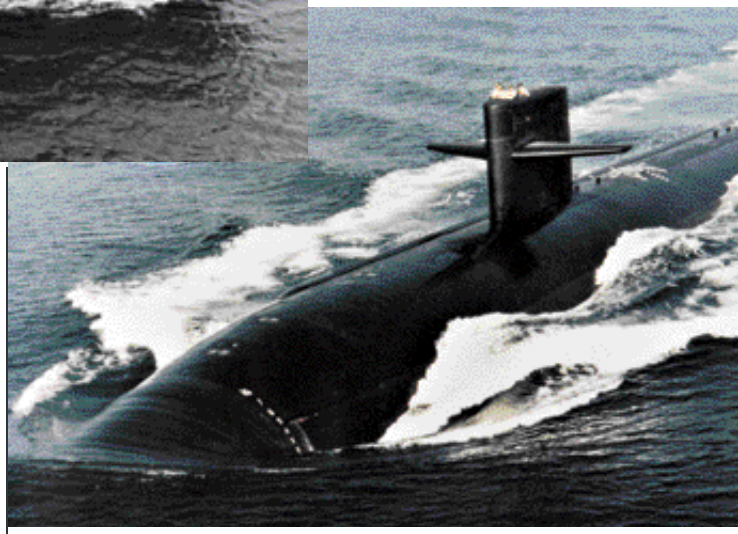
Tactical prosecution of the Orange submarine was assigned to Commander Destroyer Squadron TWO under Commodore Daniel Thompson. Under Commodore Thompson were three Norfolk-based destroyers and a frigate: USS *Porter* (DDG-78) as flagship, USS *Arleigh Burke* (DDG-51), USS *Stump* (DD-978) and USS *Carr* (FFG-52). Joining the DESRON from Mayport, Florida were USS *O'Bannon* (DD-987) and USS *Boone* (FFG-28), with helicopter detachments from HS-3 and HSL-42. USS *Hyman G. Rickover* (SSN-709) was the Blue force submarine, and the HVU role was played by USS *Gunston Hall* (LSD-44).

During the initial phase of the exercise, the Orange submarine transited from north to south into the battle group OPAREA as the HVU and her escorts tracked southwesterly, making maximum use of the environment to mask their noise. In these early stages, the theater-level IUSS team gained initial contact on the OPFOR submarine

At their consoles inside Naval Ocean Processing Facility, Dam Neck, Virginia, Petty Officer 2nd Class Armin Schevey and Seaman Lacresha Brown keep track of the OPFOR submarine during Smart Search 02.

(left) USNS *Prevail* (T-AGOS-12)

(below) USS *Hyman G. Rickover* (SSN-709) served as the "Blue" force submarine in the exercise.



and provided valuable cueing while it was still days away from the battle group. The closing range enabled near-continuous tracking and localization for two days by NOPF and the two Surveillance Towed Array Sensor System (SURTASS) ships and facilitated a "hot" turnover to the DESRON as the submarine neared the battle group. At the start of the transition from theater to battle group prosecution, several explosive echo ranging (EER) events were staged by MPRA aircraft, and the resulting echo returns were detected by SURTASS and processed to fix the Orange position. Subsequently, the OPFOR submarine passed right between the two SURTASS ships. Once the tactical prosecution phase started, both SURTASS ships and all MPRA aircraft were "chopped" to the DESRON.

"IUSS performance was particularly impressive," commented Commodore Thompson. "The long-range detections and accurate classification provided by *Bold* and *Prevail* – and corroborated by fixed-array data processed by NOPF – enabled rapid localization by [our] precursor forces."

During the next two days, the Orange submarine was tracked and hunted relentlessly by Blue's air, surface, and subsurface units. Simultaneously, the HVU made a successful transit of the OPAREA without being detected.

This success was achieved so early in the exercise that the scenario was "reset" and a second round of the cat-and-mouse game was played. Commodore Thompson organized another multi-platform prosecution of the Orange submarine and again, the HVU achieved a successful transit. Assisting him onboard the flagship were representatives from several communities and specialties. CDR Al Camp, Commanding Officer of USS *Tennessee* (SSBN-734), and three other submarine officers provided insight into submarine operations and tactics. *Porter*'s CO, CDR John Newell, and his own and the DESRON staffs provided surface warfare expertise. LT Steve Goff of VP-5 represented the air assets assigned to the DESRON, while ENS Teddy Tan of NOPF gave IUSS support. Other personnel included an acoustics intelligence specialist from the Office of Naval Intelligence, weather support personnel, and several specialists from other commands. Assigned onboard each SURTASS ship was a crew of eight MILDET personnel – led by IUSS veteran Chief Petty Officer Christine Barnard on *Bold* and CWO4 Allan Britz on *Prevail.*

Although assigned to a shore-based theater asset, the Sailors at NOPF had a great chance to hone their skills and contribute significantly, even in the tactical phase, when they fused SURTASS data and supplied the battle group with OPFOR positional information for the entire four-day operation. This generally allowed one or more surface or air units to be "holding" the Orange submarine at any given time. "IUSS assets employed in the right manner prove time and again their tactical applicability to any maritime acoustic challenge," emphasized NOPF's Commanding Officer, CDR Katherine Donovan.

Smart Search 02 was just the second of an annual series of planned multi-platform coordinated undersea warfare exercises, and there are certainly more lessons to be learned, particularly about coordinating prosecutions in the littorals. But this year's success was impressive, and IUSS, MPRA, ships, and submarines all added important pieces to the puzzle. Commodore Thompson summed it up best when he noted, "As you've probably heard it said, all of us are smarter than any one of us."

"IUSS assets employed in the right manner prove time and again their tactical applicability to any maritime acoustic challenge."

ENS Teddy Tan is the Public Affairs Officer at the Naval Ocean Processing Facility Dam Neck, Virginia Beach, Virginia.

by JOC Michael Foutch, USN,
with information provided by Northrop Grumman Newport News

USS *Texas* CONSTRUCTI

Heralded by First Lady, Senior Navy Leadership

As construction continues on USS *Virginia* (SSN-774), the next submarine of her class marked an important construction milestone in a ceremony 12 July at Northrop Grumman Newport News.

First Lady Laura Bush authenticated the hull of *Texas* (SSN-775) by scrawling her initials in chalk on a steel plate, so they could be incised with welding rod and affixed to what will be the keel of the ship. Referring to the advanced design of the Navy's newest class of fast-attack submarines, Mrs. Bush, the ship's sponsor and a native of Midland, Texas, smiled and joked that "Texans love to brag – if something is newer, bigger and better, then it must be from Texas."

More than 200 guests, including a large group of shipyard workers, listened to a host of Navy and political leaders laud the significant effort already made toward building the ship.

The First Lady described the submarine's namesake as a land of heroes, legends, and great adventures. "And Texas is the land of the cowboy, an all-American fellow who is polite and slow to anger but who also has an iron fist and steel-toed boots" – attributes she credited not only to Texans but also to all Americans. "I believe that spirit will be built into the core of this ship and its crew," she added. "In the Texas vernacular, this submarine will be bigger and better than anything, anywhere, and it will be manned by the heroes and legends of the United States Navy."

The *Virginia*-class's advanced technology will bring with it an increase in firepower, maneuverability, and stealth. These submarines are 377 feet long, will be able to stay submerged for up to three months at a time, and are capable of underwater speeds of more than 25 knots. They are designed to be multi-mission capable, with the most advanced levels of stealth and new systems for intelligence gathering and deploying Naval Special Warfare forces in littoral areas. The new class also will serve as the stealthy platform of choice for ISR, strike, covert mining, SOF, ASW, and Anti-Surface Warfare (ASUW) missions.

"The keel laying is the first milestone – authenticating the foundation – of this ship," said Thomas Shievelbein, President, Northrop Grumman Newport News. "But the real foundation is the shipbuilders who build it and the men who board it. This is a celebration of their skills and dedication."

"Four centuries ago, sailors arrived on our shores at Jamestown seeking freedom," Virginia Governor Mark Warner said. "Today, our Sailors go around the world to protect freedom."

Texas, the second *Virginia*-class submarine, is under construction within a cooperative

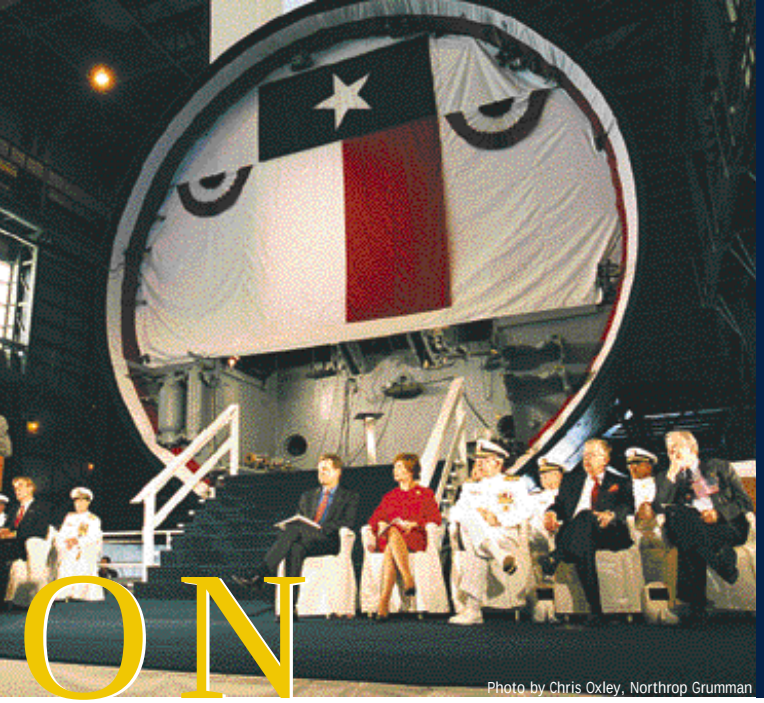
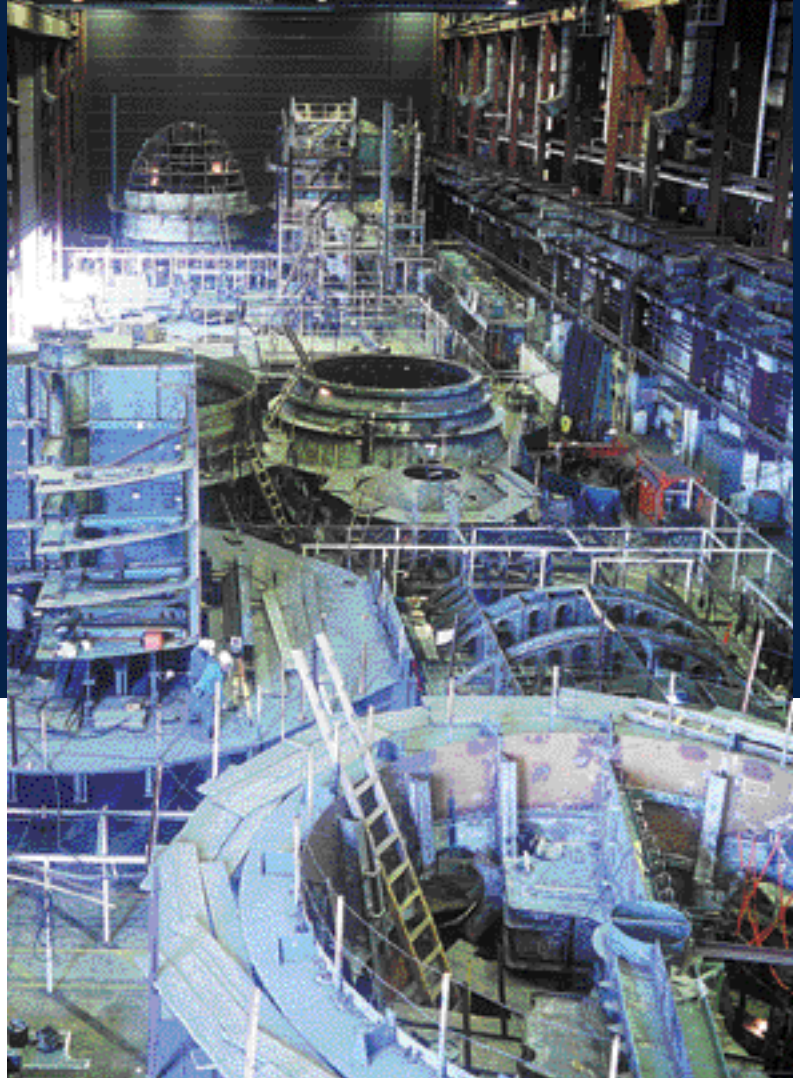


Photo by Chris Oxley, Northrop Grumman

(above) The Honorable Gordon R. England, Secretary of the Navy, addresses the employees of Northrop Grumman Newport News at the keel authentication ceremony for the newest *Virginia*-class submarine, *Texas* (SSN-775). First Lady Laura Bush and Chief of Naval Operations ADM Vern Clark were also in attendance.



(right) Under an innovative agreement, Newport News is producing the *Virginia*-class submarines as part of a team with Electric Boat. The team is currently under contract to build the first four submarines of a class expected to reach 30 ships. This image taken in March 2002 shows sections of the submarines *Texas* (SSN-775), *Hawaii* (SSN-776) and *North Carolina* (SSN-777) under construction at Newport News.

agreement between Northrop Grumman Newport News and General Dynamics Electric Boat to produce four such platforms, in coordination with Naval Sea Systems Command's Supervisor of Shipbuilding, Conversion and Repair, Newport News. *Texas*' combat system has already been installed in the Command and Control Module, and testing is in progress at CCSM Off-hull Assembly and Test Site (COATS). Meanwhile, construction of *Virginia*, the lead ship of the class, is 79-percent complete and on schedule for delivery to the Navy in June 2004.

The *Virginia* class will compose the bulk of the post-688 SSN force. However, planned build rates will not maintain what the Navy has determined to be the minimum essential level of SSNs needed to meet future mission tasking. Program planners have cited evidence that an insufficient SSN force size carries costs in terms of Indications and Warning/ISR gaps, engagement opportunities lost, and ASW and ASUW shortfalls.

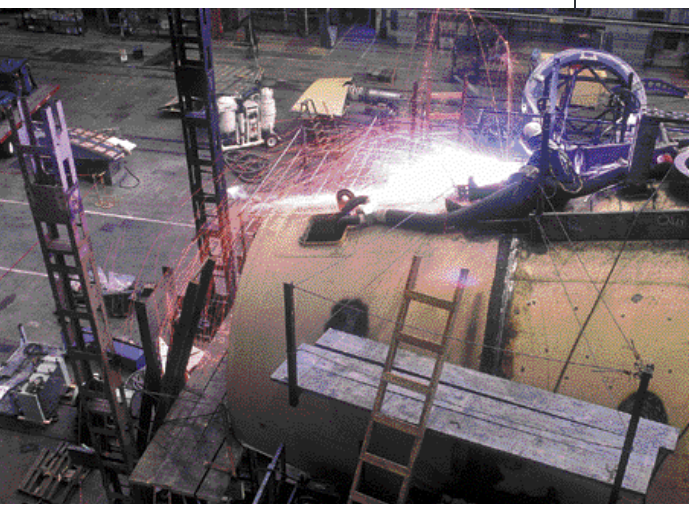
Texas is the 13th submarine to be built in the Northrop Grumman Newport News Module Outfitting Facility (MOF). In the 130,000-square-foot MOF, submarines are constructed on a level platform, not on an inclined shipway as in years gone by.

Traditionally, labor, material, and equipment flowed through the shipyard to arrive at a single production site: the ship on an inclined way. But construction for *Texas* has been broken down into two dozen hull

The future USS *Texas*, with its awesome array of combat capabilities, will enable America to "strengthen the shield of freedom, enabling us to sail where others fear to go."

sections and modules, with each portion representing a key sub-assembly of the submarine's hull or equipment.

Modules are extensively outfitted and tested "off-hull" before the individual pieces are loaded into the open ends of hull sections and joined to form the ship. This modular construction process is very similar to working with toy building blocks, but on a gigantic scale. At Newport News the groundwork for modular construction was started in the Ring Module Shop, where initial construction of steel hull sections creates tanks, foundations, and deck assemblies.



Virginia construction is now more than 79% complete, and delivery is currently on schedule for June 2004.

Electric Boat's Quonset Point Facility in Rhode Island also contributes groundwork for *Texas* by building hull rings and subsections outfitted with pipe, machinery, and electrical components. Electric Boat will send 11 major ship sections to Newport News on an ocean-going barge called the *Sea Shuttle*. Some of these modules will weigh several hundred tons and will ultimately be joined with others built by Newport News to create the *Texas*. The modules from the Ring Module Shop and Electric Boat will be moved to the MOF, a ten-story building with four large bay doors. Here the work of thousands of employees comes together as major systems and large components are systematically installed and outfitted. Systems and components vary in size – from entire decks and huge condensers to small electric motors and switches. All arrive at the MOF ready for installation on the modules and ultimately in the various hull cylinders.

After each module is completed and loaded into the hull cylinders, four-wheel electric transfer cars are rolled under the hull ring's strongbacks. Hydraulic jacks on the cars lift the large sections of the ship, which are then wheeled into place and welded together to form part of the complete hull. After the modules are joined and the ship's systems are interconnected, transfer cars under the ship's strongbacks will lift the vessel simultaneously and roll the ship on rails (at four feet per minute) to the outboard ways for additional outfitting and testing.

After *Texas* is christened in 2004, it will be transported westward to the edge of the James River and moved onto the yard's 640-foot floating dry dock. As the ship is transferred from land, the floating dry dock's onboard computer receives input from load sensors, tide gauges, vessel position sensors, draft gauges, and tank level sensors to control 40 onboard ballast tanks so the dock remains level during the loading process. After *Texas* is loaded, the floating dry dock will move to a nearby 70-foot deep basin where the dock will submerge, and the submarine will float free. Tugboats then will pull the ship out of the dock and to a pier in the South Yard for additional testing in preparation for the ship's sea trials and final delivery to the Navy.

"This sophisticated new platform provides versatility from the sea to the littorals," Northrop Grumman Chairman and Chief Executive Officer Kent Kresa said. "*Texas* will have an ability to collaborate with other ships on an unprecedented scale, essential in missions which will become crucial in a post-9/11 environment."

Senator John Warner (R-VA), ranking member of the Senate Armed Services Committee, pointed out that America's security requires transforming the military to be able to carry out strikes anywhere in the world. "This *Virginia*-class is leading the transformation to meet that requirement, with its stealth capability to go to the far corners, to deliver special operations forces and to disrupt command, control, and communications. No longer is a submarine just for firing torpedoes." But the loudest applause came when Sen. Warner promised more to come: "We will appropriate money to build her sister ships and beyond."

Chief of Naval Operations ADM Vern Clark said the Navy's mission is to take America's combat power around the globe and take the fight to our enemies. The future USS *Texas*, he added, with its awesome array of combat capabilities, will enable America to "strengthen the shield of freedom, enabling us to sail where others fear to go."

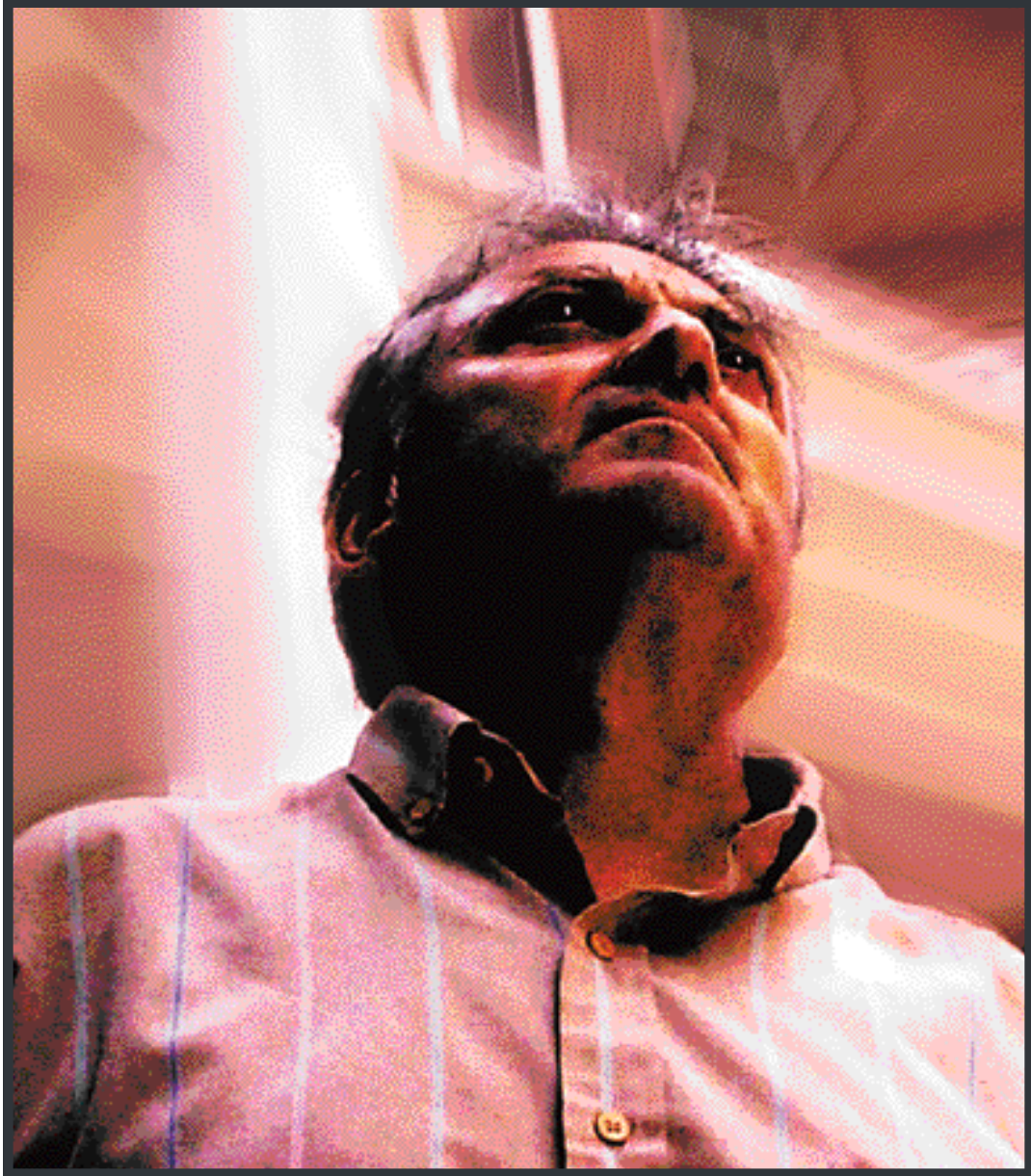
"Over 225 years ago, our nation's forefathers established a Navy to safeguard our economic prosperity and defend our homeland," ADM Clark said. "The Submarine Force is an essential part of our strength today. Our submarines control the seas, enabling us to strike our enemies from there. We're in a global war on terrorism, and our mission is to keep the enemy on the run. Our enemies in this global war will never know we're coming until they feel the sting from America's submarines."

Looking out toward the shipyard workers in the back of the large construction facility, ADM Clark made a request: "Build us a ship that can go in harm's way, because that's what we intend to do."

"Benjamin Franklin," Sen. Warner added, "in response to the question, 'What have you brought forth?' from members of the press waiting outside the Constitutional Convention in Philadelphia, answered, 'A republic, if you can keep it.' You have produced a vessel to make certain we keep our republic."

Texas is scheduled for delivery to the Navy in 2005.

JOC Foutch is a Military Editor for UNDERSEA WARFARE Magazine.



FROM DESIGN BUREAU TO CONCERT HALL

THE JOURNEY OF SOVIET SUBMARINE DESIGNER DAVID FINKO

BY JOC MICHAEL FOUTCH, USN

At the end of an extraordinary odyssey, a Russian submarine designer-turned-composer lives and works quietly in Philadelphia, still haunted by the ghosts of the past but gratified by steady international acceptance of his music. This man is David Finko, an American citizen since 1986, and his unusual story spans much of the Cold War and provides considerable insight into the U.S.-Soviet submarine design competition of the 1950s and 1960s.

But to understand the son, one must first understand the father.

Life was difficult at best in Stalin's Soviet Union. Paranoia was everywhere, from the "Great Leader" at the top, to the lowest tenement dweller at the bottom. Suspicion of one's neighbors was part of daily life – a whisper of disloyalty, a joke, even, could send a family to a labor camp above the Arctic Circle.

For a Jewish family, the harshness of everyday life was sharpened by persistent anti-Semitism much like that in the early years of Nazi Germany. To the customary prejudice that had harried the Jewish people for centuries was added the distrust of anyone with family in other countries, and Jews were especially suspected because of their overseas contacts with relatives or fellow Jews in places like America. Before the Communist Revolution in 1917, Jews couldn't even live in Moscow or St. Petersburg, nor hold positions of respect and prestige, and the best they could hope for was to run a small tailor or grocery shop. Even after the revolution and the migration of Jews to Russian cities, the doors to prosperity were narrow, and Jewish children in the Soviet Union were necessarily taught the value of study and hard work.

One way Soviet Jews could enhance their position – and their chances of survival – was to break into the "military-industrial complex." With the Soviet Union preparing for war, there could be no luxury of excluding "undesirables" from occupations – such as engineering – that would benefit the mobilization effort. So, despite an unofficial policy of discrimination, the government specifically sought the most clever and talented engineers to staff their submarine design bureaus. Such a man was David Finko's father.

"With the Cold War well under way, submarine warfare had emerged as a major focus of the East-West confrontation... This was roughly the same time that USS *George Washington* (SSBN-598) made the world's first submarine deterrent patrol, and that significant U.S. head-start acted as a spur to the Soviet design bureaus."

Rafael Matveyevich Finkelstein had been born in Belorussia, the son of an illiterate hostler who later served in the Russian Army in World War I. He displayed a prodigy's talent for mathematics and won admission to Leningrad University as a teenager. After graduation, the Soviet Union snatched him for study at a prestigious research establishment, leading to a tour at the Institute of Naval Architecture, which set the stage for a brilliant career in submarine design. Moreover, the family had a strong navy tradition – with David, the family could boast six naval officers and at least one merchant seaman closely related; his uncle was a Soviet Army colonel and his aunt a Soviet Army medical officer. For David – born in 1936 – military life was an expectation. This made for a difficult relationship with his father. "He thought I was a sissy, that I was weak. I loved music – I wanted to be a musician – and serving in the navy was not my idea. But when I was nine, my father was told that the government's desire was to train me for the submarine business."

At the time Hitler seized power in Germany, Finko's father was promoted to a special position as senior engineer in charge of calculating the strength of submarine hull plates and frames; and when Germany attacked the Soviet Union in 1941, he was advanced to head the entire hull department in his design bureau. "You must understand," the son says, "that this was an incredible advance in his career, especially for a Jewish man of very humble origin. He was even made a member of the Communist Party – you couldn't even run a hairdressing salon in the Soviet Union without being a member of the Party."

To keep ahead of the advancing Germans, Rafael Finklestein and his family were moved from Leningrad to the city of Gorky on the Volga River. There, in a new facility, the father oversaw the hull department for Central Design Bureau #18, a super-secret naval agency working on designs for S-, K-, M-, and *Pike*-class submarines through the end of World War II and into the beginning of the Cold War.

There were perks available to the son of such a respected father. While others suffered pitifully from wartime food shortages and rationing, David was offered an identification card and ration pass to eat in the bureau's sumptuous cafeteria, where he would later occasionally see German war prisoners forced to work on submarine design projects for the Soviets. After the war, these same engineers modeled the Zulu- and Whiskey-class submarines on the German type XXI boats.

In 1948, Finko's father moved to Special Design Bureau 143 – created that year to develop submarines with air-independent propulsion and later, nuclear power – and then in October 1953 to the Krylov Central Scientific Institute in Leningrad as a senior research specialist. There, he developed algorithms for designing the hulls of deep-diving submarines and taught university courses on nonlinear elasticity and strength of materials.

By this time, with the Cold War well under way, submarine warfare had emerged as a major focus of the East-West confrontation. The United States was first off the mark in deploying a nuclear-powered submarine – USS *Nautilus* (SSN-571) – in early 1955, but it was not until three years later that the Soviet Union laid down their first nuclear-powered boat, the first of the November class, which joined the Russian fleet in late 1960. This was roughly the same time that USS *George Washington* (SSBN-598) made the world's first submarine deterrent patrol, and that significant U.S. head-start acted as a spur to the Soviet design bureaus.

(left) An example of the Echo II-class Soviet submarine, which Finko helped design.

Because of his father's position and his own excellent grades, David Finko was selected for an apprenticeship for the top-secret Central Design Bureau #18 in 1957. He studied for six years at the Leningrad Institute of Naval Architecture in a demanding curriculum in which the punishment for academic failure or disciplinary infractions was service as an enlisted man at a small base well north of the Arctic Circle. It made for a stressful academic experience.

Later, Finko served as a naval cadet at the submarine base in Polyarnyy, from which he made several patrols on Whiskey- and Zulu-class diesel boats. These were no pleasure cruises, but the crew's ability to endure the most difficult and uncomfortable conditions was a source of great pride. He remembers that on one patrol, he went two months without bathing, and on another – even in the Arctic – the submarine was a fetid, humid, foul-smelling hell. Life as a Russian submarine sailor was a way to prove your manhood, with street brawling and heavy drinking, but it was certainly a rough life, with little room for a gentle or tender soul.

Subsequently, Finko found a niche working in section 21 of Abraham Kassatseaer's Bureau #18 on several early classes of Soviet nuclear-powered submarines, most notably the Echo-class guided-missile boats, which first appeared at sea in 1962, roughly contemporaneous with our own *Thresher* (SSN-593)-class nuclear-powered attack submarines. The engineering work was often sheer drudgery, but he was most discouraged by the security demands. Predictably, the bureau in Leningrad was tightly guarded. Entering the building to start the workday, "you would go straight to your desk. Nothing could be kept in your desk or on it. Only pencils and rulers. At the end of the day you had to give every scrap of paper to the security service department, and to sign a special record of that action, and to get the signature of the clerk at the security service department. He took all your work papers. You were given them back at the start of the next day. I believe they also watched every single one of us and listened to our conversations, even in the men's room and cafeteria. So it was a pain, you know?" And while naval architects or marine engineers – those geniuses in demand – in the bureau could roam the facility's libraries to read American magazines, pore over periodicals on western weapons and technology, and even examine refrigerator designs to help them come up with ideas,

he remembers being restricted to his desk day after day to work on his drawings.

Finko was a sociable young man who loved to talk – a perilous trait in the super-secret submarine design field. "If I asked about operating depths... the question alone was a crime," he remembers. "And I worked in hull design! I needed to know that for designing a hull to withstand a certain amount of pressure." Departments in the bureau were strictly segregated. His area, hull structures and systems, never spoke with other functional organizations. No one in his construction department was allowed to review new technology – this was higher than top secret and very dangerous to work in because of the potential for inadvertent security slips. Even the archives, which held British or American designs and information on special steels, was not open to the rest of the bureau. If David needed to design a foundation for a propulsion system, the other departments would send him dimensions and a scheme. If he insisted on learning details of their machinery, he could be accused of spying.

Despite the psychic rewards of working to defend the nation, the constant burden of security was increasingly oppressive. "You couldn't go on vacation to get away from it! You were under surveillance for everything by the KGB or by other state security. If I wanted to leave for a couple of days, I had to inform them where I would be and give them a phone number. If it was more than a couple of days, I had to report with my papers to the local commandant. So who needed such a life, being watched for whatever we said or what we did?" Make no mistake, he asserts – Bureau #18 was much like a prison or labor camp.

Finko worked on both new designs and subsequent modifications of stern hull structures and prepared blueprints for use in the shipyards. His biggest projects included studies on how to reduce pressure-hull weight, high-strength welding, shafting and steering components, and deep-diving adaptations. His most miserable job, he remembers, was designing flooring, the metal planking inside the sub hull.

The designers were expected to be patriotic, and particularly since he was a Jew, Finko was especially careful to express his loyalty to the Soviet Union loudly and often. "You could never be unhappy. That was considered American-like. You could never criticize an article in *Pravda* – never – and had to imitate them in saying things like, those American dogs, we'll get them!" For David, however, this wasn't entirely a false front – while finishing his graduate studies under the best technical experts in his field, he became very loyal and eager to help his country. And even today, after more than two decades in the United States, he still feels a certain pride in his homeland.

"We knew Americans were strong, because they had money – but we also considered them weak, because they were spoiled by their luxury conditions. Russians were strong, with a depth of character built from living through harsh times. We felt – and were told over and over again – that working for communism was a noble cause; and that working for money was no different than working as a whore – absolutely! Our pay was miserable, but you went to work on submarines because you were a man, not a sissy – you wanted to defend the motherland, humanity, and communism. That's what they taught us to think from the start."

During the 1960s, when the Soviet Union sought to surpass the West with advanced submarine designs, Finko labored on the Victor- and Yankee-class boats that later appeared in 1968. Money was never an issue, because so many resources were devoted to building the largest and most technically-advanced submarine navy in the world. "Let me be clear," Finko expresses his strident opinion as he jabs his hand in the air. "The Soviet Union was not behind America in technology. Technology in the Soviet Union was for the Army and Navy, nothing else. Professors and scientists would make technology work not for themselves, or for money, but for their country."

Finko claims the Soviet Union was a world leader in metallurgy, metal working and metal thermal treatment, enabling production of very strong and unique alloys of titanium and steel. Some Soviet submarines, such as Alfa-class submarines, broke ground with construction entirely of titanium and mastered the technique of titanium welding as early as the late 1950s. Another advancement of the Soviets was the idea of double-hull and triple pressure-hull submarines, a leap forward in innovation for their time. This all was "a very top secret. It was a saying at the #18: "A guilty tongue will be cut off together with the entire head".

From 1960 to 1965, while Finko worked as a naval architect at the Submarine Design Bureau, he was also studying music at the Leningrad Conservatory, the alma mater

(continued on page 31)

COLD WAR SUB MEMORIAL WILL HONOR SUBMARINERS, EDUCATE FUTURE LEADERS

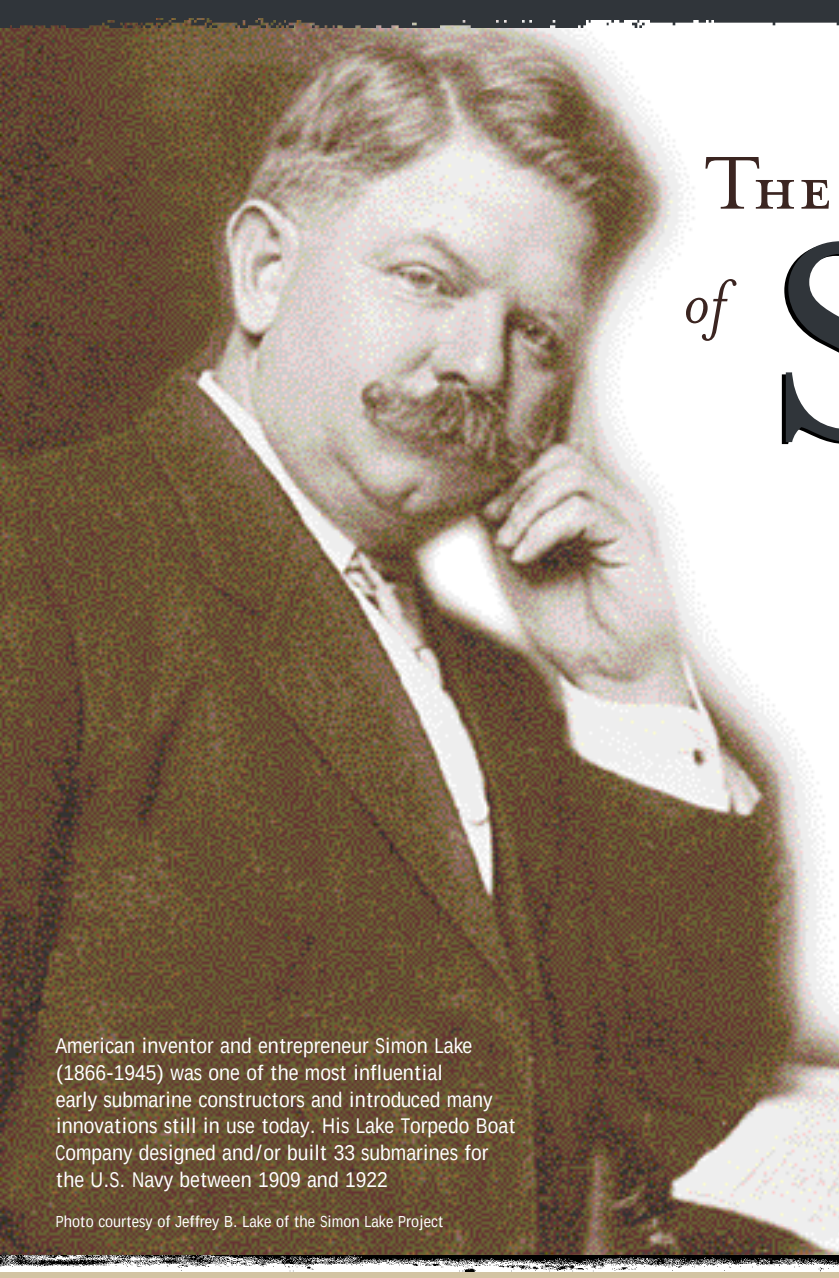
Construction of the Cold War Submarine Memorial is currently underway in Charleston, South Carolina, near a former Navy base that at one point serviced 34 ballistic missile and 15 fast attack submarines. Initiated by local community leaders with strong ties to the Cold War submarine effort, the memorial will be located prominently at the entrance to the Patriots Point Naval and Maritime Museum on Charleston Harbor and serve as a tribute to all submariners, their families, and the civilian workers who supported them during that era.

The memorial will feature the actual sail and rudder of USS *Lewis and Clark* (SSBN-644), and the combination of the sail and the surrounding landscaping will resemble a submarine underway, with white pampas grass growing around the bow representing the wake. Set adjacent to the hull will be a flagpole on a raised platform with an inlaid compass rose.

According to the Cold War Submarine Memorial Foundation, the memorial will also feature "seven educational stations that will provide information about the Cold War role played by the greater Charleston military complex, submarine families, attack submarines, strategic submarines, submarine support elements, and our nation's allies. Additionally, one station will be 'In Memoriam' to those submarines lost at sea with all hands and those submariners who died during the Cold War defending our freedom."

In a recent letter to the Charleston Post and Courier, Executive Director Russell A. Picket wrote, "Our memorial's mission is to motivate and educate our nation's future leaders on the importance of military service, dedication to what is right, and commitment to freedom, focusing on the cost and duties of freedom and instilling in our youth the essence of the American character."

Construction of the memorial, which will cost approximately $1 million to complete, began in June 2002. The dedication ceremony is currently set for 15 November. For more information on the memorial or how to contribute to the effort, visit the foundation's web page online at **http://www.cwsmf.org**.



American inventor and entrepreneur Simon Lake (1866-1945) was one of the most influential early submarine constructors and introduced many innovations still in use today. His Lake Torpedo Boat Company designed and/or built 33 submarines for the U.S. Navy between 1909 and 1922

Photo courtesy of Jeffrey B. Lake of the Simon Lake Project

The Submarine Heritage of Simon Lake

by Edward C. Whitman

Although largely overshadowed by Irish-American submarine pioneer John Holland (ca. 1841-1914), U.S. inventor and entrepreneur Simon Lake was nonetheless responsible for a significant share of the key developments that made possible the modern submarine. Although some authorities have questioned the claims of Lake's proponents for his invention of the periscope, the double-hulled submarine, and the diver's lock-in/lock-out chamber, he was a genuine innovator in the field of undersea technology, and his Lake Torpedo Boat Company built a total of 33 submarines for the U.S. Navy between 1909 and 1922. Additionally, two of Lake's most characteristic design features – hull-mounted wheels for bottom crawling and "level diving" by means of amidships hydroplanes – became an intriguing "road not traveled" in the evolution of submarine design. During a long and varied technical career – which produced over 200 patents – Simon Lake's inventive genius also ranged over marine salvage, shipbuilding, Arctic exploration, and prefabricated housing.

THE GENESIS OF AN AMERICAN INVENTOR

Simon Lake was born into a family of prolific inventors at Pleasantville in southern New Jersey on 4 September 1866. His father, Christopher John Lake, was relatively well-to-do from having invented some years before the roller window shade, and in 1883, he established a foundry and machine shop near their home town. Lake's grandfather and his brothers had played a key role in developing the seaside resorts of Ocean City and Atlantic City, New Jersey, and Simon Lake's uncle, Jesse Lake, conceived the basic idea of the caterpillar tractor while building an access road across the marshes that separated Atlantic City from the mainland.

Lake attended public high school in Toms River, New Jersey and then studied briefly at the Clinton Liberal Institute, a private, non-sectarian secondary school in Fort Plain, New York. After his return home, he became his father's partner in the foundry at age eighteen. Concurrently, he enrolled in the "mechanical course" at Philadelphia's Franklin Institute and quickly learned the rudiments of engineering and machinery design. Among Lake's earliest patents, were those for a "Can-Capping Machine" and an "Oyster Dredge Windlass," both intended for the oyster industry. His windlass was so much in demand that he moved to Baltimore to be closer to his customers, and there, in addition to building a thriving business, he met his future wife, Margaret Vogel. They were married in 1890.

Some years earlier, from reading Jules Verne's 1870 novel *Twenty Thousand Leagues Under the Sea*, Lake had been captivated by the prospects of undersea travel and exploration. Thus, when the U.S. Navy announced a submarine design competition for 1893, he quickly resolved to put his burgeoning mechanical skills to work in this new field. The Navy's solicitation was actually its third attempt to acquire a viable submarine, following similar competitions in 1887 and 1888/89 that had been won by John Holland. On both of those earlier occasions, however, contractual and funding issues disappointed Holland of his hopes to build a prototype.

Lake's 1893 design, for which he applied for a patent in April of that year, reflected his early interest in developing submarines primarily for commercial purposes, and particularly for marine salvage. It was intended to submerge on an even keel using a combination of judicious ballasting and

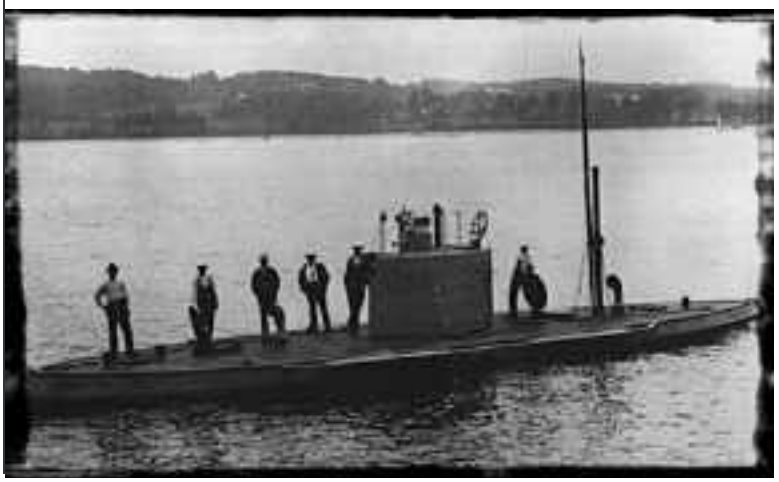
horizontal control planes and to operate largely on the ocean bottom using a set of powered wheels for propulsion. The prime mover was to have been a compound steam engine, whose boiler would be shut down for submergence, when compressed air substituted for steam to turn both the propeller and wheels. Lake's disclosure covered the key features of his design, including a diver's lock-in/lock-out chamber, a crude "viewing tube" for seeing above water, and automatic control mechanisms for maintaining depth and trim. Four years later, this resulted in U.S. Patent No. 531,213 for a "Submarine Vessel."

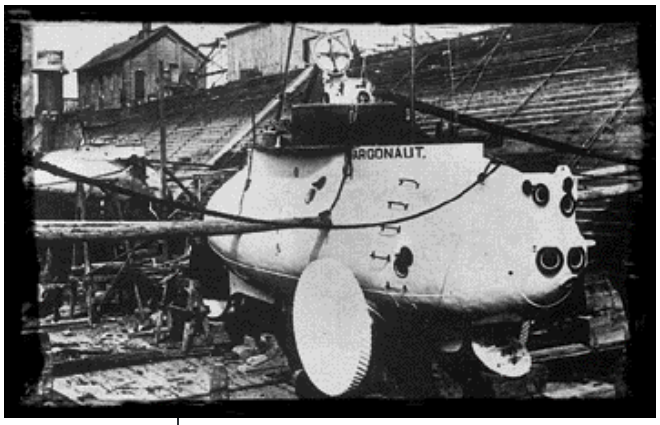
Beside Lake and Holland, six other submarine pioneers entered the 1893 competition. Although there is still significant controversy about the degree to which political influence determined the ultimate choice of Holland's design, he had, in fact, demonstrated a rudimentary gasoline-powered submarine, the *Fenian Ram*, twelve years earlier, whereas Lake's concept existed only on paper. In contrast to Lake's "level diving" approach, Holland designed his submarine to be just slightly buoyant when the ballast tanks were completely full and used the hydrodynamic forces generated by a set of stern planes to submerge the boat and keep it down. Thus, his submarine was intended to operate largely in the mid-water region using porpoise-like diving and surfacing maneuvers, while Lake's vehicle was essentially optimized to run on the bottom. Six years later, after an abortive attempt to honor the terms of the ensuing construction contract with his steam-powered *Plunger*, Holland finally produced a successful prototype, *Holland VI*, which became the U.S. Navy's first submarine, USS *Holland* (SS-1) in 1900. He – and later the Electric Boat Company, which he helped to found in 1899 – subsequently held a monopoly on the construction of U.S. submarines until 1908.

FROM PITCH-PINE TO STEEL

Although disappointed by his loss in 1893, Simon Lake nonetheless returned to Baltimore determined to break into the submarine business one way or another. Within a year, he had built a crude wooden demonstrator, called by him *Argonaut Junior* – and by others, "the pitch-pine submarine." This was little more than a large, triangular wooden box that could be ballasted to sink to the bottom, where it could be made to crawl forward on a set of man-powered wheels. Stored compressed air was used both to "blow" the ballast tanks for returning to the surface and to pressurize the interior to keep water out when a trap-door was opened in the floor to give access to the bottom. Lake first demonstrated *Argonaut Junior* without mishap in a river near Atlantic Highlands, New Jersey in December 1894, and the enthusiasm he generated attracted enough investment capital for its constructor to found the "Lake Submarine Company" and begin designing and building a "real" submarine within a year.

By an interesting coincidence, Simon Lake's resulting *Argonaut I* was built in the same Baltimore graving dock – and at the same time – as Holland's unsuccessful *Plunger*. *Argonaut I* was 36 feet long by 9 feet in diameter and incorporated most of the distinctive features of Lake's 1893 design, including powered wheels for bottom crawling and a diver's air-lock. The boat was driven by a 30-horsepower gasoline engine, even while submerged, when it used a hose supported by a surface float to supply combustion air. Although this artifice limited the depth to which *Argonaut I* could operate under power, a supply of compressed air permitted even deeper excursions and bottoming for as long as 24 hours. Primarily intended for salvage and exploration, *Argonaut I* normally transited on the surface to sites of interest, where it would descend vertically, either by ballasting down or using haul-down anchors installed in the keel. Then, it would trundle along the bottom on its powered wheels with the surface float tagging along behind.

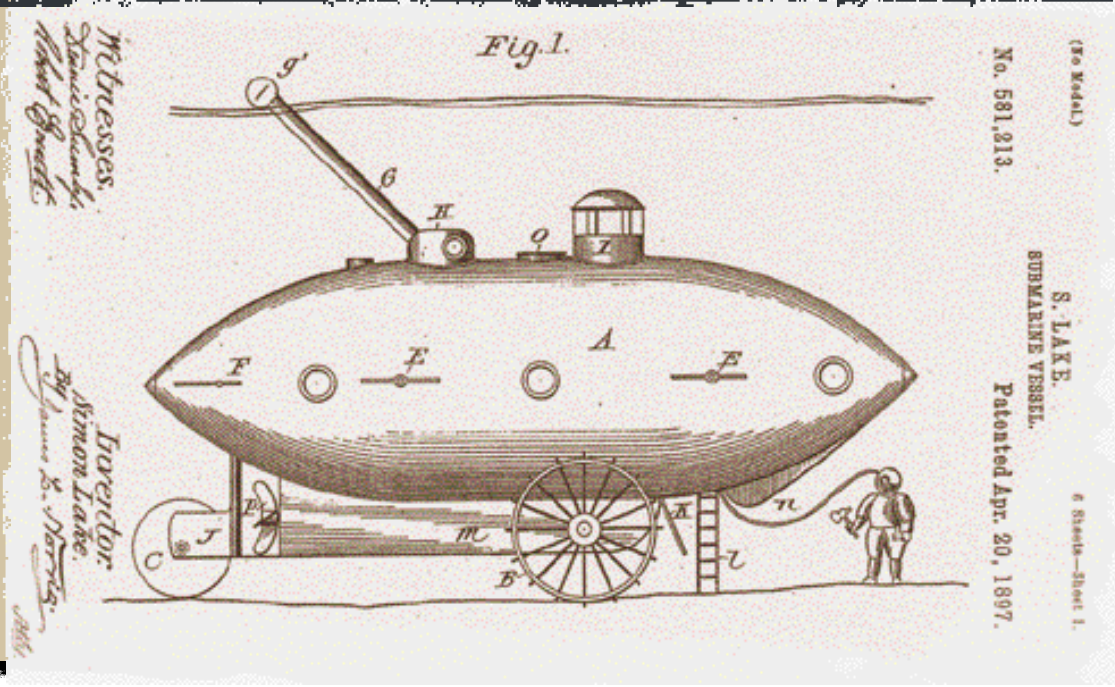




(above) Lake built his first military submarine, *Protector*, in 1902 to challenge John Holland and Electric Boat for the U.S. Navy's submarine business. Before a scheduled competition with EB's *Fulton* in May 1904, however, Lake sold *Protector* to the Russians and forfeited his chance for a contract.

(left) Lake's *Argonaut* under construction in Baltimore around 1895, with John Holland's steam-powered *Plunger* in the left background. *Argonaut*'s driving wheels and airlock hatch are clearly visible. In 1898, she made the first known open-ocean voyage by a submersible, and Lake would later modify her to salvage cargo from sunken ships.

Lake completed *Argonaut I* in 1897 and after a series of local trials, he began using the boat to salvage sunken cargoes in the Chesapeake Bay. Then in 1898, he took the boat into the open ocean, first for a limited excursion off Cape Henry, Virginia, and then for a longer cruise in which he sailed from Norfolk to Sandy Hook, New Jersey. Lake traveled largely on the surface but submerged regularly to investigate promising wrecks along the way, and when a serious storm blew up, he



Lake's "Submarine Vessel" patent was filed in April 1893 in conjunction with his entering the Navy's submarine design competition that year. This early design already shows several of Lake's characteristic innovations: wheels for running on the bottom, a diver's airlock, and amidships hydroplanes – marked "E" – for level diving. Note also the rudimentary periscope (denoted G and g'). The final patent, #581,213, was granted four years later.

Although granted first, Lake's "Submarine Locomotive" patent was intended as a supplement to his earlier filing for the "Submarine Vessel" and claimed a number of innovations specifically for salvage operations. Steam-powered on the surface, the new design used batteries and electric motors underwater. A careful reading of the patent also reveals that although it was not one of his claims, Lake intended to use closely-spaced double hulls and utilize the void between them as tankage.

DURING A LONG AND VARIED TECHNICAL CAREER SIMON LAKE'S INVENTIVE PRODUCED MORE

rode it out safely on the bottom. This feat appears to have been the first substantial ocean-going voyage by a submersible craft, and it earned Lake a telegram of congratulations from none other than Jules Verne himself.

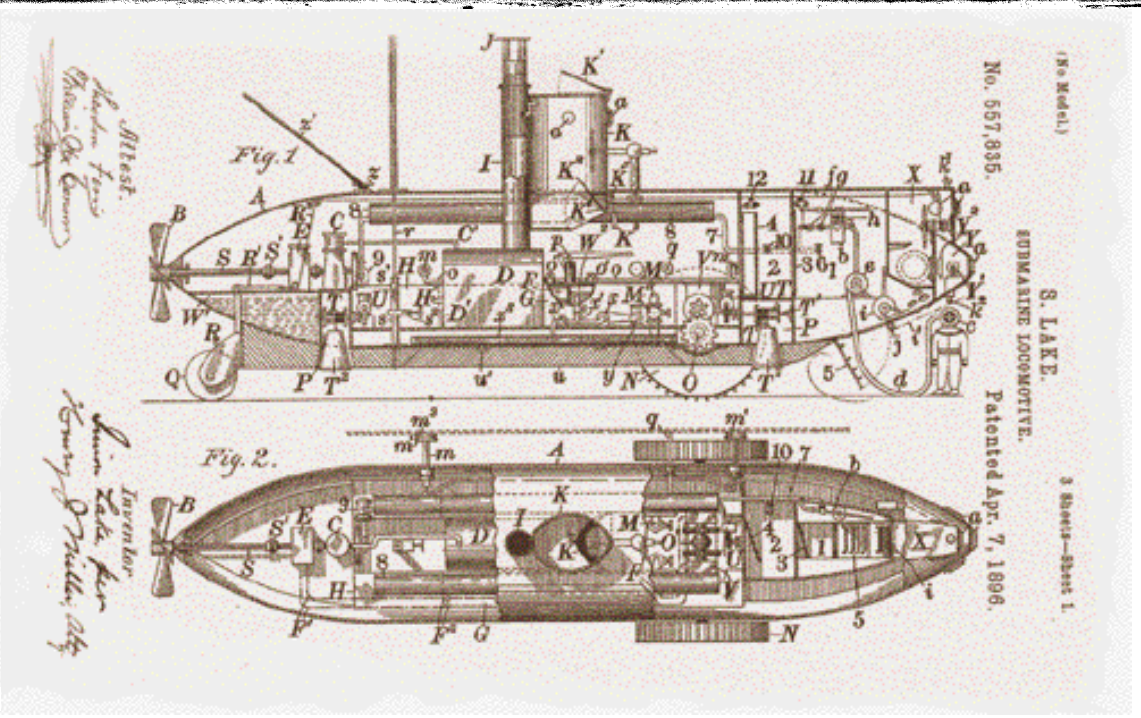
Because its open-ocean voyage showed that *Argonaut I* needed to be more seaworthy, Lake had the vessel rebuilt the following year in Brooklyn, New York, largely by lengthening the boat to 56 feet and adding a flooding, schooner-like superstructure for better surface performance. The resulting submersible was dubbed *New Argonaut*, or *Argonaut II*, and home-ported in Bridgeport, Connecticut, where Lake established the new headquarters of what had become essentially a marine salvage company. After staging several well-publicized bottom excursions for local civic dignitaries, he got down to recovering sunken cargoes in earnest. Over the next several years, he retrieved the contents of over 30 lost vessels in Long Island Sound, using patented improvements to the *Argonaut II* and a "submarine wrecking car" that could be used to bring salvageable commodities, such as coal, to the surface for resale at a handsome profit. Lake soon became a wealthy man and a prominent, public-spirited citizen of Bridgeport.

SELLING SUBMARINES TO RUSSIA

Nonetheless, noting John Holland's success in selling *Holland VI* to the Navy in 1900, Lake decided to compete for the military market himself and that same year founded his own "Lake Torpedo Boat Company" as an adjunct to his salvage interests. He immediately embarked on the design and construction of a submarine intended to compete with the Holland boats, and by 1 November 1902 had launched a prototype at Bridgeport he named *Protector*. Lake's first naval submarine was 65 feet long and displaced 170 tons. By then – like Holland – he had adopted the use of internal combustion engines for running on the surface and charging storage batteries, with electric motors underwater. Accordingly, for operation on two shafts, *Protector* mounted two gasoline engines of 250 horsepower each and two100-horsepower electric motors. Characteristically, Lake's new design also included wheels for bottom crawling, amidships hydroplanes for level diving, and a diver's airlock. *Protector* also boasted a patented optical sighting device that Lake called an "omniscope," one of the predecessors of the submarine periscope. The craft could make 11 knots on the surface and seven knots submerged, with reported underwater endurance equivalent to a radius of 50 miles.

In response to Lake's challenge, John Holland and the Electric Boat Company came up with an improved submarine of their own – the *Fulton* – in 1903, and after tortuous negotiations and continuing delays, the Navy agreed to a definitive in-water competition between the two boats in May 1904 in Narragansett Bay. However, before these trials could take place, growing financial problems forced Lake to sell *Protector* to the Russian navy, which had agreed to purchase five boats of his design just prior to the Russo-Japanese war. Consequently, after some likely connivance with Electric Boat, who quickly arranged a token demonstration, the Navy again awarded EB its next submarine contract. Ironically, *Fulton* was then also sold to the Russians, who reportedly found *Protector* the better submarine.

Following the enthusiastic Russian acceptance of *Protector* – renamed *Osetr* – the five additional boats were partially built at Newport News Shipbuilding under contract with Lake, assembled in Russia, and then transported across Siberia by rail to Vladivostok. In conjunction with this new business, Lake and his family moved temporarily to St. Petersburg, where he was lavishly entertained by ill-fated Czar Nicholas II and soon succeeded in winning a contract for five new submarines



Protector was shipped to St. Petersburg early in the Russo-Japanese War, renamed *Osetr,* and loaded on a flatcar for transport to Vladivostok over the Trans-Siberian Railway. Lake built five more of this class for the Russian Navy, and then sold them five larger *Kaiman*-class submarines between 1906 and 1908.

GENIUS
THAN 200 PATENTS.

of the larger *Kaiman* class, built in Russia under his own supervision between 1906 and 1908. Although he returned frequently to the United States during this period to manage his enterprises in Bridgeport, Lake spent most of the next several years in Europe, marketing his submarines and his services as a consulting engineer to foreign governments. He succeeded only in selling two boats to Austria-Hungary, but he also received additional royalties for follow-on construction. At the same time, however, Lake suffered a bitter disappointment when Germany's Krupp organization challenged the international validity of his patents and backed out of a planned collaboration.

PERSEVERANCE PREVAILS – LAKE'S U.S. NAVY SUBMARINES

Meanwhile, Lake had not given up hope of breaking the *de facto* Electric Boat monopoly on building submarines for the U.S. Navy. Using the proceeds from his Russian sales, he built two more experimental prototypes, *Lake X* – launched in October 1904, and *Lake XV* – launched in February 1906. Because of disputes between Lake and the government, the former boat was never granted an official trial, but after an intense pro-Lake publicity campaign, the Navy agreed to pit *Lake XV* against Electric Boat's new *Octopus* in trials held in the spring of 1907. The outcome was a decisive defeat. Lake's candidate was bested by *Octopus* in virtually every performance category and particularly in both level diving and depth control. Once again, the competition was awarded the follow-on contract.

By this time, however, a significant controversy had grown over Electric Boat's role as the Navy's single submarine builder, amid charges of cronyism, Navy Department collusion, and financial irregularities.[1] In 1908, a congressional investigation

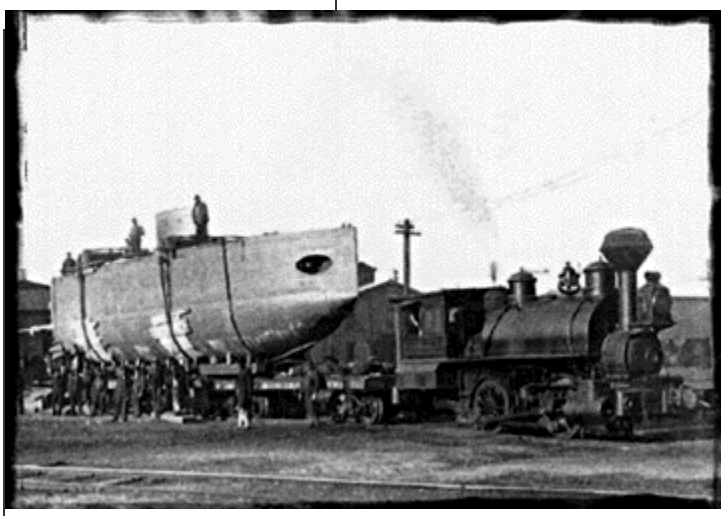
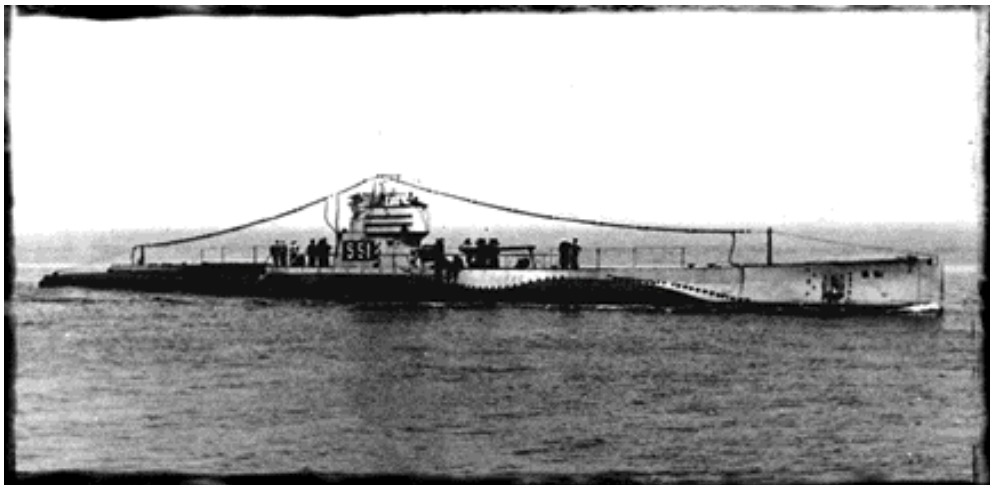


Photo courtesy of Jeffrey B. Lake of the Simon Lake Project

was initiated – with intense lobbying on both sides – and when Simon Lake threatened legal action over the Navy's procurement procedures, the Secretary of the Navy relented and agreed to the purchase of a submarine from the Lake Torpedo Boat Company. However, the new boat would have to be designed and built at the constructor's expense and would only be adopted by the Navy if it proved satisfactory in subsequent trials. Lake accepted the gamble.

Built under a subcontract with Newport News Shipbuilding in fiscal year 1908, USS *Seal* (later *G-1*) was Lake's first U.S. Navy submarine – and after 19 predecessors, the first U.S. submarine not built by Holland and/or Electric Boat. Clearly an afterthought, she was later designated SS-19 ½ a source of some amusement to Lake and his colleagues. *Seal* was launched in February 1911 and commissioned in October of the following year. In design, she was very similar to the *Kaiman*s that Lake had built for Russia, and at 516 tons and 161 feet long, she was essentially intended for harbor defense or coastal patrols. As built, *Seal* had Lake's customary wheels, amidships planes, and an airlock, as well as trainable (external) torpedo tubes mounted in the superstructure. Her twin screws were powered by four 300-horsepower gasoline engines (two in



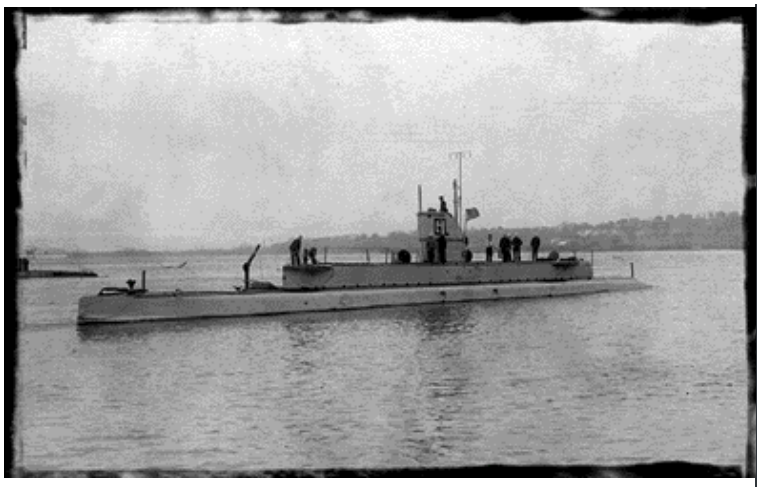


Photo courtesy of Jeffrey B. Lake of the Simon Lake Project

(top) Laid down at Lake's Bridgeport yard in December 1919 and commissioned two years later, *S-51* (SS-162) was the last of the eight S-class boats that Lake built to the Navy's S-3 design. *S-51* was sunk in a collision off Block Island in September 1925 with the loss of 33 lives. Although raised in mid-1926, she was never repaired and sold for scrapping in 1930.

(bottom) USS *Seal* (later *G-1*, SS-19 ½) was laid down in 1909 and became the first submarine that Simon Lake built for the U.S. Navy. Based heavily on the *Kaiman*s that Lake had designed for Russia, *Seal* had bottom wheels, a diving compartment, two bow torpedo tubes, and two additional trainable tubes housed in her ample superstructure. Lake built two additional G-class boats and then 30 more U.S. submarines

tandem on each shaft) and 375-horsepower electric motors. Although *Seal* was a notoriously slow diver, and her tandem engines caused recurring breakdowns until one of the two on each shaft was removed in 1916, she squeaked through her trials, and Lake was paid.

Likely because of continuing political pressure, the Navy ordered two more submarines from Lake in fiscal years 1909 and 1910. USS *Tuna* (later *G-2*, SS-27) and USS *Turbot* (later *G-3*, SS-31) were nearly identical to *Seal*, but to save costs, they lacked both wheels and airlocks. *Tuna*, launched in 1912, was the last boat built for Lake at Newport News Shipbuilding. *Turbot* was the first submarine laid down in Lake's own new yard in Bridgeport and had two diesel engines, vice the unorthodox propulsion of the earlier boats. However, in November 1913, before she could be completed, Lake was forced to put his shipyard into bankruptcy, and *Turbot* had to be turned over to the New York Navy Yard for completion. Even so, she was not fully operational until 1916, and like her two sisters, saw only five years or so of active service.

Within a year of Lake's bankruptcy, World War I would break out in Europe, and in anticipation, the Navy had already initiated a program of naval expansion that included the construction of significantly more submarines. Accordingly, Congress authorized seven L-class coastal submarines for 1913, and three of them – *L-5* through *L-7* – had been assigned to Lake before his financial troubles materialized. Lake weathered the bankruptcy well enough to reorganize and resume operations by early 1914, when he started construction of *L-5* at Bridgeport and subcontracted the other two boats to Craig Shipbuilding in Long Beach, California. All were completed and commissioned successfully by early 1918. In fiscal year 1914, the Portsmouth (New Hampshire) Naval Shipyard was assigned construction of *L-8* to Lake's own L-class design, and she emerged in 1917 as the first submarine built by the Navy itself.

Successively, in 1915, 1916, and 1917, with U.S. entry into the war growing steadily more likely and mobilization accelerating, Lake was given construction of four of seven small N-class harbor defense boats (*N-4* through *N-7*); six of 16 O-class coastal boats (*O-11* through *O-16*); and seven of 27 larger R-class coastal submarines (*R-21* through *R-27*). These were commissioned variously between mid-1918 and late 1919 and then served until the mid-1920s. It is interesting that although all of Lake's designs prior to his R-class variant continued to feature amidships diving planes, Navy specifications ruled out wheels and airlocks.

In response to growing interest in "Fleet-type" ocean-going submarines, the Navy in 1917 funded the design and construction of three competing prototypes for the significantly larger S-class at Electric Boat (for *S-1*, SS-105); at the Lake Torpedo Boat Company (for *S-2*, SS-106); and at the Portsmouth Naval Shipyard (for *S-3*, SS-107). At that time, individual constructors were allowed wide latitude in their designs, as long as all the boats of a class met common specifications and performance requirements defined by the Navy's General Board. Thus, submarines of the same class could vary substantially from builder to builder. Of the three resulting designs, Lake's *S-2* emerged as the best sea boat surfaced but was the least impressive overall, largely because her configuration required a number of awkward work-arounds to avoid infringing on John Holland's original patents, which had been assigned to Electric Boat years before. Thus, no further S-boats were built to Lake's plans.

Nonetheless, for the first buy of 38 S-class submarines – in fiscal year 1918 – Lake agreed to build four (*S-14* through *S-17*) at Bridgeport to the Navy's *S-3* design, and in fiscal year 1919, he was assigned four more (*S-48* through *S-51*), plus four additional boats canceled after the end of the war. Lake's

(continued on page 32)

Academy Graduate Serves 40 Years in the Submarine Force, Leaves Historic Legacy

By JOC Michael Foutch, USN, with information from the Navy Wire Service

Retired Admiral Robert L.J. Long, who served 40 years with the Submarine Force, passed away on 27 June 2002 and was honored at a memorial service on 11 July at the Naval Academy Chapel in Annapolis. ADM Long's family and more than one hundred friends from the sea service and the corporate community heard Chaplain Luther Alexander characterize ADM Long as having "led a life that should encourage all of us."

A 1943 graduate of the U.S. Naval Academy, ADM Long was the Vice Chief of Naval Operations from 1977 until 1979, and the 11th Commander-in-Chief of U.S. Pacific Forces (CINCPAC) from 1979 to 1983. Perhaps his greatest achievement, however, was inspiring and influencing many of the Navy leaders who occupy some of the top command positions today. One of them, current CINCPAC ADM Thomas Fargo, said, "He was a very strong, yet – I would say – a warm and charismatic leader. The first time I met ADM Long was in 1976, when I took a position as his aide," ADM Fargo remembered during the ceremony. "He said, 'Tom, I want you to know I didn't hire you to carry my bags. I hired you for your brains. But – you're gonna carry the bags, too.'"

Four days after ADM Long took over as CINCPAC on 31 October 1979, Iranian militants overran the U.S. Embassy in Tehran and seized 70 American staff members. The U.S. response included a show of military strength in the Indian Ocean, demanding long, tension-filled hours from the new CINCPAC. After a four-year tenure, dealing with the Soviet threat in the Western Pacific and working to build a warm relationship between the military and local residents in Hawaii, ADM Long retired in June 1983. "I think he felt it was important for the military to have a strong relationship with Hawaii and its people, and that's where he put his emphasis," Fargo said. "Even after he retired, he came back here about every year to visit."

A native of Kansas City, Missouri, ADM Long graduated from the Academy with distinction following an accelerated course of study imposed by the demands of World War II. Subsequently, he served aboard the battleship USS *Colorado* (BB-45), earning the Bronze Star with combat "V" for his meritorious service as plotting room officer during operations against Japanese forces in the Philippine Islands and the Ryukyus late in the war.

Following the war and Submarine School, Long served at sea on several submarines and also as an associate professor with the Naval Reserve Officer Training Unit at the University of North Carolina, Chapel Hill. Then, after graduating from the Naval War College in 1954 and commanding USS *Sea Leopard* (SS-483), he served on ADM Rickover's staff in 1959 and 1960. Next, he was the first Gold-crew commander of the Navy's second U.S. ballistic missile submarine, USS *Patrick Henry* (SSBN-599) from August 1960 to August 1963 and then the Commanding Officer of the *Lafayette*-class SSBN USS *Casimir Pulaski* (SSBN-633) (Blue).

After his promotion to flag rank, ADM Long served with Commander, Service Group THREE/Commander Task Force 73, and Deputy Commander for Fleet Maintenance and Logistic Support, Naval Ship Systems Command, before assuming duty as Commander, Submarine Force, U.S. Atlantic Fleet in June 1972. Two years later, the admiral was named Deputy Chief of Naval Operations for Submarine Warfare.

After his tours as Vice Chief of Naval Operations and CINCPAC, ADM Long retired in July 1983. Nine of the officers on his staff as Vice Chief were later promoted to flag rank.

Surrounded by members of his family, ADM Long's son, Robert Long, of Seattle, Washington, receives the ceremonial flag.

VADM Joe Williams, who served with ADM Long, eulogized his friend. "Bob never lost sight of the idea of a balanced Navy. He had strong opinions on how the Navy should be structured and the missions it should take." VADM Williams also recalled how one of ADM Long's key decisions led to the Navy's assuming ownership of a former "snake-infested, never-used, costly-to-maintain, NATO ammunition facility in Georgia" that later became the Kings Bay Submarine Base, characterizing the episode with the old saying "If you'll buy that, I've got some coastal swampland in Georgia to sell you."

After retirement, the admiral worked as a consultant and a member of the Board of Directors for Northrop Grumman Corporation and Hudson Industries. Additionally, he was appointed to head the commission that investigated the 1983 terrorist bombing of the Marine barracks in Beirut, Lebanon.

"Bob believed and forcefully expressed his conviction that leaders should first and foremost be imbued with honesty, integrity, a sense of morality, an understanding of right and wrong, and a strong, strong work ethic," VADM Williams noted. "We can all be grateful he came our way."

ADM Long is survived by his wife, the former Sara Helms of Jacksonville, Florida, and their three sons, Charles, William, and Robert. Charles Long offered a brief tribute to his father: "He cared deeply about three things – his wife, his family, and his Navy. We moved 23 times during his career, but he always taught us that home is not a place, but where your family is. With my father, it was hard to say where his family ended and his Navy family began. People were always the focus of his life."

Task Force EXCEL Focuses on Training

by COMNAVSUBFOR Public Affairs

As the Chief of Naval Operations aims to revolutionize training, Task Force EXCEL (Excellence through Commitment to Education and Learning) is making waves in the already highly trained Submarine Force.

Task Force EXCEL is a group designed to take an in-depth look at how the Navy trains its Sailors and to develop ways to improve that training, said Atlantic Submarine Force Master Chief Don Kultti. He said the goal is to develop Sailors both personally and professionally.

"We want to give Sailors the same level of certification as their civilian counterparts and improve the quality of training at the same time," said Kultti.

Stan Meyers, Submarine Warfare Division Training Officer, said Task Force EXCEL has one simple purpose: to improve training. He said the task force is affecting the Submarine Force much the same as it is the rest of the Navy – it is changing the focus of training.

"It's looking more at individual human performance instead of standard classroom training," said Meyers.

He explained that the classroom may not be the best place for all learning.

"If we can train Sailors on systems they will operate in the fleet and avoid putting them in a classroom, we can cut down on time and cost," said Meyers. "The manpower to train students in classrooms is the most expensive part of training."

With the addition of the Undersea Warfare Learning Center, Training Support Centers and new training curriculum for certain rates, Kultti said the Submarine Force is on the road to more efficient training. The Submarine Operation Center for Excellence seems to bear the most impact so far, said Kultti. He said it will serve as one voice for the entire submarine force to dissolve any communication deficiency among training sites.

Kultti said that none of this is to say Navy training is broken. He, along with others including George Horn, Task Force EXCEL action officer, believes they have been doing a pretty good job of training submariners.

"The Submarine Force has always valued its people and valued training," said Horn. "This is just an improvement on that."

Qualified Nuclear Engineer Officer

LTJG Joseph Abbott Jr.
USS Maryland (SSBN-738) (B)

LTJG Hyo Ahn
USS Los Angeles (SSN-688)

LTJG Lauren Allen
USS Scranton (SSN-756)

LTJG Peter Andrews
USS West Virginia (SSBN-736) (B)

LTJG Jesse Balboa II
USS Olympia (SSN-717)

LTJG Joshua Bigham
USS Nebraska (SSBN-739) (G)

LTJG David Brooks
USS Ohio (SSBN-726) (G)

LT Edward Browne
USS Columbus (SSN-762)

LTJG Christopher Bruce
USS Miami (SSN-755)

LTJG Joseph Burneff
USS Key West (SSN-722)

LTJG Jeffrey Cadman
USS Dallas (SSN-700)

LTJG Robert Cameron
USS Tennessee (SSBN-734) (G)

LTJG Matthew Carmona
USS Wyoming (SSBN-742) (B)

LTJG Robert Carnell
USS Louisiana (SSBN-743) (B)

LTJG Mark Close
USS Maine (SSBN-741) (G)

LTJG Joshua Cook
USS Louisville (SSN-724)

LTJG Scott Cullen
USS Rhode Island (SSBN-740) (G)

LTJG Brian Cushman
USS Miami (SSN-755)

LTJG Michael Darby
USS Alaska (SSBN-732) (B)

LTJG Cesar Dorantes
USS Louisiana (SSBN-743) (B)

LTJG Kenneth Douglas
USS Michigan (SSBN-727) (B)

LTJG Luis Figueroa
USS Pennsylvania (SSBN-735) (G)

LT David Forman
USS Chicago (SSN-721)

LTJG Michael Freed
USS Buffalo (SSN-715)

LTJG John Frye
USS Key West (SSN-722)

LT Leland Gardner
USS Olympia (SSN-717)

LTJG Christopher Gilmore
USS Rhode Island (SSBN-740) (G)

LTJG Kevin Grey
USS San Francisco (SSN-711)

LT Eriks Griffiths
USS Columbia (SSN-771)

LT Jason Guidry
USS Buffalo (SSN-715)

LT Richard Haas
USS Helena (SSN-725)

LTJG Brian Hogan
USS City of Corpus Christi (SSN-705)

LTJG Steven Isomura
USS Houston (SSN-713)

LTJG James Jones
USS Hyman G. Rickover (SSN-709)

LTJG Stephen Kaman
USS Alexandria (SSN-757)

LT Christopher Kenny
USS Jefferson City (SSN-759)

LTJG Joseph Klapatch
USS Annapolis (SSN-760)

LTJG Rayomand Kumana
USS Springfield (SSN-761)

LTJG Kelly Laing
USS West Virginia (SSBN-736) (B)

LTJG Michael Lawlor
USS Pennsylvania (SSBN-735) (B)

LTJG David Leather
USS Rhode Island (SSBN-740) (G)

LTJG Shane Lesteberg
USS Henry M Jackson (SSBN-730) (G)

LTJG Andre Lester
USS Maine (SSBN-741) (G)

LTJG Brett Levander
USS Olympia (SSN-717)

LTJG Christopher Lindberg
USS La Jolla (SSN-701)

LTJG Andrew Liston
USS Florida (SSBN-728) (B)

LTJG Joseph Lyon
USS Houston (SSN-713)

LTJG Michael Marthaler
USS Helena (SSN-725)

LTJG Dale Matheny
USS Jacksonville (SSN-699)

LTJG Christopther McConnaughay
USS West Virginia (SSBN-736) (B)

LTJG Colin McGuire
USS Springfield (SSN-761)

LTJG Brian Mcguirk
USS Cheyenne (SSN-773)

LTJG Joseph McKee
USS Kentucky (SSBN-737) (B)

LTJG Daniel Mickle
USS Key West (SSN-722)

LT James Morton, III
USS Ohio (SSBN-726) (G)

LTJG Jason Pittman
USS San Francisco (SSN-711)

LTJG Reuben Powers
USS Maryland (SSBN-738) (B)

LT William Pritchett
USS Greeneville (SSN-772)

LTJG Daniel Reiss
USS Augusta (SSN-710)

LTJG Brian Reitz
USS Topeka (SSN-754)

LTJG Neil Rice
USS Georgia (SSBN-729) (B)

LT Henry Roenke, IV
USS Cheyenne (SSN-773)

LTJG Robert Ross
USS Alabama (SSBN-731) (B)

LTJG James Royal, Jr.
USS Pennsylvania (SSBN-735) (B)

LTJG Paul Salevski
USS Topeka (SSN-754)

LTJG Aaron Sanders
USS Pittsburgh (SSN-720)

LTJG Paul Seitz
USS Michigan (SSBN-727) (B)

LTJG Andrew Sexton
USS Georgia (SSBN-729) (B)

LTJG Michael Shaw II
USS Memphis (SSN-691)

LTJG Derrin Shriner
USS Portsmouth (SSN-707)

LTJG Joshua Smith
USS Honolulu (SSN-718)

LTJG Ryan Snyder
USS Chicago (SSN-721)

LTJG Andrew Steere
USS Maine (SSBN-741) (G)

LTJG Hernesto Tellez
USS Tucson (SSN-770)

LTJG Brian Turney
USS Norfolk (SSN-714)

LTJG David Vehon
USS Florida (SSBN-728) (B)

LTJG Jason Weddingfeld
USS Alabama (SSBN-731) (B)

LTJG Joshua Wig
USS *Tennessee* (SSBN-734) (G)

LTJG Travis Zettel
USS Salt Lake City (SSN-716)

LTJG Jonas Zikas
USS Hartford (SSN-768)

Call to War

(continued from page 3)

CO the Medal of Honor, is inspiring. I highly recommend reading the well-told story of that patrol in ADM Fluckey's book, *Thunder Below*. I was awed by the bravery and ingenuity of this crew and their skipper, because they were always looking for new ways to attack the enemy. I'm glad they were on our side! This was the type of crew that had to turn down many volunteers for a sabotage party sent ashore to blow up a Japanese railroad train. I guess they ran out of targets at sea.

This account caused me to reflect on whether I was doing everything I could to improve our capabilities in the war on terror and beyond. I wondered whether I was thinking and acting with the intensity and pressing need reflective of our nation at war.

I am awed by the skill, talent, and dedication of the greatest submarine force in the world. I know that we are continually improving and have already contributed mightily to Operation Enduring Freedom. I am proud beyond words to have served as a part of the Submarine Force, and I am thankful for the safety and protection afforded to my family and all other Americans by the fact that our submarines are deployed. You are doing a terrific job!

In closing, I want to leave you with two phrases that sum up the spirit of the great ship *Barb*. First, her motto: "We don't have problems, just solutions." And second, an excerpt from her Patrol 12 Unit Citation: "*Barb* fearlessly attacked the enemy at every opportunity."

I will state again that great and innovative work is ongoing across the entire spectrum of submarine warfare. Amazing strides have been made in a tough fiscal environment that requires difficult trade-offs and skilled management. I hope that this article will stimulate additional discussion on those difficult trades and further debate within each ship on finding new ways to fight and contribute to the joint force. Do we have an appropriate sense of urgency and aggressiveness for the war on terrorism; and do we have the will to take risks technically, physically, and fiscally to deploy new techniques and capabilities? Unmatched in submarine history, the heroes of World War II provide both example and inspiration in facing these current challenges. And their unwavering focus on winning provides much to reflect on as we answer the call to war. It did for me.

RADM Terpstra is a 1974 Naval Academy Graduate who has served on many submarines in his career, including USS *Von Steuben* (SSBN-632), USS *Sturgeon* (SSN-637), and USS *Pogy* (SSN-647); he served as Commanding Officer of USS *Dallas* (SSN-700) from 1990 to 1993. Most recently he served as Commander, Submarine Group 10, and currently works for the Office of the Secretary of Defense (OSD).

COMSUBLANT Sailors of the Quarter

Commander Submarine Force U.S. Atlantic Fleet (COMSUBLANT) awarded its Sailor of the Quarter and Junior Sailor of the Quarter honors recently in the NH-95 Building auditorium on the Naval Support Activity Norfolk compound. Storekeeper 1st Class (SS) Marlon D. Wilkins received the Sailor of the Quarter award for his duties as the staff storekeeper. His exceptional fiscal management of a $5 million budget helped him earn the award. Electronics Technician 3rd Class Sabrina R. Rollins was honored as the Junior Sailor of the Quarter. As a member of the Base Consolidated Telecommunications Center, she qualified as Staff Supervisor, a position normally held by a senior petty officer. COMSUBLANT Chief of Staff CAPT Joe Walsh presented the Sailors their awards and extended a personal thank you to both Sailors for their efforts.

Changes of Command

COMSUBGRU NINE,
COMSUBPACREP PACNORWEST
and COMSUBTRAGRU PACNORWEST
RDML Bruce B. Engelhardt relieved
RDML Charles H. Griffiths, Jr.

COMSUBRON-1
CAPT Cecil Haney relieved
CAPT Richard Snead

COMSUBRON-4
CAPT David E. Eyler relieved
CAPT George E. Manaskie

COMSUBRON-11
CAPT Douglas J. McAneny relieved
CAPT Bruce E. Smith

COMSUBRON-15
CAPT Joseph P. Mulloy relieved
CAPT Jose R. Corpus

COMSUBRON-20
CAPT Tim Lindstrom relieved
CAPT Albert R. Hochevar

Submarine Base, Kings Bay
CAPT John E. Cohoon, Jr. relieved
CAPT Walter H. Yourstone

Submarine Base, New London
CAPT James E. Ratte, Jr. relieved
CAPT R. W. Ruple, II

Naval Submarine Support Facility, New London
CAPT James J. Colgary relieved
CAPT Larry B. Olsen

Trident Training Facility, Kings Bay
CAPT Roy H. Harkins relieved
CAPT Charles B. Hasbrouck, III

USS Seawolf (SSN-21)
CDR Paul Stevens relieved
CDR Butch Howard

USS Albuquerque (SSN-706)
CDR Stuart Munsch relieved
CDR Jerry Burroughs

USS Minneapolis-St. Paul (SSN-708)
CDR Dave Ratte relieved
CDR John Ferrer

USS Hyman G. Rickover (SSN-709)
CDR Ken Gray relieved
CDR Peter Young

USS Augusta (SSN-710)
CDR Mike A. Haumer relieved
CAPT Donald D. Gerry

USS San Francisco (SSN-711)
CDR Paul A. Povlock relieved
CDR David J. Kern

USS Norfolk (SSN-714)
CDR David J. Herman relieved
CDR James R. Righter, Jr.

USS Buffalo (SSN-715)
CDR R. Murray Gero relieved
CDR Ralph C. Ward

USS Chicago (SSN-721)
CDR Craig M. Selbrede relieved
CDR Daniel E. Prince

USS Ohio (SSBN-726)
CDR Brian A. McIlvaine relieved
CDR Joseph Cereola as Commanding Officer
in a crew consolidation ceremony

USS Tennessee (SSBN-734) (GOLD)
CDR John Stewart relieved
CDR Ken Swan

USS Albany (SSN-753)
CDR Brett Genoble relieved
CDR Chip Jaenichen

PCU Virginia (SSN-774)
CDR David J. Kern relieved
CDR Thomas J. Kearney

USS Nevada (SSBN-733) (GOLD)
CDR Edward B. Seal relieved
CDR Walter E. Luthiger

USS Tennessee (SSBN-734) (BLUE)
CDR James A. Hertlein relieved
CDR Alfred J. Camp, Jr.

USS Nebraska (SSBN-739) (GOLD)
CDR Christian N. Haugen relieved
CDR Paul F. Healy

USS Rhode Island (SSBN-740) (GOLD)
CDR Peter Clarke relieved
CDR Robert C. Muir, III

USS Wyoming (SSBN-742) (BLUE)
CDR Rick Kitchens relieved
CDR Jeff Hughes

Resolute (AFDM-10)
LCDR Steven D. Cole relieved
LCDR Douglas J. Holderman

Submarine NR-1
LCDR Dennis J. McKelvey relieved
CDR William R. Merz

Supply Officer Qualified In Submarines

LTJG Christopher Kovack
USS Jefferson City (SSN-759)

LTJG Shawn Triggs
USS Alaska (SSBN-732) (B)

LTJG Jimmie Wise
USS Pasadena (SSN-752)

Line Officer Qualified In Submarines

LTJG John Adkisson
USS Philadelphia (SSN-690)

LTJG Matthew Andrews
USS Albany (SSN-753)

LTJG Daniel Baker
USS Maryland (SSBN-738) (B)

LTJG Steven Bettner
USS West Virginia (SSBN-736) (B)

ENS Martin Biel
USS Jacksonville (SSN-699)

LTJG Gary Blumberg
USS Hyman G. Rickover (SSN-709)

LT William Bonifant
USS Georgia (SSBN-729) (B)

LTJG Lashun Booth
USS Tennessee (SSBN-734) (G)

LTJG Andrew Bosak
USS Seawolf (SSN-21)

LTJG Adam Bottrill
USS Florida (SSBN-728) (B)

LTJG Robert Boyer
USS Pennsylvania (SSBN-735) (G)

LTJG James Brooks
USS Maine (SSBN-741) (B)

LTJG Gabriel Cavazos
USS Newport News (SSN-750)

LTJG Orville Cave
USS San Juan (SSN-751)

LT Tulio Celano III
USS Jefferson City (SSN-759)

LTJG Robert Coleman
USS Bremerton (SSN-698)

LTJG Christopher Colson
USS Hyman G. Rickover (SSN-709)

LTJG Paul Costanzo
USS Alaska (SSBN-732) (G)

LTJG Christian Cowdrey
USS Norfolk (SSN-714)

LTJG Mark Craven
USS Pasadena (SSN-752)

LTJG Scott Cullen
USS Rhode Island (SSBN-740) (G)

LTJG Ravi Desai
USS Dallas (SSN-700)

LTJG Mark Dickinson
USS Maryland (SSBN-738) (G)

LTJG Robert Digra
USS Rhode Island (SSBN-740) (B)

LTJG Shawn Doyle
USS Maine (SSBN-741) (G)

LTJG Douglas Dreese
USS Pennsylvania (SSBN-735) (B)

LTJG James E. Mahoney, Jr.
USS Boise (SSN-764)

LTJG Jason Everson
USS Norfolk (SSN-714)

LTJG Joseph Falcone
USS Hyman G. Rickover (SSN-709)

LTJG Matthew Fanning
USS Los Angeles (SSN-688)

LT Daniel Feliz
USS Maine (SSBN-741) (B)

LT Russell Felts
USS Alaska (SSBN-732) (B)

LTJG Luis Figueroa
USS Pennsylvania (SSBN-735) (G)

LTJG Cecil Fletcher
USS Norfolk (SSN-714)

LTJG Colin Gallagher
USS Henry M. Jackson (SSBN-730) (G)

LTJG Gregory Gebbie
USS Chicago (SSN-721)

LTJG Christopher George
USS Newport News (SSN-750)

LTJG Brian Gollantz
USS Rhode Island (SSBN-740) (B)

LTJG Stephen Gulick
USS Pennsylvania (SSBN-735) (B)

LTJG Dale Haney
USS Tennessee (SSBN-734) (G)

LTJG Chad Hardt
USS Louisiana (SSBN-743) (B)

LTJG Ryan Hemminger
USS Pennsylvania (SSBN-735) (G)

LTJG Craig Hempeck
USS Albany (SSN-753)

ENS Darryl Herrmann
USS Hyman G. Rickover (SSN-709)

LTJG Andrew Hill
USS Maryland (SSBN-738) (B)

LTJG Jesse Hill
USS Augusta (SSN-710)

LTJG David Hunt
USS Albany (SSN-753)

LTJG George Jacobs
USS Rhode Island (SSBN-740) (G)

LTJG Eric Jautaikis
USS Houston (SSN-713)

LTJG Thomas Jenkins
USS Norfolk (SSN-714)

LTJG Paul Jonsson
USS Helena (SSN-725)

LTJG Maurice Joy
USS Hampton (SSN-767)

LTJG Timothy Joyce
USS Jacksonville (SSN-699)

LTJG Jonathan King
USS Ohio (SSBN-726) (B)

LTJG George Klaus
USS Key West (SSN-722)

LTJG Aaron Kline
USS Oklahoma City (SSN-723)

LTJG Bradley Lambert
USS Pennsylvania (SSBN-735) (G)

LTJG Kristopher Lancaster
USS Rhode Island (SSBN-740) (B)

LTJG Judson Lantz
USS Seawolf (SSN-21)

LTJG James Lembo
USS Pittsburgh (SSN-720)

LT Patrick Lessard
USS Alaska (SSBN-732) (G)

LTJG John Levering
USS Annapolis (SSN-760)

LTJG Brian Long
USS Rhode Island (SSBN-740) (B)

LTJG James Maher
USS Nebraska (SSBN-739) (B)

LTJG James Mahoney
USS Boise (SSN-764)

LTJG John Manahan
USS Montpelier (SSN-765)

LTJG Richard Maseda
USS Wyoming (SSBN-742) (G)

CWO3 Richard Matthew
USS Minneapolis-St. Paul (SSN-708)

LTJG Daniel McMath
USS Pennsylvania (SSBN-735) (B)

LTJG Scott Mericle
USS Georgia (SSBN-729) (G)

LTJG Thomas Merkle
USS Los Angeles (SSN-688)

LTJG Justin Montague
USS Scranton (SSN-756)

LTJG Robert Morano
USS Houston (SSN-713)

LTJG James Morrow
USS Maine (SSBN-741) (G)

LTJG Steven Obert
USS Hampton (SSN-767)

LTJG Daniel Patrick
USS Tennessee (SSBN-734) (G)

LTJG Anderson Perez
USS Key West (SSN-722)

LTJG Deryk Petersen
USS Henry M. Jackson (SSBN-730) (G)

LTJG Corey Poorman
USS Parche (SSN-683)

LTJG John R. Tuite
USS Boise (SSN-764)

LTJG Edward Ratliff
USS Wyoming (SSBN-742) (B)

LTJG Brian Rechtenbaugh
USS Maryland (SSBN-738) (G)

LTJG Remy Robert
USS Ohio (SSBN-726) (G)

LTJG Anthony Romero
USS Ohio (SSBN-726) (G)

LTJG Michael Ross
USS Hyman G. Rickover (SSN-709)

LTJG Allen Rutledge
USS Louisiana (SSBN0743) (B)

LTJG Joseph Rysavy
USS Kentucky (SSBN-737) (G)

LTJG Brett Scheland
USS Columbus (SSN-762)

LTJG Mitchell Schueler
USS Ohio (SSBN-726) (G)

LTJG Robert Schumbach, III
USS Georgia (SSBN-729) (B)

LTJG Joel Sgro
USS Albany (SSN-753)

LT Nathan Shenck
USS Philadelphia (SSN-690)

LTJG Quentin Smith
USS Jefferson City (SSN-759)

LTJG Ryan Smith
USS Maryland (SSBN-738) (B)

LTJG Neil Steinhagen
USS Seawolf (SSN-21)

LTJG John Strunk
USS Tennessee (SSBN-734) (G)

ENS Luke Sullivan
USS Wyoming (SSBN-742) (B)

LTJG Thomas Taylor
USS Kentucky (SSBN-737) (G)

LTJG Michael Tomon
USS Tennessee (SSBN-734) (B)

LTJG Matthew Ulman
USS Columbus (SSN-762)

LTJG Edward Utz
USS Columbus (SSN-762)

LTJG Christiaan Van Westendorp
USS Oklahoma City (SSN-723)

LTJG Nathan Walker
USS Pennsylvania (SSBN-735) (B)

LTJG Glenn Washington
USS Chicago (SSN-721)

LTJG Charles Watson
USS Georgia (SSBN-729) (B)

LTJG David Wierich
USS Topeka (SSN-754)

LTJG George Willard
USS Minneapolis-St. Paul (SSN-708)

LTJG Roy Wilson
USS Hartford (SSN-768)

ENS David Wright
USS Wyoming (SSBN-742) (B)

LT Mark Yates
USS Scranton (SSN-756)

Limited Duty Officer Qualified In Submarines

LTJG George Porter
USS Florida (SSBN-728) (B)

LT James Truhett
USS Georgia (SSBN-729) (G)

Qualified Surface Warfare Officer

USS Frank Cable (AS-40)
CWO2 Robert Birmingham
ENS Steve Durham
CWO2 Richard Minck
ENS Joseph Norman
ENS Steve Stewart

USS Emory S. Land (AS-39)
CWO2 Terry Fahringer
CWO2 Scott Glazier
LT Steven Ingram
ENS Andy Lysinger
CWO2 Lawrence Nielsen
ENS Jeff Peterson

Journey of David Finko

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of Tchaikovsky, Glazunov, Stravinsky, Prokofiev, and Shostakovich. He graduated from the Conservatory in 1965 and realized immediately that he wanted to spend the rest of his life in music, writing compositions.

Recently, this son of a respected Cold War submarine designer sat at his dining room table in a modest home he owns on a cramped West Philadelphia street, without so much as a window air conditioner on a sweltering, humid day. His hair is gray and wispy on top. He wears a worn, button-down shirt. There, he explained why he left the submarine community and eventually, the Soviet Union, for America.

"As a Jew, I did not have any chance for promotion to higher positions," he admits. "My father was luckier, because he worked during World War II when everyone was needed, and he was much more talented than me. For me, working at Bureau #18 was a time-wasting, dangerous life without any prospects."

Finko's avocation for music served as an excuse to leave the submarine business bit by bit, and his last tasks were on the Project 675 and 667 Echo II-class submarines, which first deployed in 1965. Nonetheless, he admits that his long career in engineering still serves him well in composing classical music. He remembers a time when he was recruited out of the submarine force for a brief time to work as a young welder on the first Soviet icebreaker, the *Lenin*. "I could just feel the enormity of that 16,000-ton vessel. I could feel the cosmos, the space, the depth of proportion, and that's how I had to write my symphonies." But leaving that career would mean repudiating all the work he had done – and turning his back on his father's legacy.

"My father felt betrayed that his only son left the submarine design bureau," David says. "I knew I had a very bad relationship with him. I regret that now. He was an absolute genius of high caliber – I was nothing in the field compared to him. I understand that all my talents, in music, everything, came from him." Even worse, to create a new life for himself as a musician, the fledgling composer changed his last name from Finkelstein to Finko, severing another connection to his family. But his need to experience the world beyond that of the Soviet Union became stronger than any remaining loyalties. "I wanted to be really Jewish, to go to synagogue without persecution, which I believed you could do in America," he notes. "I thought because of communism I was deprived of knowing about trends and developments in contemporary music, so I wanted to upgrade my musical knowledge. And I wanted the economic opportunity."

When David applied for immigration in 1979, the Soviet authorities immediately fired his father from his position and severed his connections to professional associations and working groups. For Rafael Finkelstein, fatally sick with cancer, this was a final, devastating blow, which he did not long survive. Even now, David feels terrible guilt in the strained relationship with his father and admits if he could live his life again, he would return to Bureau #18, if only to build a better relationship with the man he admires today.

After Finko emigrated to the United States in 1980 with his wife and son, it appeared that he had attained much of what he had dreamed of. He received a number of commissions and eventually composed nine concertos, three tone poems, two symphonies, operatic works, and many other pieces. His orchestral works have been performed by major orchestras in America and Europe, and his viola concerto – which premiered in Leningrad in 1972 – has been especially well received. Another is a Harvard-commissioned work, the "Fromm Septet," and both are available on compact disc today. A significant influence in his music has been the work of his fellow Leningrad composer, Dmitri Shostakovich (1906-1975), and it also reflects an admixture of both Jewish and Russian liturgical elements. Finko has taught composition at Yale, and taught music theory at the University of Pennsylvania, Swarthmore College, and the University of Texas, among other schools, and he has received a wide variety of cultural awards and honors around the world.

From his rowhouse mere miles from the Liberty Bell in downtown Philadelphia, Finko reflects on his 23 years in America and is grateful for the freedoms and opportunities in his adopted country. "People from many countries strive to settle here and to make a much better living," he says. "People here are friendly and always smile. Anyone can buy a nice house and a good car here even on a low income, anyone can practice any religion here or be an atheist without any fear, anyone can publish anything without being persecuted. We could not have it (like this) over there. My son would be drafted and killed in Afghanistan if we stayed there. I could end in a prison for my anti-communist comments and anti-government jokes."

Finko has never been granted university tenure in America, so he subsists on a small Social Security pension and occasional commissions for writing music. But, like so many in the former Soviet Union who have become artists, musicians or writers, he tries to draw strength from the struggle for life. "Pain is necessary for producing great art, music, and literature!"

JOC Foutch is a Military Editor for UNDERSEA WARFARE Magazine.

Qualified For Command

LCDR Gregory Burton
USS Maryland (SSBN-738) (G)

LCDR John Carpentier
USS Wyoming (SSBN-742) (B)

LCDR Dino Deleo
USS Maryland (SSBN-738) (B)

LCDR James Doody
USS Los Angeles (SSN-688)

LCDR Benjamin Dorman
USS Kentucky (SSBN-737) (B)

LCDR Raymond Gabriel
USS Connecticut (SSN-21)

LT John Gearhart
USS Norfolk (SSN-714)

LCDR Dannie Hostetter
USS Pennsylvania (SSBN-735 (G)

LT Robert Jezek
USS San Juan (SSN-751)

LCDR Timothy Kollmer
USS Maryland (SSBN-738) (G)

LT John McGunnigle
USS Wyoming (SSBN-742) (B)

LCDR John Newton
USS San Juan (SSN-751)

LCDR Daniel Packer
USS Ohio (SSBN-726) (B)

LCDR George Perez
USS Montpelier (SSN-765)

LCDR Gary Pinkerton
USS Michigan (SSBN-727) (G)

LCDR Brian Reed
USS Nebraska (SSBN-739) (G)

LCDR Robert Rezendez
USS Miami (SSN-755)

LCDR James Ryan
USS Hartford (SSN-768)

LCDR Duane Sand
USS Florida (SSBN-728) (B)

LT Edward Schrader
USS Springfield (SSN-761)

LCDR Stephen Smith
USS San Francisco (SSN-711)

LT Neil Szanyi
USS Louisiana (SSBN-743) (G)

LT Aaron Thieme
USS Toledo (SSN-769)

LCDR John Vlattas
USS Salt Lake City (SSN-716)

LCDR Paul Whitescarver
USS Minneapolis-St. Paul (SSN-708)

Simon Lake

(continued from page 26)

nine S-boats were ultimately commissioned between May 1920 and June 1922, and five of them survived long enough to serve in World War II, although not as combatants. The last to be decommissioned – in June 1946 – was *S-15* (SS-120).

LAKE'S SUBSEQUENT ADVENTURES

In the demobilization that followed World War I, the Navy made drastic cuts in their planned program for submarine construction. Faced with the realization that there was not enough business to support two private submarine yards and fearful of the potential monopoly power of the stronger Electric Boat Company, the Navy in 1921 decided to develop the Portsmouth Naval Shipyard as an in-house center-of-excellence for submarine design and construction. That year, they assigned Portsmouth the first of the V-class submarines (*V-1*, later USS *Barracuda*, SS-163). Subsequently – and at least partially because of the arms limitations of the 1922 Washington Naval Treaty – no submarine contracts were let again to private industry until 1931, when *V-9* was laid down at Electric Boat. During that same interim, only eight boats (including *V-1*) were begun in government yards – seven at Portsmouth and one at Mare Island. Although Electric Boat's greater diversity and financial strength enabled that firm to last out the long hiatus, largely by building pleasurecraft and marine machinery, the much smaller Lake Torpedo Boat Company was forced to close its doors in 1924 for lack of business.

However, at only 58 years of age, Lake still had several more careers ahead of him. Some years earlier, he had founded the Lakeolith Corporation to manufacture inexpensive, prefabricated housing from reinforced concrete panels, and in 1925, he began marketing a line of "Sunshine Homes" using that technique. Although several large industrial firms expressed interest in the concept for workers' housing, Lake's idea was apparently too far ahead of its time, and few orders materialized. Later, he sought to refurbish his 1907 submarine prototype, *Lake XV* – renamed *Defender* – for use as a passenger-carrying sightseeing boat and then as a submarine rescue vessel, but this venture was overtaken by events when Lake became involved in the 1931 Wilkins-Ellsworth North Pole Expedition.

When Australian-born adventurer Sir Hubert Wilkins and Arctic explorer Lincoln Ellsworth proposed in 1930 to reach the North Pole by submarine, Simon Lake was retained as a consultant and proposed that his refurbished *Defender* be adapted for the purpose. When the Navy offered the newer Lake-built *O-12* instead, the latter was renamed *Nautilus* and modified by Lake for both under-ice operations and scientific experimentation. Lake predicted that the boat could travel 150 miles on a single battery charge and then use either an ice drill or explosive grenades to penetrate the ice canopy for access to the atmosphere. *Nautilus* left for Europe in June 1931 – inadequately prepared, in Lake's opinion – and almost immediately suffered an engine failure. Then, on arriving at the ice edge in August it was discovered that several rudders had broken away. Although these unwelcome developments – and several other mishaps – prevented an attempt to reach the Pole, *Nautilus* made a series of excursions under the ice that gathered significant oceanographic information and demonstrated under-ice operations for the first time before she was scuttled in Norwegian waters later that year.

Somewhat earlier, Lake had re-entered the marine-salvage business and built a large caisson-like "salvage tube" that could be lowered to the bottom for access to sunken ships. In 1934, he used this apparatus to search for the hulk of HMS *Hussar*, a Revolutionary War-era British frigate that sank in New York's Hell Gate with a million-dollar payroll of gold and silver in 1780. After spending three years – and a good deal of money – on the project, Lake was forced by growing financial difficulties to call off the search in mid-1937 and scale back his other business activities as well.

Soon after this *de facto* retirement, World War II erupted in Europe, and Lake was quick to offer advice to the government on new and expanded roles that submarines might play in the conflict. He devised a concept for rail-transported coastal defense submarines and proposed the use of large, undersea freighters as an alternative to the Atlantic convoy system that was suffering huge losses to German U-boats early in the war. Neither suggestion saw the light of day in Washington.

Coming as it did in the last months of the war, Simon Lake's death from a heart attack on 23 June 1945 went largely unnoticed by the submarine communities of the world, to whom his energies had contributed so much since the turn of the century. In November 1964, however, his memory was honored by the U.S. Navy in commissioning the submarine tender USS *Simon Lake* (AS-33), which subsequently served the Submarine Force for 35 years until her decommissioning in 1999.

Dr. Whitman is the Senior Editor of UNDERSEA WARFARE Magazine.

[1] After 1904, John Holland was no longer associated with Electric Boat. Despite the fact that his patents were the foundation of that company's commercial success, he had been increasingly shunted aside by the time his contract with the firm expired in that year – and he quit to found a new submarine boat company of his own. Because he had signed his patents over to Electric Boat, however, Holland was unable to recreate his earlier success, and he was out of business within a year or two. He died in 1914.

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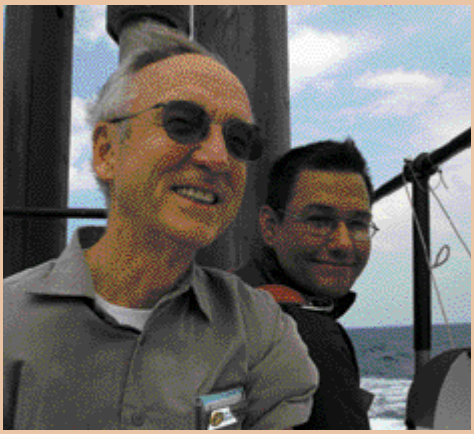
The author wishes to acknowledge the considerable assistance of Mr. Jeffrey B. Lake, great-grandson of Simon Lake, who answered a number of questions and provided several graphics for the article. Mr. Lake is the Founder and Director of the Simon Lake Project, whose historical archive and web site, www.simonlake.com, are an excellent source of information about the life and career of Simon Lake.

SECNAV visits *Scranton*

Secretary of the Navy, the Honorable Gordon England, sits atop the sail of the Norfolk-based *Los Angles*-class attack submarine USS *Scranton* (SSN-756) with MM2(SS) Mark P. Gardiner of Canton, Illinois during the submarine's surface transit to Port Canaveral, Florida. England spent the day aboard Scranton meeting with Sailors and viewing first hand the many capabilities of the submarine and her crew.



USS *BOISE* SUPPORTS BATTLE GROUP IN ENDURING FREEDOM

Photos by PH1 Jim Hampshire

(above) The *Los Angeles*-class attack submarine USS *Boise* (SSN-764) leads the fast combat support ship USS *Seattle* (AOE-3) and the guided missile cruiser, USS *Hue City* (CG-66) as the ships of the USS *John F. Kennedy* (CV-67) Battle Group transit the Suez Canal in March 2002. The Kennedy battle group is arriving to relieve USS *Theodore Roosevelt* (CVN-71) to conduct missions in support of Operation Enduring Freedom.

(left) Aircrew of the HS-5 Nightdippers lower a package on a rescue hoist from their SH-60F Seahawk to the sail of the *Boise* in May 2002. The Nightdippers are attached to Carrier Air Wing Seven (CVW 7), which is embarked aboard the *John F. Kennedy*.

On The Back

"The Constant Reminder" by Robert Malin, USN. In 1998, official Navy Artist Petty Officer 2nd Class Robert Malin was assigned to record the U.S. Navy's role in RIMPAC 1998, a biannual exercise held in the Pacific Ocean. That year, the exercise took place in the waters off Hawaii and included participants from six Pacific nations. The U.S. contributed more than 50 ships, 200 aircraft and 25,000 military men and women from all services. The goal of the exercise was to enhance the tactical capabilities of participating units in major aspects of maritime operations at sea.

While recording this massive undertaking, DM2 Malin was also able to document the conversion of the decommissioned USS *Missouri* into a museum at Pearl Harbor next the Arizona Memorial. Pictured here, a submariner looks at the memorial in a quiet moment during RIMPAC 1998. To read about the latest exercise, RIMPAC 2002, turn to page 8 in this issue of UNDERSEA WARFARE Magazine, or learn even more online at: http://www.cpf.navy.mil/rimpac2002/.

Artwork and information courtesy of the Navy Art Gallery.

The Constant Reminder

by DM2 Robert Malin, USN