THE SUBMARINE REVIEW

OCTOBER 1993

A Quarterly Publication of the Naval Submarine League

In Memoriam

PATRICIA LEE LEWIS

Our beloved Patricia Lee Lewis, matriarch of the Naval Submarine League since its inception, died of cancer on October 14 at her home in Alexandria, VA. Because of her unselfish devotion and loyalty to the League, Pat was honored as our **Submarine Hero** during our Eleventh Annual Symposium in June 1993. The "citation" for the occasion is printed herewith:

Pat Lewis is much more than merely a charter member of the Naval Submarine League. Our first office was established in Pat's basement. Office "equipment" consisted of several shoe boxes (our files) and one refurbished typewriter. Pat's title was Office Manager. Her first task was to teach herself typing. In just a few months, she had mastered book keeping and typing, and was taking night courses on computers and word processing. Our quarterly magazine, **The Submarine Review**, became Pat's "baby". She has typed and formatted every issue of the **Review** and contributed immeasurably to its organization and success.

Pat's pleasant telephone voice became the hallmark of the League's headquarters, reflecting her concern for each member and every inquiry. She took the time to converse patiently with every caller, resolving problems before they became crises. The League became the envy of all other sea service associations. Pat Lewis was in charge.

Historians write of the influence of a single individual on the outcome of an event. The success of the League is the legacy of one Pat Lewis to the now and future Submarine Force.

Well done, Pat! We all love you.

We were all greatly enriched for having the honor to know and love Pat Lewis and are grieved by her passing. Our sympathy goes out to her daughters Linda LaCoursiere, Donna Robinson, Terry Ginda, six grandchildren and her sister Sally Lash. Pat was the widow of Rear Admiral James R. Lewis, a submarine officer who died of a heart attack in 1982.

EDITOR'S COMMENTS

If there can be such a thing as a theme to one edition in a regularly recurrent magazine series, the one for this issue of The Submarine Review is that 'Submarines can do a lot of things—and we have to get that point across to everyone else'.

The Honorable John Dalton, the submarine-qualified new Secretary of the Navy, leads off this edition, and that theme, with the remarks he presented at the christening of USS TOLEDO (SSN 769). He spoke of a sense of renewal and cautioned that "...we chart the waters of a new, but uncertain world." League President Bud Kauderer reports on the results of Secretary Aspin's Bottom Up Review of our defense needs and capabilities. In justifying the decision to continue the industrial base, that Review highlighted the range of flexibility of submarines for new world activities. VADM Hank Chiles' presentation is an excellent summary of the kind of problems to be faced in today's world and where submarines stand in the effort to help with the solution to those problems.

Two special sections follow-up on that theme. A Counter Point section offers some contrast with published views on the Trident and Centurion programs and RADM Al Konetzni's comments on the objectives of submarine design are also reprinted. In addition, two pieces by active duty officers give a view *from the deck plates* of submarine multi-mission flexibility. They are both story-telling lessons and, together with RADM Bill Houley's piece in the current Naval Institute Proceedings, they give a strong sense of what can be done by submarines currently and in the near and mid-term future.

Three articles are included here that were presented at the Submarine Technology Symposium in May because they speak directly to the issue of submarine utility in the missions currently of most concern. The January issue of The Submarine Review will carry two other pieces from the May 1993 symposium that focus on specific missions in more detail.

In a more general vein, Ambassador Linton Brooks' talk to the League's Annual Symposium in June is presented as the best rundown available on the strategic force situation between the U.S. and the states of the former Soviet Union. There is also an article by a Commander in the Royal Australian Navy, who is the Operational Requirements Manager in that Navy's Submarine

Project Office, with the reasoning for a new submarine force in that part of the world.

The subject of speed in submarines, or in anything else for that matter, is always of interest and we have two articles on the subject that each offer a new perspective. From France, we have an article about the French Navy's approach to speed requirements and the consequent cost in ship size by the officer who was technically responsible for the design and construction of several classes of submarines. In Bud Gruner's article about the German Type XXVI boat he gives an interesting view of the convoy question now that their speed can be matched by submerged submarines.

For lighter reading, the Submarine bibliography in this issue is all about fiction with a listing of submarine novels. A new type of feature is presented in this issue with a conducted interview of RADM Hank McKinney just before he was relieved as ComSub-Pac. RADM McKinney was good enough to speak quite candidly and personally and there are insights in his answers that will be of interest to all. The interviewer is Richard Lawson, who used to be a reporter for Inside the Navy and interviewed ADM Carl Trost for that paper.

And then, for all those submarine sailors who are always ready to talk about how bad the weather was back whenever, there is the log of SAILFISH on her tenth patrol when R.E.M. Ward won the Navy Cross for sinking an aircraft carrier in the middle of a typhoon.

Jim Hay

■

FROM THE PRESIDENT

The recent end of summer '93 was most notable for the release of the much heralded and greatly anticipated Bottom Up Review, the Administration's plan for reducing the U.S. defense structure to levels appropriate for the post-Cold War world. In announcing the blueprint, Defense Secretary Aspin said, "We'll have a force based on tomorrow's requirements—a lean, mobile, high-tech force ready to protect Americans against the real dangers they face in this new era". By design, a relatively larger role has been given to the Navy, a tip of the hat to the

forward presence and mobility of naval forces and the Marines.

The review set limits on, inter alia, active Army divisions, Air Force fighter wings and bombers, Marine Corps end strength, aircraft carriers, tactical aircraft and surface ships, and on the number of SSBNs (18) and SSNs (45-55). More importantly, fulfilling President Clinton's promise to protect the fragile U.S. defense industrial base, the plan proposed building a third Seawolf Class SSN at General Dynamics/Electric Boat, and approved the development and building of the new attack submarine (NAS). A dual capability to build nuclear powered ships would be maintained; CVNs will be built at Newport News Shipbuilding. The plan must be approved by Congress.

Happily, there is some evidence that a year of sermons by a variety of preachers on the importance of preserving the nuclear industrial base has made some converts. In an editorial on 5 September, 1993, The Washington Post, yes, The Washington Post stated, "The administration proposes to buy a costly Seawolf attack submarine the Navy doesn't need just to maintain a submarine-building capacity. But that's hardly the first time in history the government has kept alive a defense production line for other than reasons of military necessity...There isn't exactly a large civilian market for submarines. Who will be able to build one X years from now if the operation is shut down? The administration is being selective about this...The go-ahead on the Seawolf is a good decision". Hallelujah!

Meanwhile, through the long hot summer, the ponderous acquisition mill has been grinding ever so fine on the NAS. The cost and operational effectiveness analysis (COEA) has been completed. The next hurdle is Milestone One, a review by the Defense Acquisition Board (DAB) for a blessing to press on. In this next phase, the decision makers must resolve a dilemma, i.e., where to draw the line on capability vs. cost. It doesn't take a rocket scientist to figure out that unless the NAS is acquired in numbers greater than one per year, the force level will default rather quickly in the next century to 30, or less. On the other hand, as Tevya said, we don't want our grandchildren to wonder why we willed them a fleet of submersible FFG-7s.

Clearly, a tough call, but perhaps we are presented with an opportunity for some visionary thinking. Modular hull sections, tailored to specific mission payloads, installed during construction like an option package on an automobile, should be efficient to

build and would provide operational flexibility for the future force. We might even venture into external weapons and vehicle storage. Above all, NAS should have an advanced, state-of-the-art, integrated combat control system, with open architecture and the processing capacity that will enable full participation in the joint world of the future. Fresh, new, and bold approaches to cost control and performance enhancement are not necessarily mutually exclusive.

Planning for the May 1994 Submarine Technology Symposium at The Johns Hopkins University Applied Physics Laboratory in well underway. For our annual June Symposium in Alexandria, an impressive slate of speakers has been invited. Please plan to join us.

Bud Kauderer

■

MEMBERSHIP STATUS

	Current	Last Review	Year Ago
Active Duty	954	981	998
Others	2716	2763	2707
Life	256	244	239
Student	28	28	28
Foreign	72	75	84
Honorary	19	20	20
Total	4045	4111	4076

FREEDOM REMAINS THE MISSION

Remarks as delivered by
The Honorable John H. Dalton
Secretary of the Navy
Christening of the USS TOLEDO (SSN 769)
Newport News, VA
28 August 1993

Today is another great day for the United States Navy and our Submarine Force, and I would like to begin by thanking all our distinguished guests for their presence and support. We all appreciate the presence of Congresswoman Marcy Kaptur and Mayor John McHugh, representing the 9th District of Ohio and Toledo, that fine city and soon-to-be-namesake for this submarine. Congressman Bobby Scott, representing the 3rd District of Virginia, is no stranger to the Navy. We certainly appreciate his support for shipbuilding here at Newport News. Of course, our special thanks go to Mrs. Sabra Smith[1], TOLEDO's sponsor, and to the Smiths' daughter Evangeline, the Maid of Honor. Their enthusiasm in supporting this christening ceremony is very evident.

In considering the future of our Submarine Force, I note that it has always far exceeded the expectations of skeptics. Even the first President to get underway and dive in a submarine—Theodore Roosevelt in the submarine PLUNGER in 1905—was quite cautious in writing that while "a good deal can be done with these submarines...there is always the danger of people getting carried away with the idea and thinking they can be of more use than they possibly can be." Well, President Roosevelt did not foresee the role of submarines in destroying Japanese commerce in World War Two, or preserving peace through deterrence throughout the Cold War, or firing Tomahawks against the forces of Saddam Hussein.

In any event, I don't think I'm getting carried away when I describe the significance of this ceremony. And I know our Commander-in-Chief, President Bill Clinton, is committed to a

---

[1] TOLEDO's sponsor, Mrs. Sabra Smith, is the wife of Admiral William D. Smith, USN, the U.S. Representative to the NATO Military Committee. ADM Smith is a submariner and a member of the League. He commanded USS HENRY L. STIMSON (SSBN 655), Submarine Squadron FOURTEEN in Holy Loch, and Submarine Group EIGHT in the Mediterranean.

strong America and Armed Forces that are second to none, as he affirmed during his visit to aircraft carrier THEODORE ROOSEVELT, and more recently aboard the CARL VINSON—which were both built well here in Newport News.

As a former submariner, this ceremony is more than a symbolic ritual in the building of a powerful warship. It has a deep personal meaning for me as well. It represents a sense of renewal within the Submarine Force—and indeed the entire Navy—as we chart the waters of a new, but uncertain world.

In building the future Submarine Force, we are not merely replacing older submarines with new hulls; we are replacing them with whole new capabilities. Our intent is to harness new technologies, new methods of construction, and new processes in order to build greater naval power and quality into a smaller fleet. This effort is the critical element behind our plan to *right-size* our Armed Forces in the post-Cold War environment. The christening of TOLEDO represents this effort, and represents the continuing upgrade that maintains our dominance in submarine warfare.

A month ago, prior to my confirmation as Secretary, I attended the decommissioning ceremony for one of the boats I served on, USS JOHN C. CALHOUN. That event gave me a chance to reflect on the challenges and sacrifices required of our submariners; the challenges and sacrifices that will undoubtedly face the future crew of TOLEDO. It also allowed me to think about the great advances that have occurred in the Submarine Force since the days of my service. As saddened as I was by the thought of JOHN C. CALHOUN's retirement after almost 30 years in commission, I realized, too, how proud I was of our Navy, our Submarine Force, and our sailors. I also realized how much all three have continuously improved in quality, so that today we are constructing not only the finest submarines, but we also have the finest submariners. TOLEDO is on the cutting edge of this continuous improvement.

We must always remember that as magnificent as the hull and systems of TOLEDO may be—and it is truly a marvel of technology—her success will be determined by her motivated, highly-trained crew, the men Commander Loye and his successors will lead, and by all the men and women of the Naval service who will support that crew's requirements. Our people will form the beating heart of this submarine, bringing her vital, powerful systems to life.

And what people! When President Clinton offered me the job of Secretary of the Navy he said, "John, you will inherit the finest

Navy and Marine Corps in our history in quality of people." I knew he was right, of course. But since my confirmation, I have had the opportunity to go out and visit the fleet—and let me tell you, they are the finest men and women I have ever seen. As an American and as a taxpayer, I am very, very proud of them. I considered my shipmates on JOHN C. CALHOUN well trained, dedicated and skilled, but I must admit to you that the sailors that I have met in my recent travels are even better. This fact reinforced in my mind that my job as Secretary is to ensure that our sailors and Marines continue to be as well trained and motivated, are treated with dignity and respect, and are given the best tools possible—such as the soon-to-be TOLEDO—so that they can continue their mission of protecting freedom.

This is the personal meaning that the christening today holds for me: I have had the pleasure to see the change from the Cold War era Navy in which I served, focussed as we were on the ominous and powerful Soviet threat with its huge Submarine Force. It was the contribution of submariners such as the men of JOHN C. CALHOUN that brought victory in the Cold War, deterring the expansion of communism while the internal contradictions in that system caused its collapse. And now I have the privilege, as Secretary of the Navy to greet the new era with the launching of TOLEDO, a submarine capable of performing the missions of our new strategy ...*From the Sea*. It is the privilege of seeing the finest submarines of our history being manned by the finest sailors in our history, continuing America's defense into the future.

To me, there is no question about what submarines can do now or in the future. The role of the 688 class submarine in Operation Desert Storm—destroying targets with Tomahawk missiles and deterring potential hostile actions by other radical nations—has proved that TOLEDO and her sister ships can handle the diverse threats facing our country today. Our Submarine Force remains our trump card in retaining command of the seas—an absolute necessity for the defense of our maritime nation and the bedrock prerequisite for being able to carry out our ...*From the Sea* strategy. Our Submarine Force is critical in ensuring that no other nation can challenge us at sea. And indeed, our submarines can perform missions in support of all future operations that are only limited by imagination.

In providing these tools with which to defend freedom, let there be no mistake about our commitment towards preserving our industrial base for constructing submarines such as TOLEDO. As

I said at my confirmation hearing, my preference is to maintain a slow rate of submarine production that will ensure the survival of our nation's submarine shipbuilding capability. We must ensure that our *right-sizing* process does not allow the decay of the absolutely superb engineering and construction skills that are constantly demonstrated by such men and women as are here at Newport News Shipbuilding. The skills of the men and women of Newport News, along with our other civilian shipyards, are vital assets to our nation. While I can neither guarantee nor predict the future, I intend to use every opportunity to ensure that preservation of the submarine industrial base remains a key element in our planning for future defense requirements.

During his speech at my swearing-in ceremony at the U.S. Naval Academy, Deputy Secretary of Defense Bill Perry spoke of the need for the United States military to maintain, as he called it, "an unfair competitive advantage" over all potentially hostile opponents. In my mind, it is our superb nuclear Submarine Force—built by our superior technology, submarine construction capabilities and shipyard personnel—that provides one of our key unfair comparative advantages at sea.

And this has been true since the commissioning of USS NAUTILUS in 1954. As I said, I feel the pride in what the officers and crew of the Submarine Force, both ballistic missile and attack boats, have accomplished for almost 40 years: the deterrence of nuclear and global war. In this they have achieved the greatest of victories. When the Cold War was at its height, our subs were always on the front lines—training, preparing, gathering information and deterring. That was our policy and it succeeded.

In welcoming the new TOLEDO, we should pause to remember, and take pride in, the patrols, the preparations, the personal sacrifices, and the separations from loved ones that were required to preserve the peace. We should even remember the arduous safety inspections, which were critical and highly successful in ensuring the safety of our environment. It was the hard work of crews like that of NAUTILUS, JOHN C. CALHOUN, and every other submarine that made our era of superpower deterrence a reality. The freedom of Americans and our friends and allies was safeguarded by the actions of these sailors thousands of miles from their homes. They stood watch, not for themselves, but for their loved ones, friends and neighbors in cities across America, cities with names such as Los Angeles, Newport News, and Toledo.

As we enter this era of national renewal, it is appropriate that

SSN 769, like all the submarines of the LOS ANGELES class, bear the name of one of our proud cities. Toledo, Ohio, represented here today by Congresswoman Kaptur and Mayor McHugh, is an industrial powerhouse in the heartland of America; a place where the American dream has been built and renewed across generations. Toledo, on the banks of the Maumee River and the west tip of Lake Erie, is no stranger to the ways of ships, having a fine international port. But what is most important about SSN 769's christening as TOLEDO is that it underscores the true mission of each and every Naval vessel: to defend the blessings of American liberty. And to do it day in and day out in the far reaches of the deep oceans and off the coasts of troubled lands.

Christening this submarine TOLEDO symbolizes the link between a dedicated, courageous crew with the people of the city of Toledo and all the American people who entrust the mission of safeguarding our freedom to the United States Navy. The Navy is very proud to have the opportunity to christen this submarine in the name of TOLEDO. It is our hope that the people of Toledo will always be proud of us. It is our responsibility to uphold those traditional core values of the Naval service—values dating back to the founding of our Navy. The values are simple: honor, courage, commitment, and leadership. They are the values upon which both our military and our society were founded, and they are the basis of our **pride**. They are the values that the first USS TOLEDO, a heavy cruiser, carried into battle at the landing at Inchon, Korea during the Korean War. It was the battle that won the independence of the modern nation of South Korea.

It is my prayer that the new TOLEDO will never have to go to battle, but will spend her days in the deterrence of war and preservation of peace. But if fate and injustice and the tyrants of this world challenge us, I know she will bring honor to her crew, the Naval service and the citizens of Toledo. The spirit that built that proud city will sail on in this submarine. Its true course will be within our hearts and our resolve; its deeds will become part of our legacy as Americans.

Freedom remains our mission; TOLEDO will be the means. It is fitting she will bear the name of the home of proud, independent and caring people.

Thank you all. God bless our Nation, Newport News, the Navy and Marine Corps, and the city and ship called TOLEDO.

■

SUBMARINES, TECHNOLOGY, AND THE POST-COLD WAR ERA

by VADM H.G. Chiles, Jr., USN
Commander Submarine Force
U.S. Atlantic Fleet
Keynote Address, 11 May 1993
Submarine Technology Symposium

We cannot discuss our needs in the Navy and the Submarine Force without considering the current world situation and our many difficult problems. This new era may lack superpower confrontation, but it does not lack conflicts, crises, and perplexing issues—political, military, economic, environmental, and social.

First, the Cold War is over, or so the experts tell us. After World War I and World War II people were talking and writing about how we had won "peace for all time". You don't hear that now after the Cold War. The most prevalent, thoughtful view of the next five to ten years seems to be a world of perpetual crisis. Whose crystal ball can see further? The Jane's Defence Weekly 2 January 1993 edition listed an update of flashpoints around the world. At the time of that article, there were "26 conflicts raging where two or more countries are at war, or where insurrections threaten the stability of the internationally-recognized government; 23 areas of potential conflict between nations or within a nation's existing boundaries, where ethnic tensions and rivalries could give way to fighting. Tension exists in a further 24 areas, making a flashpoint total of 73 hot spots for 1993". At the U.S. Atlantic Command headquarters, we also keep track of key crisis areas around the world on a status board. Today there are over 59 countries/areas world-wide on the board, ranging from a low level environment for crisis up to imminent crisis or crisis in progress, such as: Bosnia-Herzegovina, Armenia/Azerbaijan, Somalia, Haiti, and Iraq to name a few.

Then there are some familiar names: Libya, estimated to have tons of poison gas; China, selling weapons freely on the world market; Iran (which purchased $40 billion world of arms between 1980 and 1988, worth about 20 percent of its gross national product), continuing to buy military hardware and technology at a rate of several billion dollars per year; and Russia, with high

inflation and political and economic problems galore.

Second, the U.S. still has the #1 military and the #1 economy, but we are clearly cutting the military ferociously. For example, over 30 more submarines will be placed out of service this decade and about 40 have already been decommissioned. We're headed from a Navy of about 575,000 active duty personnel today to about 400,000 by 1998 with something less than 400 ships. The budge deficit adds economic concerns.

Proliferation of high technology weapons continues. Iran has received delivery of its first Kilo class submarine and other countries are working to expand or develop a submarine force. Some argue that proliferation of nuclear technology is accelerating; that it is, or will be, easier to get nuclear weapons components, trained scientists, and weapons engineers out of Russia and the former Soviet Union to countries apt to use these weapons for regional mischief. Some nations are developing or buying ballistic missiles with a range of hundreds of miles, which may not threaten us directly but certainly threatens some of our close allies. Richard Nixon (in a recent book) and others argue that the 20th century was the most destructive of all history with more people killed in wars than in all other centuries combined. Will high tech, high explosive proliferation mean the 21st century will top that?

Population is a problem. More people have been born on earth in the last 50 years than the last 900; the 5 billion population on earth now is likely to double, or at least increase by another 3 billion, by 2010. Further, greater than 93 percent of the growth is expected to occur in the so-called Third World that can't feed its people now. In addition, 14 countries in the world control about two thirds of the world's output and 80 percent of the world's gross national product. The 14 countries include the U.S. naturally, but also Canada, Mexico, and China, but not Russia. To really focus the disparity between the *haves* and the *have nots*, consider the Arab (or if you want, the Muslim) world. For example, the average annual per capita income of Egypt is about $750, with Morocco about the same; in the United Arab Emirates and Qatar, it is about $25,000. Many of you may have seen the May 10th article in the Wall Street Journal about how satellite TV is rapidly spreading throughout Asia. People there are seeing first hand what life is like in the rest of the developed world. Why should the *have nots* be satisfied with their meager existence when others are well-off and inattentive to their plight?

Of course, the world still seems to produce its fair share of leaders like Quaddafi, Noreiga, and Saddam Hussein. And who's to say there isn't another Hitler growing in Eurasia. We're still faced by ethnic cleansing atrocities, devastating hunger is served on CNN most nights with dinner, and we're still beset with a drug flow into our communities that destroys our children.

So these are some of the negatives on the balance sheet: trouble spots around the world; proliferation of weapons; population growth and migration; economic disparity between nations; and rogue leaders.

What I've described is pretty bleak—but it's not all bleak, and there are some pluses on the ledger. There have always been crises and even if the world seems to be more unstable, maybe it's not more risky to the U.S. for several reasons.

First, we're really working with the Russians to reduce their, and our, nuclear stockpiles. Russia is the only country capable of destroying our way of life in a half hour. Working together we can make progress on a host of fronts. Sure there are problems with the ratification of the START treaty in Ukraine, Kazakhstan and Belarus. We're working on those. But reducing the stockpiles can't hurt. Confidence building steps are being taken, albeit warily, including conventional forces cuts, chemical and biological weapon reductions, and the Open Skies Treaty.

Most of our current security challenges are distant from our shores. We've got some strategic depth and a fairly good system for determining what's happening around the world. We have ways of assessing increased tensions and areas of potentially more risk for the U.S. There currently isn't a global challenge to U.S. standing. We're working to promote a more stable order in Eastern Europe. And most of the former Warsaw Pact countries want protection, assurance, and even to join NATO.

NATO and the United Nations seem to have greater world-wide respect than in the past. The current world situation is the opposite of that under which they were formed. NATO suited the threat and the member nations pulled together for a collective security arrangement that worked for over 40 years. Now that the world situation has changed, NATO is changing with it—really changing. The use of NATO forces to enforce the *no fly* policy in the Balkans is an example of this new flexibility. The UN was often stymied during the Cold War by the superpower standoff. Now maybe it can be more effective with improved cooperation by the members of the Security Council. Let's hope so. In any

event, we're major players in both and we derive great benefits from those associations. Even if we don't have all NATO allies with us on all issues, their viewpoints are invaluable. Our NATO politico-military consensus operations enhance the trust and bilateral work with our allies. Many of NATO's greatest achievements are bilateral or trilateral.

Finally, we have a President and an Administration that's engaged internationally. Never mind the campaign, we're engaged—maybe not everywhere or doing everything you'd like, but clearly engaged and thrashing away at thorny international problems. We're respected as a world leader. Our freedoms and openness are envied by much of the world, and they have confidence we won't abuse our enormous power.

So on the positive side of the balance sheet we have: improved cooperation with our Cold War adversaries; no direct military threats and reduced risks of confrontation; strategic depth to problems; a more pro-active NATO and UN; and the U.S. is still a world leader that's actively engaged. Fine, nothing new here. But these issues are driving the direction we're headed probably for the rest of the 90s.

The military isn't going away. It's too essential to our leadership, our credibility, our economic viability, and preservation of our way of life. We may reduce but we won't disappear. The new administration gives every indication it intends to use our Navy, capitalize on the strengths we have today, and not stand for military impotence. We have a strategy that entails strategic deterrence, forward presence (especially by the Navy), crisis response, and reconstitution (not a submariner's favorite word). I'll talk more later on strategy. Our overall military size is being reduced and we are restructuring, and have restructured, to meet the new security environment. Some areas will actually see increases. In our immediate future I believe there are at least four growth industries for the military as it's being applied abroad.

- Peacekeeping—such as in Somalia. Our involvement will often be in coalitions with other nations, but sometimes we may act alone with the agreement of most concerned parties and surrounding allies.
- Counter-drug—a big effort which was approached initially somewhat reluctantly by the military. It's unlikely to reach a successful conclusion soon.
- Regional crisis resolution (peacemaking)—kicking Iraq out of

Kuwait is a prime example of a regional operation of the type which we could face again. Who knows where the next one will be?

- Reducing or minimizing the spread of weapons of mass destruction and high technology weapon systems.

These are four types of actions in which you can expect more military involvement—certainly in the first three. The Navy and Marine Corps White Paper ...From the Sea provides some guidelines for execution of our strategy. It reflects what we're already doing and have done. These are major changes from the Cold War. ...From the Sea is based on nuclear strategic strength, regional area dominance, the ability to project power, and knowing the threats (the battlefield, the air above it, and the sea in front of it). And we've got to be able to stick it out.

What I came here to say is that the nuclear submarine plays in this strategy—big time, and not in insignificant numbers.

Our strategic nuclear forces, the Trident SSBNs, will carry an increasing share of the country's nuclear warheads. The Trident weapon system has long range, is highly accurate, and is cost effective. Advocated by USCINCSTRAT, there's a new dimension to having an Air Force 4-star general arguing for 18 Trident submarines, 2 crews per boat, and protecting a robust communications system. General Butler knows, and tells people, you can talk to submarines.

We have strategic depth. We expect to fight far from our shores. Remember that in the time it took USS LOUISVILLE to get from San Diego to the Red Sea, a diesel boat wouldn't have made it much past Pearl Harbor. Our submarines may be tracking diesel boats one day, or sprinting to track a high interest surface ship the next. We have the ability to get ahead of the carrier and be her eyes and ears in close to the beach.

The Submarine Force has changed dramatically over the past two years. The employment of the attack Submarine Force really has been refocused toward littoral warfare with increased emphasis on strike, special warfare, mining, shallow water operations, anti-diesel submarine warfare, amphibious warfare, and carrier battle group (CVBG)/maritime action group (MAG) operations. Two submarines steam with each carrier battle group—East Coast and West. Admiral Miller, USCINCLANT, put together an innovative, controversial adaptive force package for the USS THEODORE ROOSEVELT battle group deployment with Marines plus

their helos on the carrier. The ASW planes were left ashore. Initially, I didn't see a submarine on the list. I asked him how many he wanted. The answer was two. Why? Because they are a force multiplier and contribute to all aspects of our strategy. The shift of submarine tactical control to battle group/joint task force commanders is commonplace. Examples of how submarines contribute include:

- Surveillance. We cannot overemphasize the importance of early and accurate knowledge of potential adversaries. Submarines are relied upon very heavily in this area. We've been supporting the multi-national effort to enforce United Nations sanctions in the Baltic region since last year. In counter-drug operations we quadrupled our involvement last year. This year will be busier. If U.S. forces are likely to get involved, you can bet SSNs will be there soon.
- Strike. Submarines make a sizable contribution to our overall strike capability, particularly where covertness and low risk to our forces are necessary. We do over 300 exercises a year. And we deployed a longer-ranged version of the torpedo tube launched Tomahawk missile this year.
- Battle Space Dominance. We're working hard on anti-diesel ASW tactics and can contribute a great deal off the beach in unfriendly waters; unseen, unheard, without surface or air control issues. We're good at targeting small surface combatants. We're getting better at finding mines. We haven't forgotten about deep water and shallow water ASW. That's still our most challenging problem. The submarines we may have to go up against only get quieter.

Communications with the CVBG used to be a significant shortcoming. We fixed it; it's not an issue now, but we must keep up with the rest of the Navy as communications systems evolve. We have over 20 SSNs with demand assigned multiple access (DAMA) equipment installed now. Our first extremely high frequency (EHF) unit is installed and has started testing.

By the way, we started work this year with amphibious task forces. They asked for us. The same principles that make us useful to the CVBG enhance our utility to the amphibs. As the amphibs consider long term forward operations, they may need our help.

Special operating forces are perhaps the strongest advocates of

submarines as their major covert means of getting ashore. Our work with these forces vividly illustrate the joint commitment of our military effort. Last week I was aboard one of our SSNs with 22 Navy SEALs, 17 Marine Force Recon guys, a nine man Army Operational Detachment, and, believe it or not, an Air Force master sergeant communications specialist/combat air controller. While a submerged lockout/lockin capability is important, a dry-deck launch may well be the best way to get large numbers of these people ashore, without the encumbrance of SCUBA gear.

So I expect the SSNs to be involved in practically all the peacekeeping and peacemaking regional issues our country faces. Our versatility is well recognized. The submarine's capability for surveillance is just too valuable to be ignored.

Recently, when the Unified Commanders were asked to validate the forward presence requirements for submarines in the next century, their numbers were essentially identical to those submitted last year for the Joint Chiefs of Staff study on SSN force levels. Those numbers, when released, should make the shipbuilders happy and argue that we must continue to build submarines. They should be quiet, affordable, multi-mission platforms; stealthy, with long legs, capable of working and communicating covertly with all types of U.S. forces; able to keep the big picture, and ready to hit with a big stick. I doubt we'll ever be able to afford all the people and ships we want; we'll always rely on our technology. We may not be much ahead of the rest of the world, but we'd always better be ahead.

Technology is the key to maintaining a modern, capable Submarine Force. In my view, our biggest technology challenges are:

- Communications. As the rest of the Navy evolves to higher frequencies and data rates, we must maintain seamless connectivity and compatibility with all joint forces and our NATO allies. Some of you are already involved in studying this issue for the National Security Industrial Association (NSIA). One of the most challenging aspects for submarines will be antenna design to fit space constraints and withstand submergence pressure.
- Mine Detection and Avoidance. A major problem area today. We need to be able to find and avoid mines, particularly in the shallow littoral areas. We can't afford to yield the battlespace to a few inexpensive mines. The amphibs in particular need

our efforts. We may be able to use our special forces in the future to help in this area.

- Shallow Water and Anti-diesel ASW. It will be increasingly challenging. We need to improve our capabilities against quiet diesel and other non-nuclear submarines, and improve the effectiveness of our weapons against them in shallow water.
- Affordability in Submarine Design, Construction and Maintenance. We need to find innovative ways to cut costs or the numbers of submarines that we can afford will be far less than our current fleet requirements. We must maintain the industrial base which allows us to design and build the best submarines in the world.
- Special Warfare Enhancements. As our older submarines retire, we need to find ways to enhance the capability of our LOS ANGELES class SSNs, ensure that our new submarines have a robust special warfare capability, and improve communications and imagery transmission to better support these missions.
- Rapid Retargeting for Tomahawk Missiles. This is not unique to submarines, but we must keep up with the rest of the Navy since we carry a large portion of the available cruise missiles.

In summary, there are many crises and challenges in this changing, dynamic world. The proliferation of technology will make our Navy's job more difficult in the future while the world's sociological and economic problems are likely to multiply. Demand for the services of the Submarine Force in this environment is likely to increase, not decrease, even as we reduce in numbers. Certainly, we intend to maintain American military preeminence through this era—ready to defend American interests wherever they may be. We have already shifted from our Cold War operating patterns; have dramatically changed what we do with our submarines, who we talk to and how; and changed who we work for and what we expect from our Commanding Officers. There will be more changes. There are many technology issues. We look forward to the submarine community's new ideas and innovations—especially affordable ones—to help us keep our Submarine Force ready for what we'll have to handle tomorrow. ■

A NEW SUBMARINE FOR AUSTRALIA

by Commander Frank Owen, RAN
Operations Requirements Manager
New Submarine Project

The launching of HMAS COLLINS on Saturday, 28 August 1993, closed the first chapter of a book which was opened in April 1982 with the formation of a project team for the Royal Australian Navy's New Construction Submarines. Now, halfway through a program that will result in six of the best diesel-electric submarines in the world, the proud boast is still "On time, on budget".

One would think, however, in these days of *reducing tensions* and *removal of the threat*, that the launching of a new class of submarines is poorly timed and unjustified, yet the program retains widespread political and public support. This public support is based not only on the fact that the project, at a total cost in 1993 prices of nearly $A5B ($US3.5B) and with the local content of around 70 percent, is generating jobs and prompting a considerable inflow of technology, but also that the need for submarines and, more importantly, self-reliance in defence matters is well accepted. This has not always been the case.

Australia procured its first submarines, AE1 and AE2, at about the time the RAN was formed in 1913. AE1 was lost without trace off New Guinea and AE2 performed with distinction in the Dardanelles, becoming the first Allied submarine to pierce that seemingly impenetrable strait in 1915 before being lost to Turkish shore-based gunfire. After the war, the submarines were replaced with six J-class submarines and they, in turn, by HMA Submarines OXLEY and OTWAY. Severe economic pressures in the Depression forced Australia to sell the submarines back to UK in 1932 and created a gap in submarine ownership that was to last until 1967 when the first of the RAN's UK-built Oberon class submarines, HMAS OXLEY, arrived in Sydney.

OXLEY was joined at yearly intervals by OTWAY, OVENS and ONSLOW and the RAN began the process of re-learning how to operate submarines. By the mid-70s, it became apparent that these boats offered more than just the ASW training for which they were initially bought and moves were made to increase the size of the Submarine Arm to six. ORION and OTAMA made the voyage from Scotland to Australia in 1977 and 1978; OTAMA

being the last Oberon class to be built. These submarines were, in their time, among the quietest and most capable conventional submarines in the world but by the mid-70s were feeling the effects of having to operate obsolete weapons and sonars.

The Submarine Weapons Update Program (SWUP) modernized the combat side of the submarines from 1980 onwards with a modern digital fire control system and new attack and passive ranging sonars. Australia became the first nation outside the U.S. to acquire the Mk48 torpedo and, later, also incorporated Encapsulated Harpoon into its now formidable inventory.

SWUP, however, was only ever a delaying tactic in the battle to keep the Oberons competitive and the requirement to replace them with a new construction design was raised in 1980. The weapons update program did, however, act as a stepping stone in jumping the four generations of computer technology which have passed in the intervening period between OXLEY and COLLINS and the lessons learnt from that program have been applied to COLLINS.

All of this was carried out in a *benign strategic climate* without the imperatives of countering a potentially hostile foreign navy's increasingly quiet submarine fleet. Even after the end of the Cold War, with its attendant calls around the world for massive demilitarisation, the RAN has managed to retain acceptance of its requirement for a capable Submarine Arm. How has it managed to do so? Much hangs on an examination of the basic rationale for submarines in the Australian situation.

There can be few nations with better justification for a substantial naval capability than Australia. As an island continent with a coastline of approximately 12,000 nm and a substantial proportion of the nation's trade being seaborne, the country endures long Sea Lines of Communication (SLOC). To the north is Asia with its burgeoning economics and almost ceaseless conflict (Korean Confrontation, Vietnam, etc.), the Indian Ocean to the west and the developing and increasingly independent island nations of the Southwest Pacific to the east. **The sea area in Australia's Area of Direct Military Interest (ADMI) covers nearly 10 percent of the earth's surface.** *[Ed. Note: Emphasis added.]*

Submarines can provide covert surveillance in a manner unmatched by other platforms as well as causing a potential enemy to allocate a disproportionate amount of resources in

countering the threat they pose, should the situation escalate. *[Ed. Note: Emphasis added.]* If any were to question the truth of that statement, they need look no further than the effect that the possibility of Argentinean submarines being at sea had on the British commanders during the campaign for the Falklands. The existence of other submarines in the region, although few in number, also requires that the Australian Maritime Commander possesses the capability to counter them should the need arise. Submarines can do that job as well as, if not better, than other ASW forces.

Also important in the Australian context is the deterrent effect of a Maritime Strike capability and no platforms can match the firepower and stealth of any submarine. The ADMI abounds with natural choke points as the USN submariners discovered during WW2—choke points that carry much of the world's shipping traffic. While Australia's defence posture remains unmistakably defensive, the option to strike offensively at an adversary is an essential element of her self-reliant defence capability.

Self-reliance is that catch-cry that has been around since President Nixon espoused the Guam Doctrine in 1969 where he made it clear that no longer could nations rely unthinkingly upon the United States for their own defence, but that self-reliance was necessary. Australia was either slow to pick up the none too subtle *hint* in that statement, or was not under any immediate need to embark on a defence policy that embraced it. It was another ten years before the equipment procurement side of defence took their eyes off foreign shores.

The original plan of the Submarine Project called for the lead boat to be built overseas and the remainder in-country in an attempt to reduce the risk, but it was the Government which decreed that all submarines were to be built in Australia. That decision, once taken, was embraced with gusto and has resulted in the historically high level of local content referred to earlier. It has also meant that most of the money spent on the project has stayed in the local economy.

The question could also be put as to why nuclear propulsion is not being utilised. Given Australia's remoteness from any likely patrol areas and the vast areas to be covered, the nuclear solution would seem to provide the greatest flexibility and to be the most logical. The reasons for its non-adoption are many and are not just limited to political concerns.

Firstly, it was fundamental to the project that local content was maximised, not just from an economic perspective, but also for through-life support and battle damage repair. The RAN had suffered from dangling at the end of a 12,000 mile supply chain for too long and, however much goodwill was present, the fact remained that we were a customer of different priority to the home navy. Given that local construction was essential, it was considered, probably rightly, that the learning curve from refitting relatively simple diesel submarines to building highly complicated nuclear ones would be too steep and would be adding unnecessary risk with no significant benefit.

Secondly, the RAN had developed considerable experience in the operation of diesel submarines, experience that will translate most readily into the Collins class. This meant that *conversion* training should be minimised.

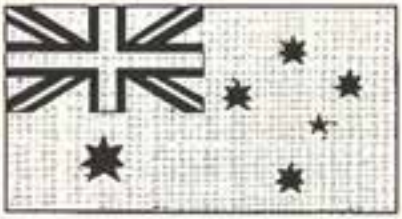
Finally, the massive cost of the infrastructure that would be required if a sustainable nuclear program were to be embarked upon would be out of all proportion to the advantages of nuclear power. Especially with the advent of Air Independent Propulsion (AIP) with the fact that there is no loss in terms of noise signature, the difference between the SSN and a good diesel submarine is reducing by the year. Combine this with the political, environmental and perceptual factors facing nuclear submarines, and the choice of diesel submarines for Australia is inescapable.

By any standards, COLLINS will be a most capable submarine. She will rarely be troubled by the need to refuel before she has to re-provision; will have greatly improved underwater performance compared with her predecessors; and a generating capacity that will permit covert transits at speeds unheard of until now. She will also be several orders of magnitude quieter than her predecessors. Through adoption of a high degree of automation and redundancy, the crew has been reduced from the Oberon's 63 to 42, yet the combat system has many times the capacity of its predecessor.

Using concepts very similar to those being embarked on with AN/BSY-2, the Collins class combat system provides the Commanding Officer not only with capabilities he would not have considered before, but also with the problem of managing the vastly increased amount of information now being presented. Accordingly, his role has subtly changed from one who has his team process the data so that he might make the decision to one

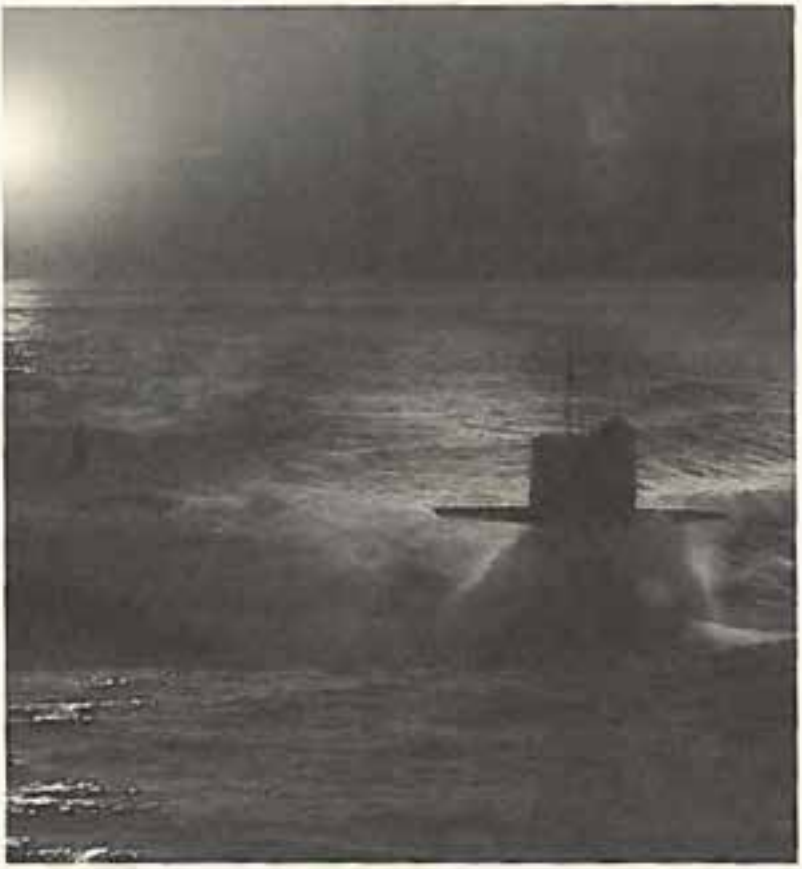
who must manage his six or seven decision makers so as to achieve his objectives. This is probably one of the more fundamental challenges facing the commander who takes COLLINS on her first operational patrol.

The project which has overseen the establishment of a new industry and of a completely new way of doing defence business in Australia may have finished the first chapter, but the rest of the book promises to put War and Peace into the shade. It has the prospect of even greater excitement and challenge if HMAS COLLINS is to achieve the potential she so richly deserves. ■



I am planning a biography of CAPT Edward Ellsberg, famous U.S. Navy salvage expert, and would like to hear from anyone who knew him. Please contact:

CDR J.D. Alden, USN(Ret.)
98 Sunnyside Avenue
Pleasantville, NY 10570
(914) 769-6035



Submarine Technology in a League by Itself.

General Dynamics Electric Boat Division has been designing and building nuclear submarines for more than 40 years. We are the sole designer and builder of Trident ballistic missile submarines, and we build SSN688 class attack submarines.

The Navy has awarded us contracts for the first two Seawolfs, America's most advanced attack submarine. And, we are now developing concepts for Centurion, the next generation attack submarine.

At Electric Boat Division, we continue to set the standard of excellence in submarine construction and technology.

GENERAL DYNAMICS

Electric Boat Division

START, START II, AND THE SUBMARINE FORCE

by Ambassador Linton F. Brooks
U.S. Chief START Negotiator
NSL 11th Annual Symposium
June 10, 1993

Introduction

I want to do three things this afternoon. First, I want to talk about the two START Treaties and bring you up to date on where they stand. As you probably know from the press, that is very much of a moving target. Second, I want to speculate a bit about the future, recognizing that, if the last two years have taught us anything, it's that conditions in the former Soviet Union can change quickly and in unpredictable ways. And finally, I want to suggest what these developments, both past and future, mean to the Submarine Force.

When I'm speaking about the current status of the two START Treaties, I'll be speaking authoritatively, but my speculations about the future are just that—speculations—and should not be taken as representing Administration policy.

START I Status

Let me begin with START I. It was signed less than two years ago, after almost nine years of negotiation involving hundreds of people. Once implemented, the Treaty will result in an overall reduction of about forty percent in strategic forces, with cuts up to fifty percent in some categories. In negotiating START I, the United States had several goals:

- First and foremost, to increase stability and to reduce the risk of war through preferential reductions in the most destabilizing systems.
- Second, to maintain overall equality despite the vastly different force structures of what we still called "the two superpowers."
- Third, to capture real military capability through the use of complex counting rules and by focusing on deliverable warheads and ballistic missile throw-weight.
- Fourth, to avoid limitations on U.S. conventional forces and to avoid restrictions on our ability to develop strategic

defenses.

- And finally, to do all this in a treaty that could be effectively verified through our own intelligence augmented by extensive on-site inspections and a large data exchange.

To accomplish these goals took an exceptionally complex Treaty over 600 pages long. Most of the complexity was a result of our great concern with verification, reflecting the Cold War attitude of mistrust that prevailed during much of the negotiations.

Less than a month after START I was signed came the August 1991 coup, the beginning of the end for the Soviet Union. Fifteen states emerged from the ashes. Four of them—Russia, Ukraine, Belarus, and Kazakhstan—have strategic weapons and facilities on their territories. While the forces in Belarus are small, Ukraine and Kazakhstan would be the third and fourth largest nuclear powers in the world were they to seek and obtain independent control of the forces in their respective states.

Obviously we had to adapt the START Treaty to the new situation. As a result, in May 1992, in Lisbon, the five states signed a new START Protocol under which Belarus, Kazakhstan, Russia, and Ukraine assumed the START obligations of the former Soviet Union. The protocol also obligated Belarus, Kazakhstan, and Ukraine to adhere to the Nuclear Non-Proliferation Treaty (NPT) as non-nuclear weapons states as soon as possible. Finally, letters from Belarus, Kazakhstan, and Ukraine obligated them to eliminate nuclear weapons and strategic offensive arms from their territories within seven years of entry into force.

When START I was signed, the reductions involved seemed huge. And they were. The former Soviet Union would have had to destroy a missile launcher or a heavy bomber every 68 hours for seven years. There was serious debate about whether we should even agree to follow-on negotiations, and those who favored them thought in terms of modest additional reductions. By the end of 1991, however, the collapse of Communism and the dissolution of the Soviet Union had totally changed our attitude. It became obvious that, with or without follow-on negotiations, both sides were going to reduce to well below START I levels. Which led us, of course, to START II.

START II Status

START II began, although we didn't fully realize it at the time, in September 1991. That month, in response to the failed coup,

President Bush set in motion a series of initiatives designed to transform the nuclear relationship between the United States and what was still the Soviet Union. The President announced that the United States would withdraw from overseas deployment and destroy all ground-launched tactical nuclear weapons and would remove all tactical nuclear weapons from U.S. ships and submarines. He challenged the Soviet Union to take comparable steps, which it soon did. And the President called on the Soviet Union to agree to eliminate all ICBMs with multiple warheads.

The President's proposal was amplified in his 1992 State of the Union address, where he set forth a number of steps that the United States could take to limit sea-based forces and bombers as part of an agreement to eliminate all ICBMs with multiple warheads. Over the next year the basic START II trade emerged. It was a simple and straight-forward exchange. Recognizing that Russia would be forced by economics to reduce to unusually low levels of strategic forces, the United States agreed to go to those same low levels in return for Russian agreement to eliminate ICBMs with multiple warheads—MIRVed ICBMs—which have long been regarded as the most destabilizing strategic offensive system. The basic terms of the deal were settled during the June 1992 summit; the START II Treaty itself was signed in Moscow on January 3, 1993.

When fully implemented, START II will reduce strategic arsenals by about two-thirds from current levels. That's what's gotten the publicity, but that's not what's important. We didn't set out to get to 3500 warheads; it was the price we paid for the complete elimination of MIRVed ICBMs.

START II reductions will occur in two phases. No later than seven years after entry into force of the first START Treaty, the United States and Russia will be limited to 4250 total warheads on deployed strategic offensive arms. Because by this time Belarus, Kazakhstan, and Ukraine are supposed to have eliminated all strategic offensive arms, START II only involves the United States and Russia.

All remaining START II reductions must be completed by January 1, 2003. From then on, each Party will be limited to 3500 total warheads, of which no more than 1750 may be SLBM warheads. In addition, at this point, deployment or production of any MIRVed ICBMs will be banned. And, in a particularly important accomplishment, all heavy ICBMs must have been eliminated. This elimination achieves a decades-old U.S. objec-

tive. Under START I, half of the existing 308 heavy ICBM silos must be destroyed. Under START II, all the rest must be destroyed or converted to launch single-warhead SS-25 ICBMs. In return for our allowing Russia to save money by converting rather than destroying some silos, the Russian Federation agreed to eliminate all deployed and non-deployed SS-18 missiles; an elimination requirement which goes beyond what is required by either the START I Treaty or the agreement between the two Presidents reached at last year's summit.

If that's what we got, what did we give up? Four things:

- First, as I noted, we went to a level of deployed strategic warheads that is considerably lower than we initially preferred.
- Second, we agreed to a limit on SLBM warheads, something we had resisted in START I. Because some START I rules are relaxed under START II, however, we can meet that limit by downloading, or reducing the number of warheads on Trident II SLBMs, without reducing our planned Trident SSBN force structure.
- Third, we agreed to changes in the heavy bomber counting rules. Under START I, a series of attribution rules resulted in heavy bombers being counted at significantly less than their full weapons loading. In contrast, START II counts such bombers with the number of nuclear weapons for which they are actually equipped. The impact of this provision on the United States is mitigated by provisions allowing up to 100 heavy bombers to be reoriented to a conventional role and thereby not to count against START II warhead limits. These provisions were designed to allow us to reorient the entire B-1 force, but are not specially limited to the B-1.
- Finally, for the first time, we will permit exhibition and inspection of the B-2 bomber. Such exhibitions and inspections are not required under START I.

There has been a lot of talk about the demise of the Soviet Union. I must confess that, for a long time, I thought that the Russians were just Soviets with a different name. Some of them, of course, still are. But I was struck with how different the endgame of START II was from the START I endgame. In START I we were constantly fighting against Soviet walkbacks, up to and including the morning the Treaty was signed. With START II there was none of that; just professionals doing a

professional job. Maybe things really are changing.

The Future of Nuclear Arms Control

What about the future? Will there be a START III? It might seem that, with two massive treaties which haven't yet been ratified, we have more than enough to do without looking for more negotiations. And of course, in one sense that's true.

Everyone in the Administration agrees that our first priority is to get START I and START II ratified. That is proving difficult. The legislatures of the United States, Russia, Belarus, and Kazakhstan have all approved START I. Russia, however, imposed a condition: it will not exchange instruments of ratification until Belarus, Kazakhstan, and Ukraine not only ratify START I, but also agree to give up nuclear weapons by acceding to the NPT as non-nuclear-weapon states. Only Belarus has approved accession to the NPT, although I expect Kazakhstan will take similar action either this summer or in the early fall.

That leaves Ukraine. The Ukrainian Parliament began to debate START I in early June, although many parliamentarians are predicting that no action will be taken before fall. While the government remains firm that Ukraine should approve START I and become a non-nuclear state, there are some in the Rada, the Ukrainian Parliament, who are urging keeping nuclear weapons, at least for a while, primarily because of security concerns about Russia's intentions and long-term stability. Ukraine also is worried by the cost of implementation of START, and by its continuing disputes with Russia over the division of the assets of the former Soviet Union, including the highly enriched uranium in nuclear warheads.

The United States has taken a number of steps to meet Ukrainian concerns. We have allocated at least $175 million in Nunn-Lugar funds to aid Ukraine in dismantlement and related tasks. We have told Russia we will not implement the agreement to purchase highly-enriched uranium from dismantled weapons until the Russians reach agreement with the other states, including Ukraine, on an equitable sharing of the proceeds. We have agreed that we will give Belarus, Kazakhstan, and Ukraine certain security assurances once START and the NPT have been approved. As you can tell from the newspapers, the jury is still out on whether this is enough.

START II ratification is also facing problems, this time in Russia. While the Supreme Soviet approved START I by a huge

margin (157 to 1), START II is far more contentious. Although the Treaty was submitted to the Supreme Soviet in early March, consideration has been delayed by the domestic political tensions between the Yeltsin government and the legislature. In addition, many Russians are reluctant to act until Ukraine approves START I and joins the Non-Proliferation Treaty. Although some Russians claim START II is unbalanced in favor of the United States, I believe Russia will ratify the Treaty once Ukraine acts and the Russian political crisis is over. The Treaty has the strong support of the Russian Ministry of Defense and the military. When approval will come is hard to predict; it won't be before this fall and could be much later.

Once we overcome these problems and get START I and START II ratified, there is general agreement that our highest priority should be to accelerate the reductions called for by both Treaties. In particular, while the letters associated with the Lisbon protocol give Kazakhstan and Ukraine seven years to eliminate strategic arms from their territories, the United States would obviously like to see that elimination occur sooner and we are willing to spend U.S. money to make that happen.

Similarly, START II has built-in provisions for acceleration. If we and the Russians agree on a program of assistance to Russia, all the obligations specified for January 1, 2003—the reductions, the ban on MIRVed ICBMs, the elimination of all SS-18 ICBMs—can be advanced to the end of the year 2000. Once ratification occurs, negotiating such a program of assistance will be a high priority.

But I do not believe that the United States will be satisfied to simply consolidate and accelerate what we have already gained. As you know, the Administration will be examining where to go next in strategic arms control, and in nuclear arms control in general, over the next few months. One result of that examination is clear: there will be negotiations on a comprehensive test ban, leading to the complete, and probably permanent, cessation of nuclear testing in the next few years.

I think that there will also be interest in negotiating various confidence building measures. These are measures that seek to promote openness or reduce risk without imposing actual limits on forces. There have been suggestions in the press, for example, that we might seek an agreement on detargeting strategic missiles. The Russians may want to reach some type of formal agreement on attack submarine operations near their SSBN patrol areas. You

can think of other measures that might be interesting as well.

A year ago, I would have said that if there were to be START III negotiations at all, they would be limited to confidence building measures. That remains my personal preference, but it is by no means a sure thing. In the most recent issue of Foreign Affairs, Admiral Bill Crowe, the former Chairman of the Joint Chiefs of Staff, argues for a strategic force of 1500 warheads. I'm uncomfortable with reductions of that magnitude, given the great uncertainties we face about Russia's political future, but it would be a mistake to dismiss proposals for further cuts out of hand. Three years ago a colleague of mine proposed that START II aim at a reduction to 3500 warheads. He was derided as hopelessly naive. Who knows what will seem acceptable in a year or two.

You will note that I've said nothing about what happens if Ukraine fails to ratify START I or elects to keep nuclear weapons. I've also said nothing about what happens if Russia rejects START II. That's because I remain confident, despite some discouraging trends, that both treaties will ultimately be ratified. Sooner or later, Ukraine will recognize that its future security lies in integration into European political and economic institutions and that nuclear weapons stand in the way of that integration. In Russia, we are in the happy position that the more individual Russian officials understand START II, the more they support it as being in their interest. Thus, once Ukraine acts and the current constitutional crisis is resolved, I'm reasonably certain that Russia will reaffirm its commitment to START II. If I'm wrong about either of these predictions, the consequences will be severe and all predictions about the future are off.

Submarine Force Impact

Finally, what does all this mean for the Submarine Force? What START I and START II themselves mean is clear. They mean that ballistic missile submarines will remain the mainstay of our deterrent and we can continue to operate those submarines the same way we have in the past. START II was explicitly designed to allow the United States to keep all 18 Trident SSBNs. We sought and obtained changes in the counting rules so that the missiles on these submarines could be downloaded from eight warheads to four, allowing us to meet the START II limit of 1750 SLBM warheads without changing our planned SSBN force structure.

Just as the impact on force structure is minimal, so too is the

operational impact. The only notifications directly related to submarines concern construction, dismantlement, change of home port, or missile launch. There are no operational notifications. While submarine-launched ballistic missiles, primarily D-5, can be inspected to ensure they carry no more than the legal number of warheads, the impact is minimized since these inspections can be done topside with the missile in its launch tube or with the missile removed, at our choice. Shipyards and submarine interiors are never inspectable.

This sounds as thought the two START Treaties won't force us to make any difficult decisions, but I need to sound a note of caution. While START II allows keeping 28 SSBNs, it doesn't require it. Nine submarines outfitted with missiles carrying eight warheads each would be equally compatible with the Treaty. Given the costs of retrofitting the D-5 missile in the first eight Ohio class boats or of extending the life of the C-4, this may be a hard option to resist. Although neither treaty provides procedures for doing so, it would also be legal to make the reductions by reducing the number of tubes per submarine. At least one Senator advocates such an approach on fiscal grounds.

I think the implications for the Submarine Force of the general developments of the past two years are also clear. With the possible exception of changes in forward operations as a result of the two Barents Sea collisions—which is a subject I'm not prepared to discuss for the excellent reason that I'm not involved in the issue—there are no arms control restrictions, no inspections and reporting of any kind involving attack submarines. Nor do I see any likelihood of such restrictions in the future. **The collapse of the Soviet Union has, it seems to me, eliminated whatever faint utility naval arms control might have had.** *[Ed. Note: Emphasis added.]*

At the same time, the elimination of nuclear weapons, including TLAM/N, from ships and submarines other than SSBNs does eliminate one potential attack submarine mission. In my view, this change is irrevocable. While it's probably important to preserve the option to redeploy such weapons, it is extremely difficult to see any circumstances in which we would actually do so.

When we turn to the future, it becomes far more difficult to assess the impact of nuclear arms control. A comprehensive test ban will have little direct impact; it will simply intensify the current move toward relegating nuclear weapons to the role of ultimate deterrent, with non-strategic nuclear forces no longer

having any significant nuclear role. That tends to fit historic Navy preferences. Confidence building measures, also by definition, will not alter the fundamental way in which our strategic forces are structured, although they may change some of the ways we operate.

If, however, the United States elects to seek still further reductions, there could be significant changes. Admiral Crowe's article doesn't advocate any particular force composition, but we can't get to 1500 warheads without some drastic force structure changes. Indeed, if anything like that level were to be negotiated, I suspect that there will be calls to reconsider the concept of a Triad. My expectation, which I assure everyone here shares, is that the Submarine Force would maintain its preeminence, but who knows.

Finally, those of us charged with national security responsibilities always have to keep in mind that favorable outcomes aren't the only possible ones. I think Ukraine will ultimately give up nuclear weapons, but they might not. If they become a permanent nuclear power, it could open the flood gates to nuclear proliferation, leading to a different and frightening world.

Similarly, I think that Russia's experiment in democracy will succeed. The April referendum and its aftermath are hopeful signs. But as I reminded you last year, we can't be certain that democracy will prevail. After all, 60 years ago there was another state which, like Russia today, had a long authoritarian tradition, fragile democratic institutions, a demoralized military, hyperinflation, and a tradition of ethnic scapegoating. It was called the Weimar Republic and it voluntarily turned over power to a messianic, totalitarian, militaristic leader who plunged the world into war. Locking in the reductions of both START Treaties is an important hedge against unfriendly regimes coming to power in the future. But we also need to maintain strong, capable, and survivable strategic forces just in case the future doesn't go our way.

Thus, despite the tremendous accomplishments of the past two years, of which I'm very proud, the Navy, the nation, and the Submarine Force are all going to have to continue to maintain a robust deterrent for the foreseeable future. Fortunately, in today's Submarine Force, that deterrent is in good hands. ■

WHAT PRICE SPEED?

by Marc Menez
Ingénier Général de 1ère Classe de l'Armement
French Navy (Ret.)

[Ed. Note: Général Menez's equivalent rank is Vice Admiral, Naval Constructors Corps.]

For years, any discussion about submarines of the future appearing in The Submarine Review was limited to "the best capable sub..." and "...a 100 submarine force...", leaving very little room for more innovative combinations. From time to time, reminiscences of conventional submarines were evoked under the pressure of Congress but they were quickly passed over with little attention to detail.

During this period, from experience gained in my own country, I was well aware that when the unit price of a single item (such as a submarine) increases to the point where, for several budgetary years, such investment could not be viable for a wealthy nation, people begin to consider and study in depth unforeseeable, possible solutions.

In France, we were confronted with such a problem in the 1970s, when we intended to build large attack submarines after a first batch of our SSBNs, but we finally turned to a far smaller design.

When one tries to keep a sufficient number of submarines on the inventory in spite of budgetary constraints, the tendency is first to design them more cheaply, which more or less means making them smaller and thus less capable.

But the inventory is not all: the aim is in fact to keep a sufficient number of submarines at sea. This is a second, important aim which requires greater reliability and availability, bearing in mind that reliability, leading to more redundancies, may well run counter to the objective of a low-cost, smaller submarine. Balanced decision-making can, however, lead to the attainment of both goals. One can then obtain an even better availability, using two shifting crews for one boat, as is normal practice for SSBNs. This was introduced in the 1980s as soon as our attack submarines were deployed.

At the beginning of the 1990s after the near collapse of the SEAWOLF programme, the United States is now faced with a

similar position.

There is no doubt that large reductions are to be made in present capabilities in order to achieve a lower unit cost for the CENTURION design. This must be done in spite of a possible increase in development costs, as new developments may prove necessary to achieve required compactness with easy maintenance.

But cutting capabilities is not an easy task, as was suggested in your July 1992 issue. CDR John Alden, in your October 1992 issue, was right to underline this difficulty. Capabilities can only be roughly quantified in relative terms: they cannot be *measured*, as a physical parameter can be, and cost effectiveness evaluations may therefore be misleading.

In such a process, it must be borne in mind that operational capabilities, although difficult to quantify, are closely related to physical parameters which are much easier to deal with as they can be computed accurately. Among these parameters, **maximum speed** (as well as maximum depth) is an essential factor to be taken into consideration due to its important impact on the design. Architectural factors, such as quantified values of pressure hull diameter, are also of importance (2 decks approximate 8m or 24 ft., 3 decks approximate 10m or 30 ft.).

Let me recall first the influence of the maximum speed on submarine design. A submarine can be roughly modelled as a volume (V_u) of military items (weapons, sensors etc.) whose mobility and services are produced by another volume (V_{prop}). For the sake of simplicity, these volumes are supposed to be shipshaped when added to each other and include all trapped water.

Total volume Vt when submerged is: $V_t = V_{prop} + V_u$

Displacement Δ submerged is: $\Delta = \rho V_t$ where ρ is sea water specific weight.

Power necessary to propel the boat is: $P = k \Delta^{2/3} S_m^3$ where S_m is the maximum speed and k a coefficient supposed to be a constant in all considered designs.

η being the specific power per unit volume of the propulsion plant, also supposed to be constant, one can write:

$$V_{prop} = \frac{P}{\eta} = \frac{k\rho^{\frac{2}{3}}}{\eta} V_t^{\frac{2}{3}} S_m^{\frac{2}{3}} \quad \text{or:} \quad V_t - V_u = \frac{k\rho^{\frac{2}{3}}}{\eta} V_t^{\frac{2}{3}} S_m^3$$

which gives the relationship between V_t and S_m for a given V_u. For high values of S_m, V_t is large enough for V_u against V_t to be neglected, which leads to a less implicit and more manageable relationship:

$$V_t \approx \frac{k^3 \rho^2}{\eta_3} S_m^3$$

- To increase maximum speed by 5 knots from 25 to 30 knots leads to a total volume increase of:

$$\frac{\Delta V_t}{V_t} = \frac{\Delta S_m}{S_m} = 180\%$$

- To increase speed by 1 knot at 30 knots means that the total volume must be increased by 30%.

This being established, it is quite clear that the maximum speed considered necessary at a design stage must be chosen carefully on well established, operational deployment schemes after a thorough analysis that cannot be found in open literature.

One often reads that high speeds allow for fast deployment in peacetime. This is debatable, as safety relies, inter alia, on gathering, at least from time to time, information on the surrounding traffic. Maximum speed necessarily results in poor detection, even using the sonar in active mode. It cannot therefore be used all the time, except in open, traffic-free zones. On the other hand, short notice long-range deployments are unlikely in peacetime, as information is easily obtained and deployments set up well in advance. In this context, the Falklands War can be considered as an exception rather than the rule.

[Ed. Note: VADM Menez was in charge of the building programs for L'INFLEXIBLE, the improved French SSBN, and the RUBIS program for a nuclear attack submarine. He is a qualified submariner and an officer of the Légion d'Honneur.] ■

THE FUTURE OF THE TRIDENT FORCE

SUPERFLUOUS SUBS

An Editorial of The New York Times,
July 26, 1993

Sound the klaxon and prepare to dive. The Navy is still on alert against a surprise Soviet nuclear attack, ready to retaliate at a moment's notice.

Which is to say: Today's Navy has yet to adjust to today's realities. Its excessive fleet of missile-carrying submarines confronts a receding nuclear threat and Russia's rapidly rusting anti-submarine warfare effort.

A new study by the Congressional Budget Office shows how the Navy can safely reduce the size of the Trident force and slow its tempo of operations, saving billions in the process.

The Navy currently plans a fleet of 18 Trident submarines, 12 of which would be at sea at a time. Each sub would carry 24 D-5 missiles, as accurate as any the U.S has; the eight oldest submarines that now carry C-4 missiles would be refitted with more accurate D-5s. To comply with Start II ceilings, each D-5 missile will be armed with four warheads instead of the eight it is capable of carrying. To keep 12 Tridents at sea without wearing out the sailors, the navy assigns two crews to a sub; one on board and the other on shore duty.

By Congressional Budget Office estimates, the total package—18 subs, with 12 at sea plus onboard and onshore crews—will cost at least $46.6 billion through 2010, even more if the submarines are replaced before completing 40 years of service.

The Pentagon should pursue two of the options that the C.B.O. presents: First, reduce operating tempos by keeping 6 instead of 12 Tridents at sea at one time. That would end double crewing and reduce maintenance and training costs, saving $4.5 billion between 1994 and 2010.

Second, instead of refitting the eight oldest subs with new missiles, retire them, starting in 2001. That would yield a savings of nearly $13 billion more by 2010.

Under this arrangement, the Navy could leave seven warheads on each missile instead of reducing the number to four. It would thereby retain 1,680 warheads, almost as many as it would have under current plans—and far more than it needs to cover its

shrinking list of targets.

Having fewer subs at sea makes the Trident force somewhat more vulnerable to enemy submarines, but that risk was never great when the Soviet Union existed and is considerably smaller now that it has collapsed. The Pentagon needs to save money where it can. A good place to look is under the sea. ■

THE COMING DANGER TO DETERRENCE

by James C. Hay

The July 26th editorial in The New York Times is one of the smoke signals in the air which indicate that dangerous cutting may be done to the nation's pre-eminent deterrent force for relatively short-term budget savings.

Another signal was seen at the September 1st briefing which unveiled the Bottom-Up Review of defense needs. In answer to a question about the justification for "18 boomers", Secretary Aspin said "...we will go back and look at the strategic forces. We did not look at the strategic forces very heavily here, because they were driven by the START I and the START II agreement, and those numbers were kind of fixed in the short run, so we saw no chance to influence those except later." Three weeks later a senior defense official commented about the nuclear part of the four dangers said to be the basis of the Bottom-Up Review by questioning whether proliferators can be deterred.

One danger, of course, comes from confusing SSBN *effectiveness* with SSBN *survivability*. Effectiveness insures that the system of submarines, missiles and warheads can cause the requisite damage. Survivability has to do with force numbers. While it is true that each individual submarine is as undetectable and covert as it is possible to make it, there comes a point in diminishing force size when the risk of losing one submarine by chance is too great to accept.

Consider the numbers. The Times was a trifle fast with its combination of the Congressional Budget Office options. If the Pacific Trident I (C-4) submarines are not backfitted to the Trident II system with the D-5 missile and are put out of commission, then we will indeed be down to 10 strategic submarines. A further reduction in cost is wanted by the Times with a reduction to one crew for each boat and acceptance of a lowered operating tempo.

My arithmetic for a ten boat force on a one-in-three rotation (with one boat in overhaul) shows that only three will be on patrol at any one time. If the force is split between the Atlantic and Pacific, one of those oceans will have **only one boat** underway.

Note that such a force of submarines could carry almost as many warheads as the 18 ship force, therefore effectiveness is not greatly impacted. The problem would come upon the emergence of another global threat, Russia or someone else, for whom we would want to increase our armament. There would not be the flexibility for additional warheads that is possible with 18 submarines, each with 24 missiles and four heads per missile.

The Congressional Budge Office study also offered as an option the de-tubing of the 10 submarine force down to 12 each. That would reduce the SLBM effectiveness, as well as survivability, but it would allow quick savings in the number of missiles that have to be purchased.

When the entire reduction-in-force logic is put together, there seem to be several conceptual weak points that may not be obvious when considered one at a time. The first is that both effectiveness and survivability considerations are tied to Russia without concern for other powers that may arise during the time that we will be under the force constraints ordained now and in the near future. A second is that deterrence is being questioned as being useful on the basis of its applicability in the regional context. It may, however, be just what is needed to give pause to petty tyrants, and it is still needed to deter any global threat over the next couple of decades. Should we discard the edge we have to save the dollars or should we debate the matter first?

The third is a lack of appreciation for the dynamic which is just the opposite of deterrence. If we offer a vulnerability that is too inviting to pass up, like making it conceivable to trump our only counter to nuclear blackmail, someone over the next 10 or 15 years may decide to try it. ■

THE SENSE OF CENTURION

CENTURION MAKES NO SENSE

by James George

[Ed. Note: The following article is reprinted from Defense News June 28 issue.]

With the end of the Cold War and drastically decreasing defense budgets, few were surprised when President George Bush canceled the SSN-21 SEAWOLF program, whose construction costs had escalated to more than $2 billion.

The real surprise was the promise to proceed with a new, less-capable, low-cost submarine code-named CENTURION.

Although lower-cost alternatives are certainly possible, most observers were skeptical that the nuclear Navy trained by ADM Hyman Rickover, which always emphasized the most capable craft possible, could bring itself to build such a ship. It turns out, they probably are right.

Although it never was publicly released, in January outgoing Defense Secretary Dick Cheney sent Congress a six year Future Year Defense Program showing spending for CENTURION development at more than $3 billion followed by a new submarine costing not $2 billion, but $2.6 billion. President Bill Clinton and Defense Secretary Les Aspin have yet to issue a Future Year Defense Program, but it appears they agree.

They list CENTURION development costs of $449 million for 1994, very close to the $473 million in the Cheney budget. It's one thing to spend $3 billion in development and then $2.6 billion for a better submarine, but quite another for a supposedly less-capable one.

There are, in fact, some options that should be explored, such as looking at truly less expensive SSN alternatives, not in the 5,000-6,000-ton range as the Navy wants, but more in the 3,000 to 4,000-ton range. Since 1970, the Navy has examined 22 alternatives that should be reviewed, although if Congress wants a true evaluation they should go to the General Accounting Office or the National Science Foundation, not the nuclear Navy.

Since those 22 options are probably out of date by now, another alternative might be a combined program with England's Royal Navy, which needs and wants a new SSN but cannot afford

development costs. The Royal Navy would make sure costs are kept low.

Another alternative simply would be to continue with the improved LOS ANGELES SSN-688-class, which still costs less than $3 billion a piece.

The real problem facing the submarine force is a Catch-22 dilemma. On the one hand, with the commissioning of the 62 LOS ANGELES-class SSNs, the Navy has submarines coming out of its ears, but there simply are not enough missions for that many submarines in this post-Cold War world.

On the other hand, most agree that stopping sub production for even a few years would devastate that important industrial base.

There is still another problem. Rumors persist that the sub force will be cut to around 50, requiring mothballing of relatively new ships. Because mothballing nuclear submarines is not easy, one solution might be a lend-lease program of some of the earlier SSN-688s to Canada, which at one time wanted an SSN. Maybe even some could be lent to the Royal Navy. This could actually turn out to be cheaper that decommissioning.

But that does not solve the Navy's quadruple problem of retiring, building, increasing capabilities and saving the industrial base for subs all at the same time. The only solution is some kind of high-low mix of subs and for the low end that probably means the dreaded "D" word—the diesel SS.

As many on Capitol Hill now want, there should be at least some diesels built for export. However, the U.S. Navy also could buy a few for training and a diesel sub could even be placed in reserves. Stringent safety requirements probably preclude a reserve nuclear SSN, but certainly not a non-nuclear SS.

The Navy also should take a close and honest look at combined diesel-nuclear systems sometimes dubbed SSns, where the smaller nuclear plants are used to recharge the diesels. These also could be perfect solutions for strategic boats that will need replacing starting around 2010.

The Navy also should take a close look at the new air-independent (AIP) systems now appearing in some European navies. *[Ed. Note: see AIP - A Historical Perspective from Walter to Sterling by Dick Bloomquist in the July Submarine Review.]* AIP and the SSN solve the Navy's main and very legitimate complaint about non-nuclear subs—that they have to snorkel to recharge, making them vulnerable.

In sum, there is a fairly long list of cheaper, affordable alternatives, and best of all they can truly save money for what the Rickover-trained Navy really wants—a better, not less capable submarine.

There should be only one alternative for the Navy—stop the charade and cancel the costly CENTURION now, or see it eventually canceled by the Office of the Secretary of Defense, the Office of Management and Budget or Congress. This would throw the submarine community into the same disarray as the Navy air community, which has been chasing paper program after paper program.

The costly CENTURION will be the worst of all worlds—too expensive for the low end, therefore squeezing out funds for a truly sophisticated high end, while probably only delaying an inevitable cancellation. In short, the best way to really save the Submarine Force and industrial base is to cancel CENTURION.

[James George, A Jennings Randolph Peace Fellow with the United States Institute of Peace, is author of The U.S. Navy in the 1990s: Alternatives for Action.] ■

SENSIBLE CENTURION

by RADM T.D. Ryan, USN
Director, Submarine Warfare Division

[Ed. Note: The following article is reprinted from Defense News.]

In his June 28-July 4 Inside View "CENTURION Makes No Sense", James George argues against the Navy's new attack submarine, the CENTURION. His thesis is that "there is a fairly long list of cheaper, affordable alternatives, and, best of all they can truly save money for what the [Adm. Hyman] Rickover-trained Navy really wants—a better, not less capable submarine."

As the U.S. Navy's Director of Submarine Warfare, I would like to respond to the issues raised by George.

First, regarding the general implication by George that the Navy and the Submarine Force remain rooted in an antiquated mindset: The U.S. Navy is committed to reshaping itself after the collapse of the former Soviet Union. Nowhere is this commitment

more evident than within the nuclear-attack Submarine Force. Attack submarine levels by 1999 will go from a projected force of somewhere around 100 submarines to about 50. And that is exactly as Rickover would have had it.

George argues that the answer to "the Navy's quadruple problem of retiring, building, increasing capabilities and saving the industrial base" should somehow involve a high-low mix of submarines, the low end being diesel-powered submarines and the high end being nuclear submarines. This strikes me as the wrong solution to the wrong question.

The right question is this: How do we shape the Submarine Force in response to fiscal pressure and the reality of a less capable threat while at the same time advancing those technologies considered critical in meeting the potential challenge of a capable worse-case threat?

You do not get at the right solution to this difficult problem through discussions of what type of engines a particular vessel should or should not have. You get the right solution by critically examining what it is our country needs. Thoughtful reflection based on my years of submarine experience leads me to the following requirements.

What this nation needs, what the defense establishment and our Navy must provide, are submarines that fully exploit the enduring characteristics of mobility, endurance and stealth. Our nation needs multipurpose submarines that are able to travel a long way, in some cases halfway around the globe, in a short time.

When a crises pops up in some distant corner of the planet some 20 or 30 years hence, America's leaders will not want to wait while the Navy gets itself into a position to respond. By the time a "more affordable" submarine arrives, it may well be too late.

The nation needs submarines that can remain deployed overseas and unsupported for months at a time. Silent, unobtrusive, nonprovocative, stealthy to a fault and requiring resupply and support only when food runs out, submarines for years have maintained lonely vigils in hot spots around the world.

What value is there in a "cheaper" submarine that has to return to port and refuel every month? And if you are going to maintain the constant coverage, just how many of these cheaper submarines do you need?

We need to provide a submarine that can survive in battle and

can disengage one enemy and re-engage another immediately. If a submarine cannot get itself out of the way of an incoming torpedo, cannot take its highly trained crew out of harm's way, then I contend it is of little value, no matter how inexpensive it may have been to buy.

Finally, we need to maintain those highly perishable, technical skills required to design, build and put to sea submarines that are second to none. While some would argue that building the best is no longer in America's interest, pursuing cheap alternatives would be a hazard to our nation's future.

The answer to these needs exists in an integrated force-shaping plan that details the actions required to pare the force to about 55 submarines by 2000. This plan recommends production in 1998 of the first of a highly capable submarine class, one that will serve the American people for as many as 40 years. It exists in an integrated plan that will ensure the long-term health and viability of critical submarine designing and building skills.

Finally, it exists in an integrated plan that gets us where we need to go without breaking the bank. CENTURION, America's submarine of the future, is a key element of this carefully crafted plan. As part of a total, balanced solution, CENTURION makes perfect sense. ■

THE ALBACORE ADVANTAGE

Reprinted from the
Naval Institute Proceedings
September 1993

[Ed. Note: The following is a response by RADM(sel) A.H. Konetzni, USN, Head, Attack Submarine Branch, Office of the Chief of Naval Operations to H.E. Payne's article in the July 1993 Proceedings.]

Mr. Payne's otherwise excellent article on the control and maneuverability of submarines suffered from inaccurate statements regarding today's U.S. attack submarine force.

Mr. Payne's overall goal—increased maneuverability in submarines through technical innovation—deserves serious consideration by submarine designers. However, in building a case for such improvements, he frequently relied on examples that had little or nothing to do with the maneuverability of nuclear-powered attack submarines. For instance, Mr. Payne directly coupled recent, unfortunate incidents between Russian and U.S. submarines to a perceived maneuvering deficiency.

In and of themselves, collisions at sea or in the air—or on the highway for that matter—do not indicate a lack of platform maneuverability. The details surrounding the two events Mr. Payne refers to are classified, but it is worth noting that in neither case did the results of the official Navy investigations point to a lack of maneuverability on the part of the U.S. submarine. Is greater maneuverability desirable in future submarines? Yet bet! Would such improvements have prevented the incidents referred to? Almost certainly not.

In arguing for control improvements, Mr. Payne indicated that tomorrow's most likely antisubmarine warfare threat—the diesel submarine—requires that submarines be designed and built to a different standard.

The fact, however, is that the difference between a diesel submarine operating on the battery and a nuclear submarine operating at slow speed is not tactically significant. That is to say modern submarines, whether nuclear- or diesel-powered, are very, very quiet. As is the case with most real-world problems, countering the diesel-submarine threat requires a wide range of

technical, tactical, and training innovations—including the most advanced passive and active sonar systems, futuristic non-acoustic systems, comprehensive intelligence, and increased maneuverability.

The Navy's current fast-attack submarines and their crews are fully capable of handling diesel submarines operating in coastal waters. They also can handle the worst-case ASW threat—a resurgent Russia with its fleet of more than 50 modern fast-attack submarines. Such a capability will continue to exist in future classes of U.S. attack submarines. It may be fiscally prudent to work to concentrate on the most likely threat, but it is incumbent on this nation's leaders to ensure that the capability exists to deal with more challenging scenarios.

Furthermore, while important, the ASW role is only one of six primary naval-warfare missions assigned to U.S. attack submarines. Any proposed improvements also must better, in addition to ASW capabilities, those related to strike warfare, intelligence, and the other primary mission areas.

Finally, Mr. Payne repeated a myth that won't go away: Because U.S. attack submarines are *big*, they are found wanting in their shallow-water capabilities. Because diesel submarines are *small*, they are the perfect littoral-warfare platforms.

The U.S. Submarine Force is unequaled in its ability to operate in shallow water—period. It has more than 14,000 days of experience operating in shallow water over the past 20 years. Contrary to Mr. Payne's assertions, the maneuverability of modern U.S. attack submarines in shallow water is excellent. The real key to mastering the difficulties of shallow-water submarine operations revolves around crew experience. In real-world operations around the globe and around the clock, U.S. submariners continue to build on an already extensive base of shallow-water experience.

Improvements in submarine control and maneuverability are highly desirable. The Submarine Force and the Navy, however, must balance carefully all the platform requirements with the fiscal resources available to develop a submarine that will serve the nation in a wide variety of roles and missions, well into the next century. And that is exactly what we're doing in the attack submarine headquarters today. ■

THE MULTIPURPOSE PLATFORM OF CHOICE

by LT Wade H. Schmidt, USN
Engineering Officer
USS Philadelphia (SSN 690)

In the current budget debates each program must be substantiated with regard to the vital interests of the United States. To do so they must be evaluated as to their capabilities and cost effectiveness. The SEAWOLF is still under consideration (currently a two ship class) and a detailed review of the CENTURION program is underway. At the minimum, any in-depth analysis should include a comparison of cost, capability, and versatility with other major weapons systems.

Those in opposition to the fast attack nuclear submarines (SSNs) usually do not include in their analysis the numerous capabilities built into every SSN and the inherent flexibility provided by a competent SSN force. A fast attack nuclear submarine is a very versatile and capable platform for carrying out almost any mission.

The Modern Fast Attack Nuclear Submarine

Consider the capabilities of a modern American fast attack nuclear submarine. An Improved LOS ANGELES (688I) class submarine has 12 vertical launch system (VLS) tubes in addition to the four torpedo tubes. The torpedo room can hold 22 weapons for reloading the torpedo tubes. A 688I can employ all U.S. submarine weapons: the Tomahawk land attack missile (TLAM) with the unitary 1000 pound high explosive warhead (TLAM-C) or with the cluster bomb warhead (TLAM-D); the long range Tomahawk anti-ship missile (TASM); the medium range Harpoon anti-ship missile; the heavyweight multipurpose MK 48 advanced capability (ADCAP) torpedo; and the submarine launched mobile mine (SLMM). The sonar system is the best in the world for detecting any ship or submarine. The installed electronic support measure (ESM) equipment provides an Improved LOS ANGELES class submarine with the capability to monitor the electromagnetic spectrum.The periscope gives the Commanding Officer the ability to visually scrutinize an area while remaining undetected, and its high powered optics allow detailed inspections with still photography and video recording capabilities. The standard communication equipment provides the submarine with the capacity to establish

communications with any ship or military communication post anywhere in the world.

The crew of a 688I totals about 120 enlisted and 15 officers. These sailors are accustomed to protracted deployments beneath the ocean's surface. Unlike earlier counterparts who never went out for more than 30 days prior to the 7th of December in 1941, these submariners from Jules Vernes' imagination are trained to conduct continuous submerged operations for several months.

To support the weapons systems and the crew, the nuclear propulsion plant of the submarine can supply almost unlimited electrical and propulsion power. The reactor provides the energy which allows the ship to produce its own oxygen and water and also revitalize the air. All of these systems give the modern nuclear submarine the ability to stay submerged for extended periods of time with the only practical limit being the amount of food carried on board. An SSN usually carries provisions and stores for 90 days of continuous submerged operations. This normally means about a 90 day maximum between port calls, but the time can be increased by carrying more supplies if an extended operation is planned, or by simple rationing if the extension is unplanned.

An Illustrative Deployment

An example deployment has the submarine leaving its homeport of Groton, Connecticut and proceeding to Europe for numerous *show the flag* port visits and routine operations with a carrier battle group (CVBG). On this deployment the SSN is an integrated member of the CVBG as the group steams from one assignment to the next. Since no particular non-exercise mission is envisioned, she is loaded with a variety of weapons; namely, twelve TLAM-Cs and TLAM-Ds in the VLS tubes, and in the torpedo room there is a mixture of Harpoons, TASMs, TLAM-Cs, TLAM-Ds, and MK 48 ADCAP torpedoes. In all, the ship may be armed with more land attack missiles than torpedoes.

While enroute to England with the CVBG, the 688I receives new orders to proceed into the Mediterranean Sea for surveillance operations. The Captain orders the ship to patrol depth at flank speed. As always, within about two weeks of leaving its homeport, a LOS ANGELES class submarine can be just about anywhere in the world. Several days after leaving the CVBG the submarine comes to periscope depth and the CO looks out the

scope at the coastline of a high interest nation. The ship is now in a position to monitor coastal defense units and their movements, observe near-shore aircraft operations, and record all shipping movements around several ports. Sending non-submarine units on this type of mission is normally not an option because the presence of surface ships or aircraft often produces a change in the activity of the forces being monitored. The submariners have the advantage of being able to monitor a nation's **routine operations** due to their inherent stealth. The ability of an SSN to proceed to a surveillance station undetected, and remain on the station for an extended period, gives the United States a powerful **reconnaissance** platform and an effective **intelligence gathering** capability.

After three weeks of monitoring all events in the region, the 688I receives a message to prepare to conduct **coordinated strike operations** with another CVBG. Iraq has lined up several divisions on the border of Kuwait and has threatened to attack again. In less than 48 hours, the submarine is in position to launch a salvo of 16 TLAMs against selected targets in Iraq. A salvo of 16 missiles can be devastating, but in conjunction with TLAMs and aircraft from the CVBG, the resulting destruction of a single strike operation can cripple a nation. A Tomahawk missile can accurately hit one particular room in a given building from a distance of over 500 miles. This means that the targets that can be attacked are quite numerous and they can be of either political or military significance. As seen in the 1991 war with Iraq, the missiles can hit the nation's infrastructure (electric production plants, oil processing facilities, government buildings, etc.) or its military bases and equipment (airfields, aircraft, coastal defense units, anti-aircraft batteries, ammunition warehouses, etc.). In this example, Iraq continues to rattle its sabres and the President decides that a limited missile strike is necessary to convince the Iraqi military of the extreme nature of these events. The strike is assigned to the 688I with its 16 missiles. The SSN launches all 16 TLAMs against military supply depots. This strike also could have been aimed at the Iraqi airfields or against the surface-to-air missile (SAM) batteries to clear the way for a U.S. air strike.

Even after this salvo uses all the missiles in the submarine's VLS tubes, this 688I is still a very useful platform. While still at sea, the submarine is ordered to **monitor shipping** around the north entrance to the Suez Canal, looking for a freighter that is

carrying critical contraband to Iraq. After two weeks of monitoring all ships that pass through the Suez, a different problem develops near Cyprus. A U.S. freighter is being shot at by patrol boats and boarded by pirates. The submarine is tasked with the mission of intercepting the freighter and the patrol boats, an **anti-surface warfare** (ASUW) operation. In a few short hours, the SSN has located the patrol boats attempting to tow the freighter. The submarine CO orders an attack on the patrol boats with two Harpoon missiles and one MK 48 torpedo. Within minutes one patrol boat is in flames from the Harpoons and the other has been destroyed by the powerful MK 48 warhead. The freighter crew then takes the ship safely to the nearest port as the SSN vanishes into the dark waters.

Several hours later the submarine receives a message to proceed to an area in the middle of the Mediterranean for a **special warfare operation**. A 20 member SEAL team is being sent to perform a reconnaissance of an island. To prevent the island's defending military units from being alerted by an aircraft or surface ship coming close to the coast, the SEALs have opted to conduct a covert insertion from a submarine. To save time, the SEAL team carries out an open-ocean parachute drop to be picked up by the SSN. Two hundred miles from the nearest land, the submarine surfaces and in less than 15 minutes, the SEALs are all on board. Immediately the stealthy SSN disappears beneath the ocean's surface and heads toward the island's coastline. The 688I then covertly takes the SEALs within sight of the beach. Only the most sophisticated detection gear can now detect the SSN as it closes the coastline. By the late afternoon the submarine is at periscope depth and reconnoitering the intended landing area for the SEALs. After sunset the SEAL team starts an underwater disembarkation through the escape hatches. A short time later the lock-out procedure has been completed and the SSN is heading out to sea. The entire mission was conducted submerged without any chance of being detected by even the most observant defenders.

During this time Libya has become very belligerent toward the U.S. and Great Britain. President Khadafi has declared an exclusion zone abound Libya and he has stated that Libya will stop all American and British passing within 100 miles of Libya. To aid them in this effort, the Libyan Navy sends out several patrol boats and prepares to deploy their Soviet-built diesel submarines

outside the Gulf of Sidra. The Libyan Air Force begins patrolling the area with several squadrons around-the-clock. The SSN is ordered to the area to conduct an **anti-submarine warfare** (ASW) operation against the Libyan submarines in the east part of the Gulf of Sidra. The Captain of the U.S. submarine knows that searching for a diesel electric submarine is not easy, but the SSN is by far the most effective platform for this mission. The submerged submarine does not need air cover or protection from shore batteries and can easily search large sections of ocean while remaining undetected. The CVBG has been tasked with patrolling the exclusion zone and protecting American and British shipping. Two days after beginning its search the fast attack nuclear submarine detects one of the Libyan submarines. The SSN quickly launches a communications buoy that reports the position of the diesel submarine. A short time later, after a Libyan jet attacked an innocent merchant ship, the Captain of the nuclear submarine is ordered to sink the Libyan submarine and fires one MK 48 ADCAP torpedo. The ADCAP, the most advanced ASW weapon in the world, quickly starts homing on the Libyan submarine. As he speeds up and tries to avoid the torpedo, the Libyan Commanding Officer realizes that his submarine's maneuverability is no match for the ADCAP and within minutes the diesel submarine is broken apart by the explosion of the 1000 pound warhead of the MK 48.

While reporting the destruction, the Captain of the SSN is informed that a U.S. reconnaissance plane has detected a Libyan surface action group (SAG) of three frigates and three corvettes about 200 hundred miles to the east. The submarine and two U.S. destroyers from the CVBG that is several hundred miles northeast are tasked with a **coordinated TASM attack** against the SAG. Within an hour the destroyers have launched eight missiles and the 688I has launched four TASMs from its torpedo tubes. The defenses of the Libyan destroyers are overwhelmed by the number of incoming missiles, and the different directions from which they approach; 100 percent of the ships in the SAG are hit. The Libyan ships start to burn and in a short time several are abandoned and sinking. The surviving Libyans quickly realize the futility of their purpose and withdraw their remaining forces with no loss of life to the Americans.

This particular 688I has been in the Mediterranean for almost

eight weeks and has yet to need logistical support. The SSN still has sufficient weaons available to conduct further operations and enough supplies to remain submerged and independent for several more weeks.

Most of these missions could have been conducted by aircraft and/or surface ships, but the SSN provides all these capabilities with **only a negligible threat to American lives**. Aircraft have extremely limited on-station time and surface ships are susceptible to attack. While a CVBG can provide anti-air warfare (AAW) protection for the surface ships, and it has a significant ASUW capability, it is extremely costly when compared to an SSN force that does not require the same AAW and ASUW capabilities for a given ASW and STRIKE capacity.

Another four to six weeks of submerged operations would not be uncommon for an American submarine at this point, but to emphasize the flexibility of the Submarine Force, there is yet another possibility; **mine warfare**. A border dispute flares up between two nations. The SSN is ordered to conduct a rendezvous with the submarine tender USS SIMON LAKE (AS-33) to load SLMMs. During one day alongside the tender, ten SLMMs are loaded into the torpedo room along with 12 more TLAMs in the VLS tubes. The 688I then proceeds to the designated area. Within a few hours, ten SLMMs are launched by the submarine. With a well planned minefield in place, the SSN proceeds away from the area. The hostile nation is informed of the minefield and quickly calls an end to the fighting.

Conclusion

The above scenario demonstrates the versatility of an Improved LOS ANGELES class submarine. The SSN is a cost-effective and capable platform with inherent flexibility that allows it to perform many different missions. There are no other platforms which provide the peacetime surveillance, intelligence collection, or special operations capabilities that is built into every SSN. Combine these with the ASW, ASUW, STRIKE warfare, and MINE warfare abilities and the uniqueness of the SSN becomes clear to those considering the best force mix for the future. SSNs are vital to our national interests whether we are in a time of tranquil peace, total war, or any level of turmoil between these extremes. ■

USS BOWFIN SUBMARINE MUSEUM AND PARK

USS Bowfin Submarine Museum and Park was officially recognized by the DoD as a WWII Commemorative Community on 1 May, 1993, the 50th anniversary of her commissioning. Over the next three years, the facility will host activities and ceremonies to increase public awareness of the history of WWII and to honor those who fought in the war.

USS Bowfin (SS 287), launched 7 December 1942, was given the nickname *The Pearl Harbor Avenger*. Throughout the next three years she proved true to this name and by war's end had been credited with sinking 44 enemy ships. During WWII, a total of 288 U.S. submarines scoured the oceans in search of enemy targets. These silent undersea vessels comprised less than 2 percent of U.S. naval strength, yet they were responsible for sinking 50 percent of enemy shipping, significantly affecting the final outcome of the war. Very few WWII submarines are still in existence today to tell this story. USS Bowfin, now moored in Pearl Harbor, serves as a reminder of, and a tribute to, all submariners that bravely took up the fight that began here and continued for four long and arduous years.

USS Bowfin was acquired in 1979 from the Navy, was opened to the public in April 1981 and was granted National Historic Landmark status in 1986. It has hosted over 2.5 million visitors.

The Museum is open from 8AM to 5PM daily, closed on Thanksgiving, Christmas, and New Year's Day, and is located next to the Arizona Memorial Center.

Anyone with submarine-related artifacts which they would like to donate to the Museum should contact the Curator of Collections at (808) 423-1341.

VICTORY AND PERHAPS DEFEAT

by LCDR P. Kevin Peppe, USN

[Ed. Note: The following is a short, fictional account of Naval Warfare conducted in the not too distant future. Following the story is a brief assessment of the battle and the U.S. Navy in general, as seen through the eyes of an observer stationed in the year 2008.]

The U.S. SSN was playing the same game she and many others just like her had played over the years. Alone, silent, patient, the submarine and her crew maintained a lonely vigil just outside the principle naval port of a far off enemy. One of four submarines under the operational control of the distant USS ABRAHAM LINCOLN Battle Group Commander, she had been sent ahead of the transiting main body to conduct the covert reconnaissance and reporting tasks at which SSNs are so experienced and expert.

The name of this game is Indication and Warning or, in military parlance, I&W. Simply said, she was to remain on station, invisible, watching for early signs of trouble. This SSN had been doing just that for over two weeks. She, or her relief, would continue to do so until the Battle Group Commander decided such monitoring was no longer necessary. In similar circumstances, at different places in times past, the nuclear submarine force had satisfied this little-heralded national need.

But today things were different. This particular nation, so peaceful and quiet looking to the Chairman of the Joint Chiefs as he looked in on the live video patch the SSN beamed to all interested (and properly cleared) parties, was about to send Marines against her neighbor to the west. A small parcel of land, common to both nations, whose ownership had been under dispute for well over 50 years, was the focus of the imminent hostilities. This neighbor to the west also happened to be a close ally of ours. The Chairman knew, from talks just completed with the President, that such an attack could not be allowed to occur. He also sensed, through nearly 35 years of naval experience and some 10 years close to the centers of power, that the carrier and her covey of support ships was not going to make it before all hell broke loose.

How did the SSN, the Battle Group Commander, the Chairman, and the President all know this was about to happen? Quite

simply, the submarine had picked off hand-held walkie-talkie communications. Orders directed the warships and troop transports in harbor to prepare for an underway in advance of a land assault. As simple as this bit of eavesdropping may sound, it turns out that only a submarine on that particular coastal station at that precise time could have picked off that specific piece of information. Marine band VHF communications just don't travel far enough for any other intelligence collector to intercept. In fact, that's exactly why the military harbor master chose that communications medium to transmit the critical instructions. he certainly didn't consider that his simple instructions could turn the energies of the American Navy against his nation.

The SSN skipper had, of course, immediately reported the information back to his boss. Within 15 minutes of picking off the critical tipper, the President was fully informed of the imminent attack. As Presidents are still fond of doing, he directed the LINCOLN Battle Group to make all possible speed towards the crisis region. Unfortunately, she was still three steaming days away.

The Men of State roared into action. Words were smithed, drafts were issued, arms were twisted. The bottom line: within a day of discovering intentions, the President clearly signalled the Prime Minister, in words unambiguous enough to leave no doubt as to what he intended, that any attack against the neighbor to the west would elicit a swift military response from the U.S. The Prime Minister, fully apprised of the position and movements of the Carrier Battle Group through near-continuous CNN reports, responded by moving the Marine assault up two days. Net result: the I&W U.S. SSN was the only player we had there and, like it or not, the game was about to start.

Operating an 8000 ton warship submerged, in less than 100 feet of water, a mile off the beach was never easy. It was no easier now with the enemy armada bearing down. The Officer of the Deck, with his *Full-Up Virtual Reality Tactical Display* strapped on, focused every ounce of his energies on the task at hand.

With hostilities now imminent, it was imperative that the specially embarked SEAL team be deployed to wreak whatever havoc, and create whatever confusion possible in the enemy's living room. The diversions would help to preoccupy and confuse the enemy while the SSN conducted its interdicting mission. As the submarine began to swing around, the OOD swivelled at the

command console, looking over his shoulder to examine the virtual image generated by the *Blue-green Laser Imaging Profiler* during the ship's ingress to the drop-off point. He quickly identified a slight depression in the ocean floor, probably the long ago remains of a shallow river. As he steadied the ship on her inward leg, he ordered her down an additional three feet. It wasn't much, but in water this shallow every inch would help to covertly deploy the SEALS and their equipment.

Unseen, invulnerable to attack, the SSN had made her way to within 1700 yards of the beach. Hovering this mammoth warship with less than eight feet of water beneath the keel and less than 20 feet to the surface, the SEAL team of 37 trained experts, their gear already staged and ready, made the walk up the after ladder from submarine to the advanced swimmer delivery vehicle (ASDV), a large, automated mini-sub mounted atop the submarine just astern of her sail. Within minutes the ASDV was away, carrying with her the forces and equipment needed to complete her mission. The Captain made a mental note to forward the mine map they'd just completed to the approaching Battle Group. It was sure to come in handy in the weeks and months ahead.

As the formation of enemy ships steamed by, the submarine signalled her intent to leave the SEALS behind for now and stick with the assault group. So began the 500 mile, 25 knot transit in company with the enemy.

Next day, just before dawn, with the SSN conducting all-sensor reconnaissance some 1000 yards abeam of the armada's amphibious assault ship, the first flight of armed helicopters was launched against its neighbor. Although not yet light enough to see the nearby horizon, the Captain, through the magic of VIEW, a synthesized full-spectrum imaging system, watched the pilots go from flight-deck to aircraft. He listened in on the pre-flight chatter. The lead helicopter indicated he'd be feet dry at 0610; over the target at 0650. That was all the Captain of the SSN needed. He had been directed to "do the best he could to slow down the enemy until the carrier could get into position." He considered, for about a micro-second, a quick video teleconference with the Admiral to make sure. No need. He knew what was expected of him and his crew. The flight was airborne. The shooting began.

The last of the enemy ships was sinking within two hours of the first submarine torpedo launch. Four of the six ships were lost

when the submarine's torpedoes detonated ten feet beneath their keels, cracking them open like eggs. Two of the enemy vessels grounded themselves in their frantic efforts to escape attack. Evading in the murky twilight while other ships around you are going down after having been broken in two is a mariner's nightmare. For these two warships, evasion demanded more seamanship than their crews possessed. As the tide rose, the gored ships filled, rolled off the rocks, and sank, every bit as lost as those who were properly torpedoed.

The skipper immediately turned his attention to critical targets ashore, now nearly 600 miles to the east. After a brief video teleconference with the SEAL team leader ashore, the SSN captain ordered the first of the Tomahawk cruise missiles fired. Launch was timed to precisely coincide with SEAL team action inland that would debilitate the nation's coastal power generating network. Real-time VIEW displays began within seconds of the missiles beginning cruise. While he hoped he wouldn't have to, the Captain was fully capable of affecting targeting changes to these superb weapons at any time during their flight. The last of the Tomahawks would loiter briefly over each of the target areas, sending satellite linked VIEW imagery of the destruction each weapon affected back to military commanders and the National Command Authority (NCA). Having gathered the battle damage assessments (BDA) necessary for follow-on planning, the specially configured BDA Tomahawk reaches its final target, diving at high speed to destroy a key enemy communications relay facility.

In between, the SSN had destroyed critical surface-to-air missile sites, air control facilities, and early warning radar sites. The SEAL team had finished its work, ensuring that vital supply lines were no longer made available to the enemy. The team had in fact destroyed a key truck and rail resupply route. Air Force and Naval aviators, due to arrive early tomorrow, would have a much easier go of it with these defenses gone. Following this piece of work, which from first torpedo launch against the armada to last Tomahawk cruise missile away stretched over less than six hours, the submarine skipper sent this after-action message to the Fleet Commander:

> "Have done the best I could to slow down the enemy. Awaiting the arrival of LINCOLN."

The above is, of course, fiction; a version of history that *might-have-been*! The reality is that in the U.S. Navy of 2008 there exist neither the quality nor quantity of submarines required to do what our make-believe heroes did. The victim of a cost-cutting mentality of the early 1990s, the U.S. Navy extant today, nearly a decade into the 21st century, consists of just over 40 SSNs, some 20 to 30 short of that required to fulfill even the most basic of national commitments. Of these 40 SSNs, only three, those making up the aging SEAWOLF class of submarines, have anything like the mission capability and flexibility required to succeed in today's warfighting environment.

It might be argued that things didn't have to come to this dismal state. About 15 years ago, in the early 1990s, the submarine force, anticipating the need for performance and flexibility in a new class of attack submarine, had proposed a full-mission capable submarine, to be called CENTURION in honor of the new millennium.

That proposal, as students of military history will recollect, was quickly dismissed by the proponents of *cheaper, more affordable* alternatives. We are today saddled with 21 of these *cheap* submarines that serve no useful military purpose. They lack the speed required to support the Battle Group, the speed to respond quickly, attack, and successfully disengage. They lack the flexibility necessary to accommodate the full range of warfighting missions required. Last but not least, these vessels have managed to compromise that most basic and fundamental of submersible advantages: stealth. Cheap, yes. Effective, NO!

And so, sacrificed in order to save money and meet other priorities, the submarine force was left to figure out how to meet the nation's pressing commitments while maintaining the OP-TEMPO necessary to retain highly skilled people with a force that was cheap and small. The solution, reached at the turn of the century, was really no solution at all. The Navy began to default on commitments.

What started in 1996 as *long tethers*, pretending that a ship was on station fulfilling a commitment when in fact she was really some six or ten or even 14 steaming days away, tethered to the commitment, ended as it inevitably must. Gaps become acceptable, the U.S. Navy was in fact no longer present, and the NCA demurred to heretofore unthinkable requests that in essence turned what was the mightiest Navy this world had every known into a

force in being.

Looking back today these decisions seem unconscionable. How could the national leadership of those years gone by have erred so badly in assessing the needs of this new, 21st century. How could they not have learned the lessons history had to offer, not have seen the futility of pursuing the often misinterpreted Mahanian ideas of years gone by. In order to understand, you have to put yourself in their shoes, to walk their walk, and understand the forces they were up against.

The decision makers of that time were being squeezed, men caught in the jaws of a relentless vice. On their right was the jaw that screamed "There is no threat, the Soviets have gone!" On their left was the steel face of fiscal payback for the spending spree that defined America during the 1960s, 70s and 80s. The pressure these leaders found themselves enveloped in called for bold action, called for decisions that might relieve the strain. They had to do something.

Once you understand the forces acting on these decision makers, it becomes easier to understand their decisions. The Navy of the late 20th century remained a Navy defined by the Carrier Battle Group. It remained a Navy that saw itself in terms of high powered aircraft launched from the deck of monstrous flat-tops. It was a Navy that was comfortable with the paradigms of naval warfare past and, while recognizing a clear need to change size, saw no real need to change shape. Combine the *have to do something* with the *this is how it's always been*, and the motivation behind choices made during that tumultuous period begin to come clear.

Today, with the advantage of hindsight, it's easier to see the enormous advantages that distributed, precision firepower brings to naval warfare, to see the revolution wrought by the introduction of long-range, beyond-the-line-of-sight munitions that can be retargeted real-time, during flight. It's clear that the real force multiplier in the regional conflicts that have come to define our time are those small, clandestine squads of special forces, warriors who had come to rely on submarine insertion and extraction as the preferred means for getting in and getting out. It's now patently obvious that stealth is invulnerability, that those weapons and platforms that could deliver while remaining immune to prosecution were going to hold sway during the high tech revolution of the late 20th and early 21st centuries.

The Navy of the 1990s talked about an enabling role, talked about unlocking a littoral door and allowing the introduction of heavy Army and land-based air forces. Unfortunately for the residents of this century, they were simply unable to translate that strategic vision into a no-nonsense naval force designed to handle the demands of today.

Instead, the short little fictional war story told above didn't happen. There weren't enough submarines to do the job. The ones we do have are too slow and lightly armed and detectable to have done the job. The carrier wasn't close enough to affect the initial action. The opportunity was missed, as it so often has been over the last couple of years.

And so, halfway around the world and yet only as far away as our video monitors, these two nations today remain locked in bloody conflict; thousands dead, hundreds dying every day while the United States fumbles through the agony of deliberations, through the utter futility of trying to decide just how to control events that have gotten so totally out of control. While we now understand just a little better the forces that led to the Navy-shaping decisions of the 1990s, this insight comes late and makes the world no better. It is a shame. ■

IN REMEMBRANCE

Lieutenant Gene M. Austin, USN(Ret.)

Commander Donald R. Briggs, USN(Ret.)

Captain William R. Crutcher, USN(Ret.)

Rear Admiral William D. Irvin, USN(Ret.)

Captain Russell C. Medley, USN(Ret.)

Richard Neuendorffer

Captain R. Williams, USN(Ret.)

SUBMARINES IN A NEW SECURITY ENVIRONMENT

by Richard Chapman
Director, Undersea Warfare
Naval Undersea Warfare Center Division, Newport
Newport, RI

[Ed. Note: This article is taken from Mr. Chapman's presentation at the Sixth Submarine Technology Symposium in May.]

Introduction

It's 1993, we have a new President, the Cold War is over, and the economy needs a shot in the arm. The country wrestles with the problem of down-sizing the excess capacity in the military and defense industry while the various branches of the armed services vie for meaningful and defendable roles and missions in the new security environment—an environment in which Russia is considered less of a threat to our national security and the focus is on regional conflict.

In terms of historical events, the dilemmas and challenges we face in 1993 have many parallels to those faced in the 1946-47 post-war environment. Just as heated discussions are currently ongoing in regard to the size of our military and appropriate roles and missions to support our new and emerging security environment, so too did the same discussions take place in 1946-47. The discussions, both then and now, involved the size and nature of the military forces, as well as the roles and missions of individual platforms. While there was much debate over roles and missions in the 1946-47 time frame, our foreign policy posture left no doubt as to who the enemy was expected to be: the Soviet Union and Warsaw Block countries. Today we not only have an ongoing debate over military roles and missions, but also it is not clear if closure has been reached as to the nature of the future threat to our national security.

It would be naive to expect to solve, in any short period of time, the national dilemma regarding the size of the military, as well as the appropriate roles and missions of individual platforms in general, and the Submarine Force in particular. However, some provocative views will be put forward in this paper on current thinking within the military hierarchy regarding appropriate roles and missions in support of the new security environment, as well as innovative employment concepts for the future Subma-

rine Force.

Review of Policy and Guidance Documentation

Much insight can be gained regarding future roles and missions by reviewing policy and guidance documentation that is on the street. The policy and guidance documentation has been made available from the national or presidential level, the Joint Chiefs of Staff level, the Department of Defense, the Department of the Navy, and the Submarine Force or the Submarine Community level. Also, the milestone 0 decision memorandum, mission needs statement (MNS), and the alternatives under consideration for the new attack submarine (NAS)(or Centurion) provide some insight into the Navy and DoD's thinking as to the future direction of the Submarine Force.

National Security Strategy Statement. At the Presidential level we have a new National Security Strategy Statement that reflects the demise of the Soviet Union and places emphasis on regional conflict and crisis response. The statement was first unveiled in a speech by former President Bush at the Aspen Institute in August 1990 and contains the now famous "four pillars": Forward Presence, Crisis Response, Strategic Deterrence, and Reconstitution. The statement forms the basis for the Joint Chiefs of Staff's National Maritime Strategy, the Defense Department Planning and Guidance document, the Navy's Maritime Strategy, the Navy's Vision, the Submarine Force's Vision and current warfare task emphasis. It should be noted that the new National Security Strategy Statement calls for the ability to reconstitute certain aspects of our military capabilities in the event of a world crisis.

National Military Strategy. The National Military Strategy, developed and articulated at the Joint Chiefs of Staff level, translates and couples the four pillars of the national Security Strategy with a select group of strategic principles to emphasize a force package with a base force structure tailored primarily for the regional crisis environment of the future. The base force of the 1990s will obviously be much smaller, but hopefully carefully tailored, and will stress jointness both within the Navy and among the other services.

Department of Defense. The Defense Department translates the National Military Strategy into a regional-oriented Defense Department plan set forth in the Defense Planning and Guidance document in support of the five year defense plan or budget. The document also reflects programming for a base force configured for the regional conflict security environment of the future. The

number of submarines required for the future base force still awaits the result of a special DoD study. While unofficial numbers range from 55 to 65, the most popular number quoted is around 55 SSNs. SSN force levels as low as 40 units would not appear to be out of the question in the long haul.

Another special DoD study—this one addressing the state of the future military industrial infrastructure—will have a significant impact on the United States' ability to build submarines in numbers after the turn of the century. This study is also awaiting completion and publication.

The Department of the Navy. Within the Navy Department, the key documentation includes the initial attempts at a modern-day maritime strategy in a document issued by former Navy Secretary, H. Lawrence Garrett, and the Chief of Naval Operations, Admiral Frank B. Kelso, II, called The Way Ahead. This document puts forth the concept that the Navy to be successful in the future world order, must be able to affect events on land. The initial attempts at a modern day maritime strategy was followed by a more mature vision statement issued in mid-to-late 1992 by former Navy Secretary, Sean O'Keefe, called ...From the Sea, which further refines the Navy's roles in a post-Cold War security environment and stresses jointness, regional conflict, and shallow-water warfare.

As is now well known, the Navy reorganization disestablished the OP-02, OP-03, OP-05, and OP-07 organizational elements and integrated them into the N8 organization. The N8 organization is responsible for Navy resources, warfare requirements, and assessments.

To carry out the N8 charter with the current emphasis on jointness, N8 has created joint mission areas. Each joint mission area, in turn, has been assigned an N8 organizational element responsible for the assessment of each joint mission area. These joint mission areas map into the traditional warfare tasks as outlined in NWP-1, as well as the key operational capabilities as put forth in the Navy's new Vision Statement, ...From the Sea.

With regard to submarines and their role and contributions to the joint mission area, much work will be required to examine the objectives for their combat capabilities in the several joint mission areas. In addition to examining the appropriate role of SSN platforms in the joint arena, the submarine community needs to address and defend why the submarine, and not some other platform; why certain missions do not place the submarine in an unnecessary vulnerable position; and lastly, what special features

must the submarine possess in order to carry out the assigned role and mission in the evolving joint mission area.

The U.S.Submarine Force. The Submarine Force came to grips with the changing nature of warfare when it issued its vision statement. The MNS for the NAS (or Centurion) indicates a change in warfare task emphasis that reflects the changing nature of submarine warfare. The higher priority warfare tasks are covert strike, special warfare, and battle group support.

It should be noted that while the emphasis has shifted away from antisubmarine warfare (ASW), and with more emphasis being placed on **covert strike, special warfare battle group support, indication/warning, and intelligence gathering**, the basic list of submarine warfare tasks has remained more or less unchanged since World War II. What has changed over the past 40 years is the degree of emphasis given to any warfare task or group of warfare tasks, depending on the nature of the prevailing security environment. ASW is today viewed as only one of the important warfare tasks, compared with just a few years ago when it was the Navy's number one warfare task.

Submarine Warfare Task Emphasis/Prioritization

Combat Systems Characteristics. While the basic nature of submarine warfare tasks has not changed over the years, the advances in technology have certainly had a dramatic impact on the submarine's ability to perform its mission. This is true especially in the areas of platform, combat systems, and weapon systems technologies. What the future holds in terms of submarine warfare task emphasis, only time will tell.

However, with less emphasis being placed on ASW and increased emphasis on strike, special warfare, intelligence and reconnaissance, and battle group support, the relative importance of the individual warfare system functional subsystem is undergoing considerable change. For example, the new emphasis on the joint strike mission area will create the need for covert/high data rate communications, as well as onboard strike planning systems that permit at-sea units the flexibility to re-plan and re-target with onboard resources in theater. This reduces the need for extensive shore support; and it must all be accomplished without compromising the submarine's inherent stealth.

The current prioritization of the warfare system functional capability is a significant departure from the past, and our community must make the necessary adjustments in a world that places less emphasis on ASW.

Submarine Technical Attributes Emphasis/Prioritization

After considering warfare tasks and their associated emphasis, the next consideration is basic submarine technical attributes and the change in emphasis that has occurred over the years. In the past, stealth was one of the most, if not the most, important technical attribute of our SSNs. While speed was also one of the more important technical attributes in the past, today and in the near future high ship's speed is less important.

Platform stealth and combat/weapon system technical characteristics have been and will remain two of the most important submarine technical attributes. The combat/weapon system technical characteristics needed to meet future warfare requirements are currently being examined as the range of options for the new SSN or Centurion during the cost operational effectiveness analysis (COEA) phase of the program, between milestone 0 and 1.

However, there is one technical characteristic of the SSN that cannot be compromised, and that is stealth. The submarine is the only remaining self-contained military weapon system that, more or less unsupported, carries the battle to the enemy. It must have stealth in its favor to enable it to determine when and where and under what conditions to engage the enemy. It there are no revolutionary changes in submarine warfare tasks and associated platform attributes, what will be the defendable rationale for the submarine's being a major player in new security environment base force? That is the critical question that will be asked in light of the platform's high cost and other difficult issues such as the defense industrial infrastructure question.

The Changing Nature of Warfare

The security environment of the future will be much different from that of the past, and in fact the basic nature of warfare will be different from what it is today. Warfare will be conducted with a much different set of rules which include low public tolerance for loss of personnel; low public tolerance for loss of ships and other equipment; willingness to dispatch personnel and equipment to foreign soil only when the need is critical; and goals that are intended not to inflict damage on the enemy but rather to send him a strong message.

Submarine Political/Military Attributes

The submarine platform itself offers many attractive options for the new security environment. Little mention is made in the

literature of the submarine's inherent political/military attributes. These include:

- The ability to operate in the enemy's backyard, unsupported, where the United States may not have yet established control of the air or battle space.
- The ability to carry on non-politically intrusive operations in forward areas for extended periods.
- The ability to operate for extended periods in forward areas without the need for a logistics pipe line.
- The abiljty to be covertly or semi-covertly inserted early in campaign for a wide range of multi-warfare task operations (i.e., intelligence/indications and warning (I&W), special warfare, strike, etc.).
- The ability to conduct a variety of operations with high degree of assurance of no loss of personnel or materiel assets.

The submarine is a particularly attractive military option because it can be deployed in forward areas for multi-warfare task operations with minimum political risk or exposure, especially in the early phases of the campaign or before the United States has established battle space dominance in the area. It is less susceptible to attack by air (both from planes and shore-based ballistic missiles); it can conduct covert land strikes early in the campaign to soften the enemy and reduce losses of follow-on forces; it can conduct covert I&W or intelligence-gathering operations without alerting the enemy to its presence—and the list goes on. More thought is required as to the appropriate roles of individual platforms or combinations of platforms as a function of the phases of a military campaign, including the most appropriate roles for submarines.

The important message to be put forth is that in our current budget-constrained times, **the affordable submarine of the future** will probably still cost $1 billion or more and will look more or less the way submarines have always looked. However, the civilian leadership of Congress and the White House must be convinced that it is still one of the more attractive and cost effective weapon systems of choice to handle a wide range of military problems in our new security environment, which will undoubtedly pose many unknown and complex political and military situations.

The submarine platform is also particularly well suited to the earlier phases of a campaign at or before hostilities have com-

menced where stealthiness, covertness, and the element of surprise are critical. Fire power is not usually a driving factor in the first hours of a campaign. Surgical strike capability is more important at this point. And when fire power is the name of the game, it should be kept in mind that two modified Trident submarines can carry 144 missiles each or a total of 288 missiles. This means that two modified Tridents could deliver a cruise missile strike to a country such as Iraq of approximately the total number of cruise missiles delivered by all platforms in Operation Desert Storm.

Moving Forward Means Dispelling Popular Submarine Myths

Several popular myths exist and must be dispelled regarding the Submarine Force's ability to perform certain types of missions in the new security environment.

Myth No. 1. Submarines cannot operate in shallow water.

Response: Modern day SSNs are fully capable, trained, and possess the required expertise to operate for extended periods in shallow water depths. In fact, the Submarine Force routinely logs hundreds of submarine days in shallow water. **Operating safely in shallow water is no problem for a modern-day nuclear submarine.**

Myth No. 2. The submarine platform has limited deterrence impact because of its inherent stealth and lack of visibility.

Response: The submarine can have a significant psychological impact on the leader of a potential hostile nation. In the area of deception, the submarine can be employed covertly, semi-covertly, or overtly. The submarine's presence in the area can be made known in a variety of ways to ensure that the desired impact is effected:

- Inform a potential adversary through diplomatic channels that U.S. and/or allied submarines have been deployed in the area and can be brought to bare if so directed.
- Have SSNs in the potential conflict area make their presence known by making obvious port-calls or other visible events or acts.

The submarine can always utilize its inherent stealth to remain totally covert and perform a variety of tasks until it is called upon for an overt act, such as strike. But the bottom line is that a **submarine can have a significant psychological effect on the leader of a potential hostile nation**, especially during the early phases of tension.

Myth No. 3. The submarine lacks the fire power to be a credible strike platform in the joint strike arena.

Response: If it is desirable to have a high fire power submarine for purposes of conducting a covert strike delivering literally hundreds of missiles to enemy targets, a Trident-like submarine can be configured to be capable of delivering up to 144 missiles per ship. As previously mentioned, it should be noted that two modified Tridents can deliver the total number of Tomahawks launched by all platforms during Desert Storm operations. **If moderate fire power is the operational need, one can employ one or more of the 12 VLS-tube-equipped 688 class units.**

Summary

In the months and years to come, the Submarine Force and the Submarine Community must do its best to make a strong case for the cost effective contributions of submarines in the future security environment. Wherever possible, the contribution of submarines in the new security environment that takes advantage of their unique and inherent characteristics and capabilities should be emphasized.

With the Navy's ships construction and modernization (SCN) budget hovering around $4 billion, coupled with the fact that the Submarine Force's historical allocation has been about 20 to 25 percent of that sum, the next generation submarine will need to come in at about $1 billion. A multi-purpose SSN that costs about $1 billion or less in production will be a big challenge to say the least—of course there is always the possibility that the SCN budget will be increased as a result of savings from down-sizing the shore infrastructure (a DoD management strategy that seems to be gaining popularity).

While submarines may be built in the future solely to maintain the industrial infrastructure, a mature and well articulated set of defendable submarine roles and missions tailored for the new security environment is a must.

It is most likely that any of the current leaders of our country believe that the United States could be a super power nation without submarines—interesting and challenging times lie ahead. ■

COMMAND AND CONTROL, COMMUNICATIONS AND SURVEILLANCE

by RADM W.J. Holland, Jr., USN(Ret.)
President
AFCEA Education Foundation

[Ed. Note: This article is taken from RADM Holland's presentation at the Sixth Submarine Technology Symposium in May.]

Nowhere in warfare has the paradigm shift of 1990 been as large and dramatic as in submarine warfare. These changes can be translated into operational terms related to command and control. Vice Admiral Bill Owens stated the situation succinctly in the March PROCEEDINGS saying, "When it is outfitted with the right kind of communications—the right links to important national systems—the Maritime Action Group (MAG) can provide us a real warfighting edge." Notice Vice Admiral Owens says nothing about endurance, speed, explosive power, delivery potential. Vice Admiral Roger Bacon coined the operative phrase for this model, "If you can't talk, you can't play."

The maritime strategy declared submarines the predominant naval weapons of both deterrence and suasion. There are those of us who argue that though the Soviets may have disappeared, we shouldn't be too quick to dismiss the Russian submarine fleet because it is the only military force which can hold the United States hostage. However valid our argument may be, no one is listening to it. The only model now being addressed is not the Battle of the Barents Sea, but Desert Storm.

In the giant step between these two, we move from environments expected to be target rich ones to target poor; from an enemy with some naval forces to one in which ASW is nonexistent and electronic countermeasures rudimentary at best. Submarines come up from deep and fast to operate most of the time at periscope depth, actually not a new mode for us, but one in which we now can openly address situations in which mast and antenna exposure will be generous and continuous.

The ability to execute these new roles and missions will depend in large part on the communications capability of the submarine and the command and control schemes and equipments employed to exploit the submarines' unique capabilities.

If we translate the descriptions of the changed roles and mission into C^3 terminology we see:

- from short clear messages on assured dedicated circuits,
- we go to high volumes of high data rate tactical messages in a crowded electromagnetic spectrum;
- from a few messages a week sent to the ships, needing no reply, authored or reviewed by other submariners,
- to continuous two-way communications which will have to cover echelons from the President down to Coast Guard Petty Officers on independent anti-drug operations;
- from little or no off-board intelligence, and most of that time late,
- to direct down-links from space-based assets and by immediate updates of information from land based sensors and analysts;
- from terse descriptions and directions sent only when required from a Captain rank to Commander,
- to a continuous stream of conflicting information from a variety of sources each with peculiarities unknown to submarine recipients and many of the pieces of data originated, sorted or screened by a third class operations specialist or generated and sent by a machine without the benefit of human intervention.

So attack submariners can expect to move from a self contained service with the most efficient and effective command and control system in all the world's military forces to one in which we may be hamstrung because we lack the experience, procedures and equipment to perform all the tasks which the platform permits.

This does not mean abandoning the present superb C^3 system. Characterized by short clear messages on dedicated circuits with assured connectivity, these remain clearly the best in the strategic TRIAD and perfect to support submarines in transit, under the ice or involved in ASW operations in the ocean or on its littoral. But while our submarine power plants are superb, our weapons unsurpassed and improving, the internal habitability and damage control adequate, available C^3 seems marginal to meet the expected needs.

If submarines are to be first on the scene then as one who has been in the room, I can assure you the Chairman of the JCS won't

wait patiently for reports on what the submarine sees and hears. The HICOM net of the future will have stations in the White House, the National Military Command Center, the CINC's Headquarters, the Joint Task Force Commander's War Room and the control rooms of the submarines on station. And it won't be long before the video saturated commanders and staffs will expect to see the periscope picture on video in the command center.

Furthermore, we ought to expect the NCA to give rudder orders directly to the submarine's Commanding Officer. This may not be what military professionals, especially CINCs and Commanders of Joint Task Forces would like, but in the Falklands Campaign, CONQUEROR did not shove off from Portsmouth with a patrol area assignment and orders to "Operate in the Best Interests of the Queen". On the contrary, with BELGRANO in sight, the command to "shoot" went from the Prime Minister to the First Sea Lord to Flag Officer Submarines, who was in the chain only because he was the Broadcast Control Authority who owned the radio, to CONQUEROR's Commanding Officer. This design, orders from the cabinet room of the War Council, or the National Security Council chambers, can be expected to be a likely one in the new era.

If all the predictions about covert strike warfare are correct, they are only to the extent that the triggers can be pulled in near real time when the Chief of State says to do so. If the submarine is to be able to do this, there must be a C^2 doctrine, procedures and equipment which will support this aim.

Additionally, when forces, naval or otherwise, join the submarine at the front, there have to be mechanisms to coordinate operations because time will not allow having well thought out actions or well understood plans in place well in advance of their need, so as to eliminate or reduce the amount of information which needs to be passed. And while there is validity to the argument that not everything needs to interoperate with everything else—a situation in which GEORGIA has to talk to the 2nd Armored Cavalry Regiment is hard to envision—these will be the rare exception. The rule will be, if you are going to play, you have to be on the net.

In summary, all of this claims that since the Berlin Wall came down, the most important aspect of submarine research, design, and construction has been information management and transfer systems.

In this new game, will orders be clearer? Probably not.

Will mission be easier? Probably not very often.

Will submarines be more effective in this new C^3 environment than before? Probably not for awhile.

Will change come easily? Absolutely not!

Will we have choices about how to operate? If we can't talk, we won't play. ■

[RADM W.J. Holland, Jr., USN(Ret.) is the President of the AFCEA Education Foundation. The Foundation, a non-profit tax exempt organization subsidized by the Armed Forces Communications and Electronics Association, sponsors scholarships in civilian educational institutions and provides awards and prizes in military training activities, and provides professional education in the Command, Control, Communications and Intelligence fields.

Admiral Holland served 32 years on active duty, mostly in submarines. He served on the staff of the Chief of Naval Operations as the Deputy Director for Space, Command and Control and as the director for Strategic and Theater Nuclear Warfare.

Admiral Holland commanded Submarine Group FIVE based in San Diego; Submarine School, New London, Connecticut; Submarine Squadron ONE in Pearl Harbor; and the submarines USS PINTADO and USS PLUNGER.]

IMPORTANT DATES TO REMEMBER IN 1994

STS'94
May 10 - 12

Annual June Symposium
June 15 - 16

PLEASE RECRUIT 2 NEW MEMBERS FOR 1993!

JOINT LITTORAL OPERATIONS

by RADM Craig E. Dorman, USN(Ret.)
Director
Woods Hole Oceanographic Institution

[Ed. Note: This article is taken from RADM Dorman's presentation at the Sixth Submarine Technology Symposium in May.]

...From the Sea says it all. Submarines have their work cut out to perform what's planned for them in the joint littoral operation (JLO) environment where at least one, and in many cases all three spatial dimensions are severely restricted.

When thinking about changes as dramatic as those we're addressing in the new security environment (especially the JLO environment) it's usually a good idea to retreat to history and puzzle out what lessons we have (or at least should have) learned. Let me suggest you start with Michael Gannon's OPERATION DRUMBEAT: The Dramatic True Story of Germany's First U-Boat Attacks (1990 Harper & Row, NY). Then, since Gannon makes it sound too easy for the submarine, you should review the last few months' newspaper articles about our encounters with the Russian in the Barents Sea (no book yet!). And, since in the littoral area we're closer than submariners usually are to the population that live just beyond the coastline, it may pay to consider their nature and their motivation. Varied as these may be in detail, the mindset we can expect to encounter in most of today's scenarios is beautifully captured in Eric Hoffer's The True Believer: Thoughts on the Nature of Mass Movements (1991, Borgo Press: first published in 1951).

In support of littoral operations our normal eyes and ears, acoustics, are severely dimmed; we face emplaced (mines) and moving (mini-subs to coastal diesel boats) weapons that are stealthy, cheap, mean, nasty, clever, and hard to find; our basic navigational safety is encumbered if not imperiled; and our own trusty weapons, designed to counter peers in deep water, are degraded at best.

While OPERATION DRUMBEAT and our own operational experience in shallow or restricted waters give us reason to expect that the ASW problem is at least as tough as what faces the submarine, our JLO objective is to provide full, totally reliable, timely, and unencumbered tactical mission support to Allied units

with minimal or no loss to own forces. We may need, therefore, to consider a few improvements.

Let me lead off by talking first a bit about the environment—after all I represent an oceanographic institution—and then by briefly describing some technologies that are evolving from ocean research and may make the littoral environment of a decade from now vastly different than it is today.

First, there is little that one can briefly say about local coastal oceans as operational environments for submarines other than that they are hostile, dangerous, and extremely variable in space and time. Our explicit knowledge of most of them is poor, since international maritime law limits our access to other nations' home waters. On the other hand, to those into whose land we will be coming *from the sea*, they are usually of fundamental economic and social importance, and heavily used. We can expect that the maritime part of the enemy knows them the way a farmer does his fields, cares as deeply about them, and has had adequate time and resource to prepare them with rugged, even if unsophisticated, defenses.

There are also a lot of ambient characteristics of littoral waters which can influence submarines; and in most cases there are sufficient *niche* environments that predictions and estimates lack both accuracy and reliability. Most waters aren't even well charted; and as we're now finding with GPS, gross positional inaccuracies are common. Taking just one parameter—shelf currents—as example, we can say that our state of knowledge is good enough for general planning purposes, but by no means adequate to preclude some really nasty surprises.

From an operational perspective, the bottom line is that the adversary usually has the information edge and a good defensive advantage. Thus, pre-mission reconnaissance is essential simply to avoid disaster (let alone secure success). The question of course is how to do that clandestinely and effectively.

Here is where some of our ocean technology comes into play. Simply stated, we're learning how to *wire the oceans* much as we have the land and air. Starting with deep water and moving in, our scientists are learning to model the acoustic channel and exploit it for communications. The best way to think of what we're trying to do for JLOs is to consider a private, wide band, cellular telephone system...to which one can attach a variety of sensors. What makes it so interesting compared to any earlier in-

water sensor network system I've heard of is that there are no wires, so it is easy to seed and maintain; it's quiet when it doesn't need to pass information, is robust and low probability of intercept (LPI). And it's unclassified (many of the Principal Investigators (PIs) are new or non-U.S. nationals), so we're all making a lot of fast progress.

The JLO utility of this engineering construct becomes considerably more powerful when some of the nodes are moving. This is where, in my mind, unmanned underwater vehicle (UUV) technology will have an enormous impact on littoral warfare. Briefly tracing how we started with manned submersibles and simple towed sleds, think about how we've learned a lot about the forces involved and both sensing and mobility requirements. We are now developing and starting to routinely use both tethered and free swimming vehicles in research and education (some ground breaking results have come from undergraduate involvement in Sea Grant programs). As one example of an end-point design consider ABE, our Autonomous Benthic Explorer, which can sit on the bottom for a year, make preplanned or commanded excursions, and then relay its findings over the telemetry net.

Conceptually, this type of a network can monitor and diagnose virtually all significant changes in the characteristics of the littoral acoustic channel, the water mass, and the bottom. It could become an extremely powerful reconnaissance and early warning tool. Similarly, however, it would be very hard to penetrate without detection.

In summary, the JLO environment reduces or eliminates many of the tactical and technological advantages we have worked so long and hard to provide for our SSNs. It gives the recipient of our thrust *from the sea* a host of opportunities to compound the many natural problems caused by the environment itself. And, within a decade or so, technology may well transform our and their ability to monitor and penetrate. Perhaps it is time to seriously consider the value of the submarine systems we are willing to expose to those risks. Traditional U.S. SSNs and their multi-billion dollar crews (the intellectual value of each boat exceeds that of the steel and silicon if we rated these commodities as they do on Wall Street)—those we now operate and even more those we are planning—are not (necessarily) an appropriate match to what they will face in JLOs. It might be important to start talking about the options.

■

[RADM Craig E. Dorman, USN(Ret.) is the Director of the Woods Hole Oceanographic Institution.

RADM Dorman served in the U.S. Navy from 1962 to 1989. He was on the staff of the Chief of Naval Operations as a specialist in anti-submarine warfare and was the Commanding Officer, Underwater Demolition Team Eleven.

RADM Dorman received a Bachelor of Science in Geography from Dartmouth, a Masters of Science in Oceanography from the Naval Postgraduate School, and his Doctorate from MIT in Oceanography.]

BULLETIN BOARDS

DO YOU HAVE ONE AT WORK?

* * * IF SO * * *

PLEASE POST AN NSL INFORMATION BROCHURE

and

MEMBERSHIP APPLICATION

Call NSL Office at (703) 256-0891
to replenish you supply of materials.

* * * * * * * * * * * * * * * * * * * *

THE GERMAN TYPE XXVI CONVOY KILLER SUBMARINE

by William P. Gruner

It was fortunate for the Allies that Germany was unable to get her Type XXVI submarine into production before she was defeated in World War II. What was the Type XXVI submarine? It was Germany's attempt to beat the Allied convoy system by means of a very fast convoy-killer submarine. Had she succeeded, the employment of this new weapon system would have been as important to the German war effort at sea as the development of panzer tactics was to German land warfare.

Although German scientists had been working to develop nuclear power, they were not very far along. In a separate effort Professor Walter and his engineers pursued a two pronged approach to give German submarines the high submerged speed of about 25 knots with good endurance. They sought to accomplish this by designing a streamlined hull and powering it with powerful gas turbine(s) using concentrated hydrogen peroxide (H^2O^2) and fuel as the energy source. *[Ed. Note: See Dick Bloomquist's article AIP - A Historical Perspective in the July 1993 Submarine Review.]* This system became known as the Walter propulsion system, and with it the streamlined Type XXVI submarine could have evolved as the German weapon system to counter Allied convoys.

Convoys and Wolfpacks

To reduce Allied losses to German submarines in World War II, most of the shipping in the North Atlantic was organized into large escorted convoys. Convoys consisting of as many as 50, 60, and even 100 ships were not uncommon. As a result, when a single German submarine detected a convoy it had limited ability to inflict damage because of its limited supply of torpedoes, low submerged speed and endurance, and counter attacks by convoy escorts.

To bring more torpedoes into an attack, Admiral Doenitz established the wolfpack system. Under this system, a submarine making contact on a convoy reported the contact to the submarine command headquarters by radio. The contact maker then continued to shadow the convoy until the headquarters could direct additional submarines to the scene. Although the wolfpack system

was fairly effective, the convoy system allowed large quantities of men and war supplies to safely cross the Atlantic. In any event, the attack tactics employed by German submarines remained essentially the same—individual submarine attacks on individual ships.

Search for a Better Convoy Attack System

Recognizing the need to attack convoys more effectively, a few German submarine tacticians and scientists sought means to sink more convoyed ships. Among these were Professor Walter, a man with a keen grasp of those fundamentals of physics, chemistry and engineering needed to improve German submarine capabilities. Working with submarine design groups and building yards, Dr. Walter set out to design an attack submarine able to run submerged at high speeds for many hours without intake of atmospheric air. The culmination of that effort almost brought the Type XXVI submarine into production by the end of the war, although apparently none became operational. While the development of these submarines was in process, submarine headquarters personnel set out to design tactics for attacking convoys with Type XXVI submarines.

Development of the Type XXVI Submarine

The Walter Propulsion System. As noted above, the basic concept for this system used stored concentrated hydrogen peroxide (H^2O^2)—called Ingolene—to replace air as an oxidant for creating energy to drive a gas turbine. The turbine was coupled to a propeller shaft through a reduction gear. In many respects the Walter system was limited to several hours at high speed due to limited storage capacity for hydrogen peroxide. Nonetheless, this performance was outstanding compared to that of the conventional diesel/battery powered Type VII and IX submarines then in operational use. Those types had a maximum submerged speed of only 7 knots at their one-hour battery discharge rates.

Walter system submarines were also equipped with moderate sized diesel engines for running on the surface and snorkeling, and electric storage batteries for low speed submerged running.

By war's end the development of the Type XXVI submarine had progressed in steps almost to the point of operational capability.

V.80. The first high speed submersible powered by the Walter

system was an experimental propulsion test model designated the V.80. She was small—an 87 ton submarine driven by a 2,000 horsepower turbine. It attained a submerged speed of 25 knots. Professor Walter reported that he had personally operated the controls during trials and found that steering and depth control presented no problem at top speed.

Type XVII. The next development step was a streamlined experimental prototype of an operational design with two bow torpedo tubes. Four of these were built. They were small, displacing about 260 tons. Fitted with two 2,500 horsepower turbines coupled to a single propeller shaft, their maximum submerged speed was 26 knots. Hydrogen peroxide was stored in plastic bags set into tanks on the sides of the hull. A 210 h.p. diesel was provided for surface/snorkel running.

Type XVIIB. The next step was planned as the operational version of the Type XVII. Six were built or under construction at war's end. Their length was about 136 feet, beam about 11 feet, and draft 14 feet. They were larger than the Type XVII with a submerged displacement of about 340 tons. Although designed for two Walter system 2,500 h.p. turbines, they were fitted with only one because of shortages. Powered by the one turbine they had a maximum submerged speed of about 21 knots. Maximum speed with two turbines was calculated to be 25 knots, and endurance at that speed was expected to be five hours, and range about 125 miles. Endurance at 15 knots was greater, about 11 hours, to provide a range of 165 miles.

Like the Type XVII, the Type XVIIB was fitted with two bow torpedo tubes and had a total capacity of four torpedoes. Test depth was about 400 feet. The complement was 3 officers and 16 enlisted men.

Type XVIII. The Type XVIII was planned to be the largest version of the Walter system propelled streamlined submarines. It was designed for a submerged displacement of about 1,800 tons and a maximum submerged speed of 27 knots. At lower speeds it was to have an endurance of about 7 hours at 24 knots, and 22 hours at 15 knots for corresponding ranges of 175 and 330 miles respectively. The program was terminated due to wartime need for more immediate production of operational submarines. However, the streamlined hull design was incorporated into the more conventional diesel/battery Type XXI submarine.

Type XXVI. This was the last step in the wartime develop-

ment program of a German high speed, long endurance submarine. Two were under construction at war's end, one of which was scheduled to be completed during the summer of 1945.

Type XXVI was a relatively large streamlined submarine of about 1,000 tons with an initial design length of approximately 185 feet, beam of 12 feet and draft of 19 feet. It is understood that these values were later increased. She was equipped with the Walter propulsion system featuring a single 7500 h.p. turbine to drive a single shaft. The system was designed to provide a submerged endurance of about 15 hours at 15 knots for a range of 225 miles, or about 6 hours at 24 knots for a range of about 125 to 150 miles. She had a relatively small battery for low speed submerged operations, and one main 580 h.p. diesel, plus one 265 h.p. auxiliary diesel, for surface/snorkel cruising. Test depth was 450 feet. Crew size was 4 officers and 26 enlisted men.

A unique feature of the design was the arrangement of its 10 torpedo tubes. Four were conventionally mounted in the bow, and three on each side were pointed aft and outboard at an angle of about 9°. The orientation of the side tubes permitted a torpedo to be reliably launched at speeds up to 15 knots, whereas launching from the bow tubes was limited to speeds of less than 6 knots. Torpedo capacity was 10; i.e., one in each tube, with no reload capacity.

A Hypothetical Type XXVI Wolfpack Attack

In early June 1944 Allied troops landed in Normandy to begin the *Great Invasion* of the continent. Earlier in 1944, 90 Allied merchant ships had been assembled on the U.S. East Coast to form the large convoy, US/UK-45. Its mission was to deliver war materials and personnel to England in preparation for the coming invasion. The convoy was intercepted by the German Type XXVI submarine, U-3606 shortly after noon on a typical North Atlantic overcast and stormy day. The convoy was then over two-thirds of the way across the Atlantic.

The Convoy. The convoy was steaming in rectangular formation. The front consisted of nine column-guides deployed 700 yards apart on a line-of-bearing from the formation guide. The column-guides were on parallel courses with nine ships following in the wake of each at 600 yard intervals. The width of the convoy was somewhat greater than three miles and the length somewhat less. Plowing into heavy seas built up by strong winds

from the northeast the convoy advanced toward England at 8 knots. Destroyers and destroyer escorts assigned to protect the convoy against submarine attack normally patrolled outside the perimeter of the convoy but on occasion darted between columns to keep the convoyed ships in a semblance of order. While so engaged the escorts were unable to devote full time to their anti-submarine duties.

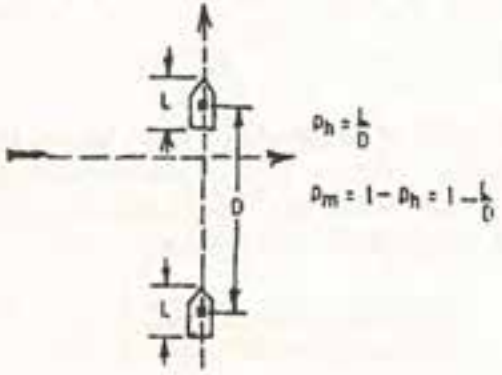
Intercept and Attack. U-3606 was one element of a submarine wolfpack of six Type XXVI's deployed on a north-south scouting line 100 miles long which crossed expected convoy routes. In accordance with established procedure U-3606 reported the convoy's position, course and speed to the Submarine Command Headquarters upon making contact. She also reported that she was changing position from the convoy's south flank to its north flank to gain better position for reasons of both visibility and attack position. U-3606 crossed under the convoy at 15 knots and emerged a half hour later in position to both observe and attack. Within three hours four of U-3606's consorts which had proceeded a high submerged speeds were able to rendezvous with her on the north flank of the convoy. The fifth Type XXVI was too distant to reach the attack station during daylight hours.

Following standard wolfpack procedures, U-3606 as contact maker, took over as Officer in Tactical Command and issued instructions to wolfpack submarines. He ordered them to take stations 600 yards apart in column on a line paralleling the northern flank of the convoy. At 3:15 each of the five attacking subs turned in a time-coordinated submerged maneuver to approach the convoy's flank and loosed 20 torpedoes from their bow tubes into the mass of the convoy. Each then made a 180° turn to the left in the direction the convoy was heading and within minutes loosed another 30 torpedoes at the convoy from their side tubes. Explosions followed by smoke and fire which illuminated the area created a scene of utter confusion. U-3606 remained in the area to gather further evidence of damage inflicted on the convoy while the other four attackers sped away submerged at 15 knots to clear the area and then headed for their base. U-3609, the fifth Type XXVI, arrived at the attack scene three hours later with a full load of 10 torpedoes and set about finishing off the damaged ships. The tally for the initial attack was 40 hits out of the 50 torpedoes fired, plus seven damaged stragglers sunk by U-3609. None of the U-boats were attacked or damaged. Total

ships sunk was later evaluated as 30 sunk out of the original 90 in the convoy, or a loss of one-third of the convoy in a single Type XXVI wolfpack attack.

Attack Tactics. Special tactics for Type XXVI wolfpack attacks on convoys had been developed by tacticians of Submarine Command Headquarters. Their solution was based on the application of simple probability theory to the problem. This is illustrated in Figures 1 and 2 which depict the path of a single torpedo fired on a straight course into the 90 ship convoy described above. Figure 1 shows the probability of hit of a single torpedo fired without aim at a single column of ships 450 feet (150 yards) long, steaming 600 yards apart in column. The probability that the torpedo will hit one of the ships is 150/600 or 25 percent. Conversely, the probability that the torpedo will miss hitting a ship is 450/600 or 75 percent.

Figure 1 - Torpedo Crosses Track of 1 Column



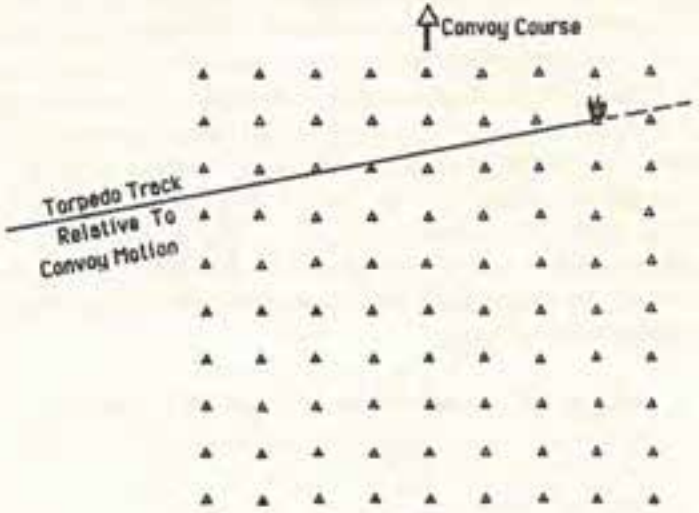
In the case of a large convoy (Figure 2) the torpedo that missed a ship in the first column will continue on its path to hit or miss a ship in the second column. The probability that the torpedo that missed a ship in the first column will also miss a ship in the second column is 0.75 x 0.75 or $(0.75)^2 = 56.25$ percent. In like manner, the probability that the torpedo will miss ships in all nine columns is $(0.75)^9$ or about 7.5 percent, and the probability that this torpedo will hit at least one ship in the convoy is 1-7.5 per cent or about 92.5 percent. To summarize, the probability, P_h, that a single torpedo will hit a ship in a multi column convoy is:

$$P_h = 1 - \left\{1 - \frac{L}{D}\right\}^n$$

where n = number of columns through

which the torpedo may pass.

Figure 2 - Torpedo Crosses Multiple Tracks



The probability of hitting one ship in a convoy will be greater if the distance, D, between ships in each column decreases, and less of it increases. This effect is illustrated in the following table for convoys composed of 4 and 9 columns of ships.

Probability That a Single Torpedo
Will Hit at Least One Ship in a Convoy

Distance Between Ships (Yds)	No. Columns	Probability (%)		No. Columns	Probability (%)	
		Miss	Hit		Miss	Hit
600	4	31.6	68.4	9	7.5	92.5
700	4	38.2	61.8	9	11.4	88.6
1,000	4	52.2	47.8	9	23.2	76.8

These probabilities will be degraded if torpedo reliability is poor. Nonetheless, they are significantly greater than average hit

probabilities achieved by German and U.S. submarines in World War II.

An advantage of this tactic is the simplicity of a fire control system which produces excellent results. The probability of hit is independent of: (1) convoy speed and precise course, (2) the distance between columns provided that the torpedo has sufficient range to cross through all columns, and (3) the angle at which the torpedo crosses the convoy course. To this end, a 30 knot torpedo with range capability of about 10,000 yards is a very satisfactory weapon. Further, no torpedo homing device is required to achieve high probability of hit.

Conclusions

- Simple torpedoes and simple fire control systems can wreak havoc with large convoys if large numbers of torpedoes are fired into the mass of the convoy.
- Although the convoy system was effective against conventional diesel-electric submarines in WWII, it would not have been effective against attacks by Type XXVI submarine wolfpacks.
- The tactics described above are also effective against large formations of combatant and support group ships. ■

[Ed. Note: Mr. Gruner qualified in submarines in 1936. He made ten war patrols. He served as Executive Officer of PIKE, SUNFISH and APOGON and commanded SKATE (SS 305) for three patrols. After the war he worked for Lockheed and did the development plan for the Polaris missile. He is a member of the League and a frequent contributor to the Review.]

THE SUBMARINE REVIEW

THE SUBMARINE REVIEW is a quarterly publication of the Naval Submarine League. It is a forum for discussion of submarine matters. Not only are the ideas of its members to be reflected in the REVIEW, but those of others as well, who are interested in submarines and submarining.

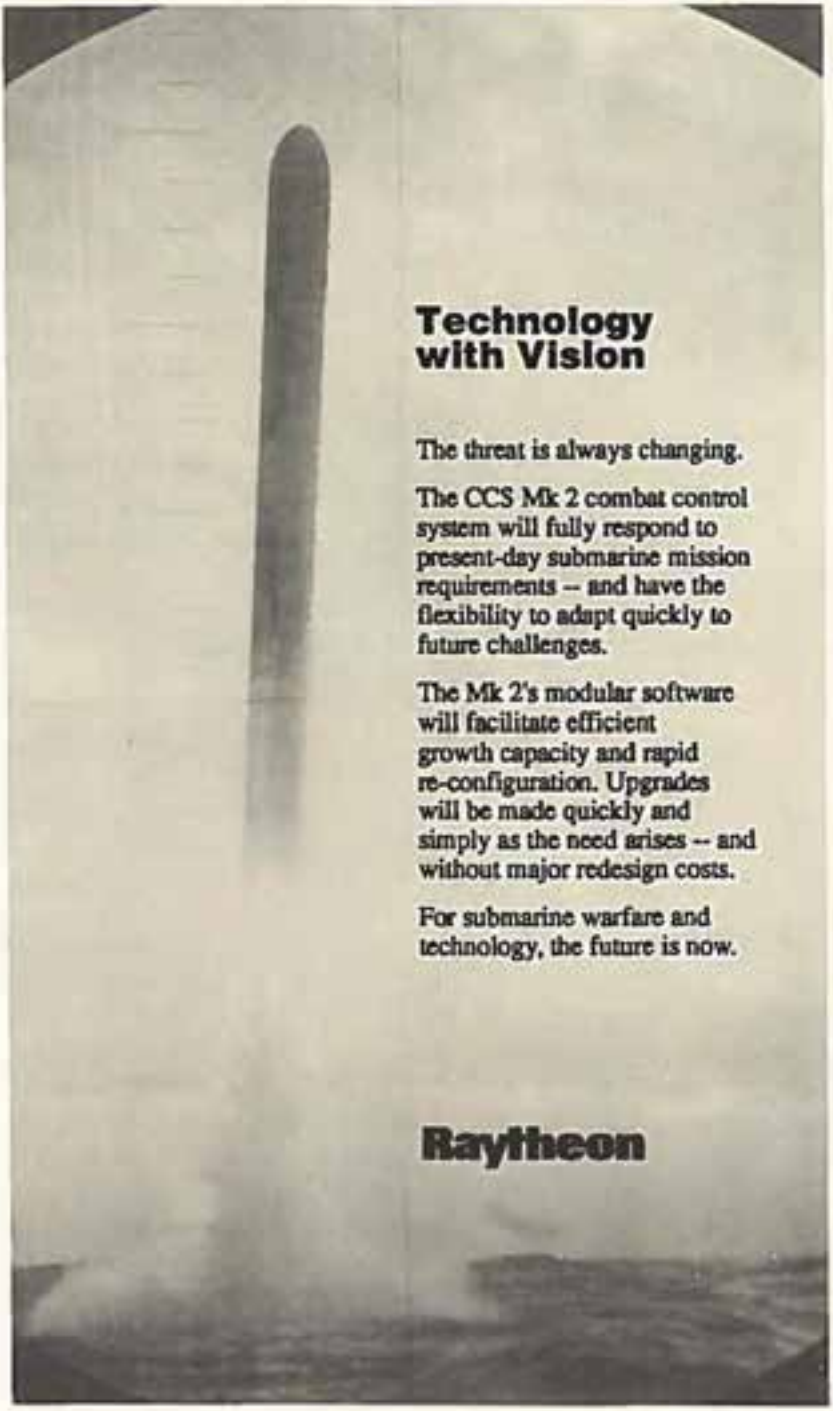
Articles for this publication will be accepted on any subject closely related to submarine matters. Their length should be a maximum of about 2500 words. The content of articles is of first importance in their selection for the REVIEW. Editing of articles for clarity may be necessary, since important ideas should be readily understood by the readers of the REVIEW.

A stipend of up to $200.00 will be paid for each major article published. Annually, three articles are selected for special recognition and an honorarium of up to $400.00 will be awarded to the authors. **Articles accepted for publication in the REVIEW become the property of the Naval Submarine League.** The views expressed by the authors are their own and are not to be construed to be those of the Naval Submarine League. In those instances where the NSL has taken and published an official position or view, specific reference to that fact will accompany the article.

Comments on articles and brief discussion items are welcomed to make the SUBMARINE REVIEW a dynamic reflection of the League's interest in submarines. The success of this magazine is up to those persons who have such a dedicated interest in submarines that they want to keep alive the submarine past, help with present submarine problems and be influential in guiding the future of submarines in the U.S. Navy.

Articles should be submitted to the Editor, SUBMARINE REVIEW, P.O. Box 1146, Annandale, VA 22003.


In the defense
of our nation, there can be
no second best.
716
Newport News
Shipbuilding


Technology
with Vision
The threat is always changing.
The CCS Mk 2 combat control system will fully respond to present-day submarine mission requirements -- and have the flexibility to adapt quickly to future challenges.
The Mk 2's modular software will facilitate efficient growth capacity and rapid re-configuration. Upgrades will be made quickly and simply as the need arises -- and without major redesign costs.
For submarine warfare and technology, the future is now.
Raytheon

SUBGUIDE: SUBMARINE AIRCRAFT CARRIERS

by Norman Polmar

Between the world wars several nations experimented with aircraft-carrying submarines—France, Great Britain, Japan and the United States, while the Soviet Union considered the concept. Floatplanes, it was believed, could provide long range reconnaissance for the submarines, which had severely restricted search capabilities, especially prior to the installation of radar in submarines.

At the beginning of the war in Europe (1939), only two navies had operational aircraft-carrying submarines: the one-of-a-kind French SURCOUF and several Japanese I-boats (the term for long-range submarines). The Japanese used submarine-launched floatplanes extensively in 1941-1942 to scout out enemy anchorages, often in cooperation with fleet and midget submarine attacks. And, in August 1942 the submarine I-25 launched a two-man, E14Y *Glen* floatplane on two nighttime incendiary raids over Oregon forests.

The I-25 was one of 20 large scouting submarines of the B1 type; each of these long-range boats, displacing 2,198 tons standard surface displacement, could carry a single floatplane. There was an aircraft hangar and catapult forward of the bridge (with a 5.5-inch gun and lighter weapons aft). Several larger scouting submarines with a single aircraft capacity were built during the war. Two larger, AM-type submarines of 2,620 tons standard surface displacement were completed in 1944-1945; these could each accommodate two floatplanes. But all of these boats would be dwarfed by the I-400 class.[1]

In 1942 the Japanese Navy initiated the I-400 submarine class SEN-TOKU or Special Submarines with the designation STo. They were intended specifically for the bombing of Washington, DC and New York City. But while the first units of the class were still under construction, that plan was discarded because of the direction the Pacific War was taking and it was intended to use the I-400s against the Panama Canal, to halt further U.S. reinforcements to the Pacific area.[2]

The I-400 was the largest undersea craft ever built prior to nuclear propelled submarines. The original design of 1942

provided for a surface displacement of 4,550 tons with a hangar for two seaplanes. However, the design was enlarged to handle three floatplanes plus parts for a fourth, which could be assembled on board. The deck structure was to be similar to the AM design, with a catapult forward of the hangar, having a 85½foot track slightly offset to starboard. The aircraft could be pre-warmed in the hangar while the submarine was submerged through a system circulating heavy lubricating oil. The submarines, of course, would have to surface to launch their aircraft. For recovery there was a collapsible crane fitted forward.

The submarine design was unusual with a modified figure-8 configuration forward, evolving into a **horizontal** figure-8 amidships. This permitted the submarine to have two forward torpedo rooms, one above the other, while accommodating four diesel engines, paired side-by-side amidships. They carried sufficient diesel fuel to cruise farther than any other non-nuclear submarine ever built, and could embark supplies for a 90 day mission (see table). In addition to carrying avgas for the aircraft, the submarine's magazines could hold four aircraft torpedoes, three 1,760 pound bombs, and twelve 550 pound bombs.

The massive conning tower, offset to port above the aircraft hangar, mounted a snorkel, a Mark 2 radar (not a particularly reliable set although it was said to be able to detect aircraft under ideal conditions at ranges of 60 miles), and elementary radar warning equipment. Internally the submarines were fitted with accommodations and communications to serve as squadron flagships.

A streamlined, low-wing floatplane was developed specifically for operation from the I-400 submarines. This was the Aichi M6A1 *Seiran* (Mountain Haze), a two place, high speed aircraft with an unusual twin float configuration. The floats could be jettisoned inflight for possible suicide attacks against the Panama Canal locks or Allied warships. The aircraft was developed in total secret, as were the submarines, and hence there was no Allied code name for the aircraft. With a top speed of 295 mph at 17,000 feet, the M6A1 could carry bombs or an aerial torpedo.

I-400 Class Characteristics

Displacement:	5,223 tons surfaced 6,560 tons submerged
Length:	400¼ feet (122.0 m) overall
Beam:	39⅜ feet (12.0 m)
Draft:	23 feet (7.0 m)
Propulsion:	4 diesel engines - 7,700 hp electric motors - 2,400 hp 2 shafts
Speed:	18.75 knots surfaced 6.5 knots submerged
Range:	30,000 n. miles at 16 knots surfaced 37,500 n. miles at 14 knots surfaced 60 n. miles at 3 knots submerged
Depth:	330 feet (100.0 m)
Manning:	approx. 145 officers and enlisted*
Torpedo tubes:	8 21-inch (533 mm) forward
Torpedoes:	20
Aircraft:	3 M6A1 floatplanes assembled; parts for another
Guns:	1 5.5-inch (140 mm) 10 25-mm (3 triple, 1 single mounts)

* In excess of 200 men are believed to have been embarked on the I-400 and I-401 operational missions.

The Japanese Navy planned to build 18 submarines of the I-400 class with construction given a high priority. The lead ship was laid down on 18 January 1943. Changing priorities and production limitations led to only five units being laid down, of which four were launched in 1944, the I-400, I-401, I-402, and I-404. Three would be completed with work on the I-404 being halted in March 1945 when 90 percent complete (she was later sunk at Kure by U.S. carrier aircraft).

The I-400 was completed in December 1944 and the I-401 the following month. Along with the aircraft-carrying I-13 and I-14

(AM type), they were to form Submarine Squadron 1 under Captain Tatsunoke Ariizumi. But the underwater monsters could not be sent on a mission because of delays in producing their M6A1 aircraft, caused by U.S. bombing of the Aichi aircraft factory in Nagoya. And pilot training further delayed operations. The 901st Air Group was formed specifically to train I-400 pilots and crewmen.

Even then the I-400 and I-401 had to sail to Dairen, Manchuria in mid-April to take on fuel, which was desperately short in the home islands. (The I-402 was modified before completion to a tanker configuration to carry fuel from the East Indies to Japan, but the war ended before she undertook a tanker mission.)

After fueling, while enroute to the Inland Sea for further pilot training, the I-401 hit a magnetic mine laid by a B-29 bomber and had to put into Kure for repairs. Finally, flight operations began. One plane crashed at sea and another into a mountain. Practice reduced the time to unfold a *Seiran's* wings and ready the plane for flight, in darkness, to less than seven minutes. The crews practiced until a submarine could surface, prepare the three aircraft, and launch them in 45 minutes. Although this was a long time for the submarine to be exposed, even at night, it was a remarkable achievement. (The submarines could dive to periscope depth in just under a minute.)

Drills were conducted against models of the Panama Canal locks. The four submarines of SubRon-1 were to carry a total of ten aircraft for the strike, six carrying a torpedo and four a 1,760 pound bomb. The war was moving too rapidly toward Japan for even the Panama Canal attack to be undertaken. Instead, the I-400 and I-401 would attack the U.S. anchorage at Ulithi Atoll in the western Caroline Islands, launching a six plane strike.

The I-400 and I-401 sortied from the Inland Sea on 26 July 1945 with Captain Ariizumi riding the I-401. The raid on Ulithi was planned for 17 August, the planes to be catapulted aloft in the predawn darkness.

The war in the Pacific ended on 15 August. The surrender order was received aboard the at-sea submarines in reverent silence. On 20 August, Ariizumi was ordered to destroy all offensive weapons, raise the black flag of surrender, and return to port. The I-400 and I-401 fired all of their torpedoes; the I-400 pushed her planes over the side, and the I-401 catapulted her three planes, sans pilots, into the sea. Ariizumi considered scuttling his

flagship, the I-401, but decided that he would not sacrifice his crew. Instead, as the I-400 and I-401 approached Yokosuka, he placed his pistol against his temple and took his own life. The tanker submarine I-402 returned to Kure and was then moved to Sasebo.

The giants of the I-400 class had never fired a weapon in anger. At Yokosuka the I-400 and I-401 were minutely examined by U.S. intelligence officers and submariners. A distinguished British historian noted:

> "The American officer first on board the I-400, Joe Vasey (later Admiral), found the monster submarine "incredibly filthy, with a layer of grease and leftover food on the decks...the stench was almost unbearable, particularly near the (oriental style) heads, where one of our party lost his breakfast as he was hovering over the sanitary tank opening. That well-known paper product was conspicuous by its absence...but despite the unhygienic conditions the physical appearance of the crew was remarkably good. Everyone seemed to be lean and alert."[3]

The I-402 was the first to be sunk, being scuttled off Gato Island on 1 April 1946. She was first used as a target for U.S. destroyer gunfire. A total of 24 Japanese submarines were sunk that day (and nine more on 5 April).

The I-400, I-401, and slightly smaller I-14 as well as several smaller submarines were sailed to Guam and then to Pearl Harbor by U.S. crews for further examination.[4] They too were then scuttled in 1946 ending a remarkable era in submarine development. ■

NOTES

1. Characteristics and illustrations of these submarines are found in Door Carpenter and Norman Polmar, Submarines of the Imperial Japanese Navy (Annapolis, MD: Naval Institute Press, 1986).

2. Zenji Orita, I-Boat Captain (Canoga Park, CA: Major Books, 1976), pp. 255-256.

3. Richard Compton-Hall, Submarine Warfare: Monsters & Midgets (Poole, Dorset: Blandford Press, 1985), p. 78. This book contains excellent descriptions of the larger aircraft-carrying submarines of the British, French, and Japanese navies.

4. See Paul R. Schratz, Submarine Commander (Lexington, KY: University of Kentucky Press, 1988), for a description of American experiences in sailing Japanese submarines to Pearl Harbor. Schratz commanded the high-speed submarine I-203 during her voyage from Japan to Pearl Harbor.

REMINDER
1994 SYMPOSIA

* * * * *

SUBMARINE TECHNOLOGY SYMPOSIUM

- May 10 thru 12, 1994
- Secret Clearance Required
- Invitation only: Contact Mrs. Pat Dobes
  (703) 256-1514

* * * * *

NSL TWELFTH ANNUAL SYMPOSIUM

- June 15-16, 1994
- RADISSON MARK PLAZA HOTEL
- Alexandria, Virginia

MARK YOUR CALENDARS AND SAVE THESE DATES!!

INTERVIEW WITH COMSUBPAC REAR ADMIRAL HENRY C. McKINNEY, USN

by Richard Lawson

Submarine Review: What are your reflections on the two years as COMSUBPAC? How has the job changed with all the changes in the world?

COMSUBPAC: The most significant change, of course, has been the restructuring of the world and the Soviet Union's demise, the so-called end to the Cold War, and the shift in the submarine focus which has accompanied that. When I got here, we were focused on deep water ASW missions and primarily against the Soviet Union, and rightly so. That was the focus for the last 40 years. It really spans my entire career in the Submarine Force. The CNO's ...From the Sea policy clearly laid out a different approach for the Navy. The Submarine Force has adopted that full bore. It's an issue that we see as very forward looking and one that we can support with out multimission platforms. VADM Roger Bacon USN(Ret.), when he was OP-02, laid out in 1991 the roles and missions of the Submarine Force. It's a well written document and provides the blueprint for what we've accomplished here in the Pacific, and for what VADM Hank Chiles, Commander of the Atlantic Submarine Force, has done as well in the Atlantic. The submarine platform, that was focused on ASW for at least the last 20 years, has taken on the new roles and missions of mine warfare, handling special forces, providing strike warfare with Tomahawks and providing support to the carrier battle groups, in addition to the intelligence and warning missions and covert surveillance of submarines. It's just been dramatic. We've been involved with virtually every carrier battle group that's deployed. Since I became COMSUBPAC, one or more submarines worked up with each carrier battle group and then deployed with it and provided direct support. TOPEKA was the first SSN to go into the Persian Gulf, and we've maintained a regular presence with the battle group there since. PASADENA is currently deployed with the LINCOLN battle group in the Indian Ocean.

SubRev: Are the submarines serving as intelligence gathering platforms for the battle group?

COMSUBPAC: Multimission. They can do everything. They can provide ASW services if required. The Iranian Kilo is an issue that we are paying attention to. Our submarines can collect intelligence in one location while the battle group is in another. They can provide antisurface warfare support. We have taken over the MAGOPs concept which are Maritime Action Groups developed by VADM Bill Owens when he was the Sixth Fleet Commander, lock, stock and barrel and said we can do that in the Pacific. We've taken his manual and applied it here in the Pacific. It's the use of the submarine in many different roles and missions with carrier battle groups or pieces of the battle group. USS LOUISVILLE worked with a P-3 and an Atlantic Fleet destroyer, which happened to be in the Red Sea, and was involved in a drug interdiction operation. So there were three different platforms, one being covert, the LOUISVILLE. It was one of the biggest drug busts that we've had in recent history. The ship was intercepted by Turkish forces after it went through the Suez Canal into the Mediterranean. But it was tracked by LOUISVILLE with the other platforms.

SubRev: What changes have been made in your operations to address the downsizing?

COMSUBPAC: Remarkably enough, the Pacific Submarine Force has not yet downsized. When I took over, we had 36 submarines and now we have 35. Two new submarines have arrived since I've been here and we've decommissioned three. So there hasn't been a dramatic loss. The strategic Submarine Force has been stable at eight Trident submarines. Most of the downsizing has affected the Atlantic. They've decommissioned squadrons, and they've reorganized entirely. We've not done that in the Pacific. It's coming. I would say in the next three or four years we will see some downsizing. What I'm eager to have happen is a redistribution of assets as well.

SubRev: What do you mean?

COMSUBPAC: Traditionally, the Submarine Force has had 60

percent of the submarines in the Atlantic and 40 percent in the Pacific. I think we need more submarines in the Pacific. We are hoping to get a 50-50 split. Admiral Chiles and I have talked about how we would redistribute the pie. I have submarines deployed in the Indian Ocean and all through the Western Pacific today. I even have a submarine in the Caribbean doing operations in support of SUBLANT's efforts. As you can see we are spread pretty thin. If we get the 50-50 split, we will see that as a minor decrease in the size of the Submarine Force. By minor, I mean four or five submarines.

SubRev: Why do you think there should be a greater presence of submarines in the Pacific?

COMSUBPAC: With the new world reality and with the diminishing of the Soviet submarine threat and the growing ports of the Pacific, we need to pay attention out there. Two-thirds of our trade is with the Pacific and two-thirds of the world's gross national product is in the Pacific. Southeast Asia is the fastest growing region in the world. The Navy will pay attention and I think the Submarine Force needs to be a player.

SubRev: Do you think there should be a greater than 50-50 shift?

COMSUBPAC: I would like to see the 50-50 (laughs). That's not a new controversy within the Submarine Force. We've joked about it for a long time. Joked is probably an understatement. It's been a bone of contention for a long time.

SubRev: Who are the new threats in the Pacific Command's area of responsibility?

COMSUBPAC: We definitely think China is building. It's a very strong military and building dramatically. There are negotiations going on now for China to buy Soviet submarines. North Korea continues to be a threat. Although it is an isolated threat, it is a strong threat and a little bit outside the international community and they're kind of on their own. Of course, there also is Iran which is buying submarines from Russia and developing the capability to bottle up the Strait of Hormuz as is the stated objective of Iran. I would say those are the significant threats of

today in addition to Russia. We shouldn't forget Russia. They still have a very powerful Submarine Force, the biggest one in the world.

SubRev: Do the countries that broke away from the Soviet Union have submarines?

COMSBUPAC: Only Ukraine, and it only has diesel submarines in the Black Sea. They are not a significant issue.

SubRev: How many submarines did the Iranians buy?

COMSUBPAC: Apparently they bought three. One they have been operating for a year. The second is about to be delivered if it hasn't been already. We don't know when the third will be delivered, maybe in a year or so.

SubRev: Are the Russians training them?

COMSUBPAC: They're training them, correct.

SubRev: There's been talk in Washington of taking one of the boomers and making them conventional missile shooters. What kind of changes are being considered?

COMSUBPAC: There's been a couple of things. One is the possibility of putting a conventional warhead on a Trident missile. It's a very accurate missile and you can do a lot of damage with a conventional warhead but it's not a nuclear warhead so it's not quite the same escalation. The other thought is to convert Trident submarines to carry Tomahawk missiles. Both of those are being looked at in addition to other thoughts of converting some Tridents to carry special forces, which we have done successfully with older SSBNs. I see them as unique options to fully utilize the capabilities of an extremely capable submarine. All of those are nice discussions but none of them are happening. The discussions also are predicated on a couple of things. One is that we will not need the same level of strategic forces that we have today. We are going to have 18 Trident submarines and there are discussions that we don't need them all. The second thing is the Trident I missiles that are here in the Pacific will reach end of life some

time in the next decade. When that happens, what do you do with the submarines? Because right now there are no funds for a replacement (Trident II or D-5) missile that has gone into the ten Tridents in the Atlantic. The Navy has recommended funding the replacement missiles. When those missiles actually will expire is still unknown. Our experience on those missiles shows that some last 20 years while others last 25. So it's not clear when they would expire.

SubRev: Everyone seems to think you are a natural for your new position. What are your goals for that position?

COMSUBPAC: Clearly, the Navy is struggling with downsizing. Downsizing is not only capability and hardware, but people. People have been and will continue to be my focus. It has been that way my entire career. My new position is my fifth tour in Washington; that's the bad news. But the good news is it's my fourth tour in Washington outside of the Pentagon. I had one tour as the Executive Assistant for OP-02. All the others have been in the people business either in the Bureau of Naval Personnel or as being the Commander of the Naval Recruiting Command. So, I've had a chance to work lots of people programs and I have a pretty good understanding of them. In my last tour as Commander of the Naval Recruiting Command, I reported directly to ADM Mike Boorda, as the Chief of Naval Personnel. He is a superb individual and really is one of my heroes. His background is most unusual. He went from Seaman to Admiral. He came in as a high school dropout and is now a four-star admiral. He's just a brilliant man with a love of his country and a love of his Navy and, most importantly, a focus on what sailors are all about. The Bureau of Naval Personnel has that now with the current leadership. I think I can continue that focus. I look forward to focusing on the needs of today's sailor. We are going through a traumatic time. We're downsizing and it's a tough problem. You can't sugar coat the pill. But you can at least make sure they understand what it's all about and what options are available. I think that has been clearly articulated today. I would say the Navy has worked hard to send a clear message that we're not interested in RIFing anybody. We're protecting the career sailor, both officer and enlisted. And that's been very clear. We have programs in place to ensure that each individual gets through to their retire-

ment. Now, the early retirement program in 15 years kind of surprised a few people but in fact it's a good program and one designed to selectively retire those individuals that probably don't have much of a future with the Navy. Once you reach 15 years and the Navy doesn't see a future for you, then retirement is the right option. I think we are working in the right direction. But we are not going to throw people out at the 12 year point. I think the other services have been forced to do just that. When I was in recruiting and Desert Shield was just starting up, you could just see the Army turn on the recruiting machine to bring in more people because we were going to go into military action. I went to Admiral Boorda and said I'm not ready to turn on the Navy recruiting machine unless you think I should and he said "Absolutely not, we don't need to do that." He said we need to stay exactly where we are which was at that point on a glide slope down. We knew the Navy was going to get smaller. If we turn it on we are just going to bring people in that we are going to have to throw out in two years. That's wrong. We just kept the recruiting quotas at a manageable limit. It paid off because of that. We've *right sized* the Navy's personnel force. Although there is a lot of anxiety, I'm pretty comfortable about where we are headed.

SubRev: Since the Submarine Force is such a small community, people may see limited career paths and may not go that route or the ones in the community may get out for the same reason. What are your feelings on this?

COMSUBPAC: Ever since I have been in the Submarine Force it has been growing. I came into the Submarine Force when we were building 41 ballistic missile submarines, which had two crews for each. We were grandly expanding the Submarine Force and we have been playing catch-up every since. It's driven us toward a significant increase in the percentage of individuals selected to become Commanding Officers. Some would say the selection is too high. I happen to be one of those. I would say that during my time as a commander and a captain an awful lot of people that were very good and some that weren't quite so good. We would have been a better-off Submarine Force had we not selected the not-so-good ones for command. But we didn't have any options. My command tour was four years long. All my

contemporaries also had four year command tours. There also was a three and a half year XO tour. Those were long tours. But that's what was required to make it happen. Virtually everyone had a shot to reach command. I think that is unhealthy. I think the selection opportunities for command and for Executive Officer that exist in the surface and aviation communities of around 50 percent is a pretty healthy selection opportunity. That's good for them. They've picked their best to put in command. I think we have to have a similar percentage in the Submarine Force. I would say a little higher, maybe 65 percent. But I sure would like to see, and we are seeing that now, a selection where some people don't make it to command. I continue to tell my people to focus on the half full glass; don't focus on the half empty. You started out your comment talking sort of about, well, all these people aren't going to get a chance. I'd say yes but look at all the good ones that do get a chance. They're the ones I want to focus on, the half full glass. As I look at my commanding officers in the Pacific Submarine Force today, everyone of them is a super star. They are awfully good. But they've been selected. I think that's healthy. I guess I don't really worry about it. I think we are a better-off Submarine Force today. I have to compare what I've seen today to what I saw as a Squadron Commander in the Mediterranean. I probably saw 30 submarine skippers come through on deployment in the Mediterranean. Of those 30, there were 15 really good ones and maybe five or six pretty good ones. There were ten not-so-hot skippers. I don't see those not-so-hot skippers today. Now they are all good. I feel good about that.

SubRev: Is there anything else you would like to stress to the submarine community?

COMSUBPAC: I think the Submarine Force today has the highest quality people we've ever seen. They're truly the best of the best. It goes back to what I said before. We are selecting for positions of leadership the best that we've ever selected out of a tremendous crop of talent. That's very positive. The individuals that are running the forces today—my squadron commanders, group commanders and commanding officers—are the best. I see chief petty officers that are enormously talented individuals and the best. That's the good news. But I guess I would like to talk a little bit about my focus in command of the Submarine Force. I've talked

positively and I've talked about the best. But there's another side to it. And it has to do with competition. As I ride the submarines, I see junior officers not having as much fun and enjoying what they are doing as I did when I was a JO and when I had command and seeing the spirit of my wardroom. I've seen some that are pretty good. But I've seen others that are not. I've seen commanding officers that are extremely capable and have great execs, but the wardroom is kind of uptight. They really are. They don't seem to be having a good time, with the give and take and the enjoyment of their business as much as they should. I don't think it's because I'm the Admiral and riding the ship that they have this sort of attitude because after awhile they realize that I'm a regular kind and not too interested in formality. But I still sense that they are not having a good time.

SubRev: Why do you think they aren't having a good time?

COMSUBPAC: I think a lot of it has to do with the mentality in our business to make no mistakes. We are going to be an error free, zero-defects operation. And when you get that mentality, which is driven from the top, then individuals tend to get very uptight because they are afraid to make a mistake. Granted there are mistakes that you don't want to make. You don't want to sink a ship obviously and you don't want to run aground. When I had command of SEAHORSE (SSN 669), my philosophy to the wardroom was there are only three things I really worry about. One is running aground. If we are going to run the ship aground then I'm going to be involved and making the decisions. I'm not going to sit by and ignore it. The second is having a collision. If we are going to have a collision, I'm also going to be involved. You can count on me being around. And finally, shooting torpedoes. That's what I do. I'm the Captain. That's why I'm being paid. But the rest of this business is yours. You run the ship. You're the department heads. You're the chief petty officers. You make decisions. Don't come to me to ask me to solve your problems. Just make the decision. If you have a problem that you can't solve, come to me with the options and we'll talk about the solutions. But make the decision on your own. I will not try to tell you how to do things. I want you to do it and enjoy it. Did we make some mistakes? You bet. We made a lot of mistakes in SEAHORSE. But I think those junior officers

and chief petty officers grew because of the fact that they got involved in making their own decisions. One of them is right next door. He's my Chief of Staff and still makes his own decisions. He does pretty good, doesn't he? To me, that's very important. What worries me in today's Submarine Force is that fear of making a mistake. I've worked really hard to overcome that and to get the junior officers to enjoy things a little more and get the COs to focus more on it. The way I've been doing it is by trying to drive to the chief petty officers an awful lot of the day to day running of the ship, maintenance decisions and how to deal with the people. The chief petty officers are an enormously talented group of people. They are our best. They are wonderfully qualified. Focus on them and let them run the ship. Let the officers learn how to fight the ship. I think that the message is getting across. I watch some skippers do this and they are wonderful at it. I rode onboard RICHARD B. RUSSELL and the skipper at the time was Chuck Munns, who is now back in Washington. I stated this publicly in my speech at his change of command. He's the best skipper I ever saw, bar none. What was so great about him? He never said a word. He let his wardroom and his chief petty officers run the ship. While I was on the ship, he explained to me what was going on while everyone else was running the ship. It was marvelous. Did they learn how to do all those things and make all that happen because they just all came aboard with that capability and talent? No. They were just the same cut of officers that is on every ship. But he created an atmosphere where they knew they could run the ship. Sure they made a few mistakes. But if the ship were to run aground or have a collision, I bet the skipper would be involved. That's exactly how he ran it. He had complete confidence in what they were doing. The crew understood it and they went ahead and ran it.

SubRev: In the business world, they call what you advocate empowerment.

COMSUBPAC: Yes, absolutely. But it's very hard to do in the Navy because of our chain of command. But you have to take the step. I think that is critical. To me, again I go back to the Submarine Force's roots, that's what has made the Submarine Force such a great place. It's the cohesiveness of the crew and closeness of the crew, the sense of unity, and the fact that

everyone trusts everyone else. Everyone believes in what everyone else does. My last act as COMSUBPAC is pinning dolphins on two enlisted men. The reason why I want to do that is kind of symbolic. I truly believe that is a very, very important symbol in our business. It's not because I pin it on as the Force Commander. It's more important that it's done on the ship. But once in awhile I get a chance to participate in that because I happen to be riding the ship. But it's the ship that's made the decision. The ship's crew, the Captain and everyone else, has had a say, a vote, or a check mark in that guy's qualification that says he is good enough to be one of us—we trust him. That's what the dolphins really mean. You've gone through that final screening by your shipmates, not the school and not some instructor somewhere. That's important. I'm privileged once in a while to pin dolphins on an individual. I didn't qualify him. It was his ship. I really think the most important thing we can do for the Submarine Force is empower our leaders, our young officers and our chief petty officers, to run the ship. We have a way of saying submari´ner. In the Royal Navy they say subma´riner and that probably is more appropriate. My motto is let's put ma´riner back into submariner because I really want to get our junior officers as mariners, competent seamen, so they can take a ship to sea and run it. Take the example of periscopes. I have yet to see junior officers today that have the skill with a periscope that Red Ramage or the other submarine heros of World War II had. They were tremendous submariners because they had great skill with the periscope and a great ability to visualize relative motion and put their ship where they could launch a torpedo. That's a skill that has atrophied a little bit over the years with all our modern torpedoes and modern computers. But when you get right down to it, a submariner ends up having to make those decisions today even with the assistance of all these modern day computers. He has to have a sense or feel for where the submarine is and put it in the right place.

SubRev: Would you say the empowerment of your officers and chief petty officers is one of your crowning achievements so far?

COMSUBPAC: We haven't achieved it yet. I wish I could say it was an achievement. I certainly set it as a goal, and I'll turn it over to my relief.

■

SPEECH AT THE INACTIVATION CEREMONY FOR USS RICHARD B. RUSSELL (SSN 687)

Remarks by RADM Arlington F. Campbell, USN
Mare Island Naval Shipyard
2 July 1993

Mrs. Talmadge, your presence with us today adds great dignity and grace to this ceremony; Mr. Robinson and Mr. Finn, great-nephews of Senator Russell, a special greeting to you as representatives of the Russell family; COMO Elliott, CAPT Cavener, CAPT Boyer, CAPT Brons, CAPT Stanley, distinguished guests, current and former crew members of USS RICHARD B. RUSSELL, ladies and gentlemen. It is my distinct honor, while at the same time my sad duty, to address you today as we witness the death rattle of a valiant and respected *Cold Warrior*.

As I begin it is only fitting that something be said about the namesake of this great ship, Senator Richard Brevard Russell of Winder, Georgia. During his long and distinguished career in the U.S. Senate, a career that spanned the years from 1933 until his death in 1971, he was nearly always to be found at the very center of power of that institution. He was the first senator to become the chairman of the Senate Armed Services Committee, a position currently held by another senator from Georgia, The Honorable Sam Nunn.

It was not only longevity and its attendant seniority that made Senator Russell such a force in the Senate; it was his leadership and behind the scenes work on policy and steering committees and what he himself referred to as *doing homework*. He served in the Navy for a brief period during World War I and had a real grasp of our nation's defense needs. During the 1930s, while serving on the Committee on Naval Affairs, he remarked that the United States "should go right ahead and build the biggest navy in the world". Historians in attendance will be able to put his position in its proper perspective.

During the 1950s he fought against the tide of change that demanded reducing our nation's defense. His argument centered on the fact that in 1918 and again in 1945 the United States had dismantled, and I quote, "the mightiest fighting machine ever known on earth, before it had been assured of peace". I trust that all of you can understand that statement in today's context.

Senator Russell favored negotiating, but negotiating "from strength rather than weakness". He said that the only way this country could avoid atomic warfare would be to stay "ahead of Russia in the matter of armed might".

Once when chided by Senator Milton Young of North Dakota about his southern democrat, pro-defense views he replied, quote "Milt, you'd be more military minded too if Sherman had crossed North Dakota".

Senator Russell once remarked that he would never live to see the end of the Cold War. As in most things he was right in this, also. But this ship, our *Cold Warrior*, that so proudly carried his name and his legacy of military preparedness, did live to see it. This ship not only saw it, but contributed mightily to its end. The Senator would have been pleased.

Our *Cold Warrior* is really an *Amazon Warrior*, if you will, because we who go down to the sea in ships traditionally refer to ships as if they were of the female gender. It is not without some thread of truth that submarines such as this one are thought to be the mistresses of their crew members, especially the mistresses of their Commanding Officers.

On more than one occasion, my own wife, Bonnie, refereed to the RUSSELL as my mistress and even professed some degree of jealousy at our relationship. She was right and we both knew it, but fortunately Bonnie was able to share my time, commitment and affection with what she considered a very worthwhile and interesting, as well as a very demanding mistress.

Since we often attach a less than positive connotation to the term mistress, let me draw the analogy of the men and their ship, particularly the CO and his ship a little further. Who among us has not, upon attending a Change of Command ceremony, been struck by how much it was like a wedding...combined with a divorce? The relieving Commanding Officer was very much like the bridegroom, eager in the anticipation of the wonderful relationship that he had sought so long and hard to achieve. The ship was his new bride and his love for her was real then, but would most assuredly grow during the years of marriage that lay ahead. The out-going CO, on the other hand, looked, acted and spoke like a devoted husband who was being divorced from the love of his life through no fault or desire of his own.

Now we must watch Steve Stanley participate in a ceremony that is even harder for him than that which his predecessors had

to endure. He must take part in a ceremony more like the funeral of a spouse rather than a divorce. We, the former COs of RUSSELL, share his grief and his loss, just as if she were ours; because in truth, none of us from Jack Brons to Steve have ever really left her or stopped loving her.

During my career in the Navy, I have been blessed with many great and wonderful commands, some of which I was even fortunate enough to have been their first *lover*; but when asked which was best, I, like most all who have been so blessed, have said with all sincerity that the first command was the best.

So today we are gathered to acknowledge the untimely passing of one that so many of us hold very dear. And we who have had the honor of being crew members of USS RICHARD B. RUSSELL (SSN 687) thank you for honoring this great lady with your presence.

The Cold War is over, so we are told. And it really is, but the need for this country to maintain the finest, most capable navy the world has ever known remains. Not withstanding this truth, however, we must reevaluate our missions, we must right-size our forces and we must live within the realities of our budgetary constraints. Some missions are not as vital as they once were, as they were when RUSSELL was commissioned in 1975, as the last of the 637 class. Surely they did *save the best for last*. This then accounts for her untimely passing after but 18 short years of commissioned service. She did not get to exhibit longevity as did her illustrious namesake, who at the time of his death had served in the U.S. Senate longer than any other.

While we mourn her passing, we must temper our grief with the knowledge that she led a full and productive life, one blessed with many significant accomplishments and much recognition. Just look at the commendations flying from her pigstick. Her life was one full of the satisfaction of being loved by many. Her passing today, while noted by us, will not be long remembered nor will any marble monument be built to her memory. But let us who care take heart in the words of Nathaniel Hawthorne who said that "the marble keeps merely a cold and sad memory of [one] who would else be forgotten. No[one] who needs a monument ever ought to have one". RUSSELL needs none!

While 18 years doesn't seem long, Gabriel Heater said it best when he stated that "mere longevity is a good thing for those who watch life from the sidelines. For those who play the game, an

hour may be a year, a single day's work an achievement for eternity". Theodore Roosevelt might have added that "no[one] is worth his salt who is not ready at all times to risk [their] well-being, to risk [their] body, to risk [their] life in a great cause". USS RICHARD B. RUSSELL did accomplish much in her short lifetime and she certainly was oft times in the most challenging of arenas fighting to retain our hard won freedoms. Her accomplishments will long live in the annals of *Cold Warrior* exploits and will be always with those who crewed her, even though details of many of those exploits must remain a closed book to most even today.

This ship was an unthinking, unfeeling conglomeration of steel and technology, the work of human hands and minds; she will not take note of her own passing. The life, that she had, coursed through veins of those who designed, built, maintained and especially those who crewed her. These are the true *Cold Warriors* whom we must pay tribute to today. The best tribute that I can give is just to say that each of them, each of you, did well. They and you accomplished assigned missions with style and grace. Our nation, indeed all nations who have sought our aid, comfort and leadership during the long Cold War, salute you and wish you continued success and happiness as you continue to contribute to the great work of maintaining freedom.

Just about one year ago, RADM Austin B. Scott, USN(Ret.), a wordsmith of the first order and former Commander, Submarine Force, U.S. Pacific Fleet, when speaking at a similar ceremony inactivating the Fleet Ballistic Missile submarine LEWIS AND CLARK (SSBN 644), said some things about submarines and submariners that bear repeating. Permit me to quote some of them.

> "Unfortunately, history will miss us. There will be no victory parade, neither will there be a wall with our names written on it. Few of us died in action, and for us to have told our story would have worked against our reliability and it would have violated the principle of reticence which we as submariners have always valued and respected."
>
> "No, we did not lay down our lives for our country, but we certainly laid down a portion of them, you and I. When there were more lucrative things we might have done,

things that would have kept us closer to our families, we chose instead to bring fine ships such as this to life and through doing so allowed our civilian leaders to count on us."

In other words, we did our part.

At the recent launching of the Arleigh Burke class Aegis destroyer, LABOON, named in honor of the great Navy submariner chaplain Father John "Jake" Laboon, our former Chief of Chaplains, Cardinal O'Connor stated that "I have never known a commander or a ship's company that wanted to do battle, to kill or destroy. I have known thousands who have spent their lives in deterring aggression, in preventing war. For all of this, as a churchman and as a citizen, I am grateful."

So let us, too, be grateful as we respectfully and thoughtfully mourn the passing of our great *Cold Warrior* mistress and move on to further service to our great country and its ideals. She and the Senator would have wanted it that way.

May God bless you and the United States of America. ■

STATUS OF SUBMARINE HISTORY BOOK

Rear Admiral Mike Rindskopf has completed the introductory sections of the book. Turner Publishing is proceeding with final design. The expected date for mailing the history books is December 1993/January 1994.

SUBMARINE BIBLIOGRAPHY
Part IV

by Dick Boyle

FICTION

Beach, Edward L., Cold is the Sea. New York: Holt, Rinehart and Winston, 1978. LC 77-18841/ISBN 0-03-03916-3

_____, Dust on the Sea. New York: Holt, Rinehart and Winston, 1972. LC 79-155503/ISBN 0-03-076390-8

_____, Run Silent, Run Deep. New York: Henry Holt, 1955. LC 55-6416

Buchheim, Lothar-Gunther, The Boat. New York: Alfred A. Knopf, 1975. LC 74-21314/ISBN 0-394-49105-X

Caidin, Martin, The Last Fathom. New York: Meredith Press, 1967. LC 67-18496

_____, Aquarius Mission. New York: Bantam, 1978. ISBN 0-553-11267-8

Chanukoff, Lon, Submarine Z-1. New York: The Citadel Press, 1960. LC 60-13932

Clancy, Tom, The Hunt for Red October. Annapolis: Naval Institute Press, 1984. LC 84-16569/ISBN 0-87021-285-0

Coulter, Stephen, Threshold. New York: William Morrow & Company, 1964. LC 64-20296

Davis, Bart, Atlantic Run. New York: Pocket Books, 1993. ISBN 0-671-76904-9

_____, Destroy the Kentucky. New York: Pocket Books, 1992. ISBN 0-761-69664-5

_____, Full Fathom Five. New York: Bantam, 1987. ISBN 0-553-26205-X

_____, Raise the Red Dawn. New York: Pocket Books, 1991. ISBN 0-671-69663-7

_____, Voyage of the Storm. New York: Pocket Books. To be reissued.

Delaney, Lawrence, The Triton Ultimatum. New York: Thomas Y. Crowell, 1977. LC 77-1290/ISBN 0-690-01490-2

Ehrlich, Max, Deep is the Blue. New York: Pocket Books, 1964

Ellsberg, Edward, Pig Boats. New York: Dodd, Mead, 1930

_____, Treasure Below. New York: Dodd, Mead, 1940

Finney, Jack, Assault on a Queen. New York: Dell Publishing, 1960

Fullerton, Alexander, The Waiting Game. New York: Ives Washburn, 1960. LC 62-18466

Gage, William, The Cruel Coast. New York: Signet, 1966. LC 66-26047

Gallery, Dan, The Brink. Garden City: Doubleday, 1968. LC 68-24835

George, Peter, Commander 1. New York: Delacorte Press, 1965. LC 64-24932

Gerson, Noel B., Neptune. New York: Dodd, Mead, 1976. ISBN 0-396-07325-5

_____, Warhead. New York: Doubleday, 1970. LC 78-103747

Good, James, Sub Wars. New York: Zebra Books, 1982

Grant, Edward, The Ultimate Weapon. New York: Pinnacle Books, 1976. ISBN 0-523-00832-5

Greenfield, Irving A., Barracuda. New York: Charter, 1978

Griffin, Gwyn, An Operational Necessity. New York: G.P. Putnam's Sons, 1967. LC 67-23127

Hardy, William M., U.S.S. Mudskipper. New York: Dodd, Mead, 1967. LC 677-12714

_____, Wolfpack. New York: Dell, 1960

Henrick, Richard P., Beneath the Silent Sea. New York: Zebra, 1988. ISBN 0-8217-2423-1 *[Ed. Note: All Henrick's books by Zebra except as noted.]*

_____, Counterforce. 1987. ISBN 0-8217-2013-9

_____, Cry of the Deep. 1989. ISBN 0-8217-2594-7

_____, Dive to Oblivion. 1993. ISBN 0-8217-4026-1

_____, Ecowar. New York: Harper, 1993. ISBN 0-06-100649-1

_____, Flight of the Condor. 1987. ISBN 0-8217-2139-9

_____, Sea Devil. 1990. ISBN 0-8217-3089-4

_____, Sea of Death. 1992. ISBN 0-8217-3742-2

_____, Silent Warriors. 1985. ISBN 0-8217-1675-1

_____, The Golden U-Boat. 1991. ISBN 0-8217-3386-9

_____, The Phoenix Odyssey. 1986. ISBN 0-8217-1789-8

_____, Under the Ice. 1989. ISBN 0-8217-2808-3

_____, When Duty Calls. 1988. ISBN 0-8217-2256-5

Herbert, Frank, Under Pressure. New York: Ballantine Books, 1956. ISBN 345-23835-4-125

Herst, Roger, Status ISQ. Garden City: Doubleday, 1979. LC 77-27707/ISBN 0-385-14242-0

Homewood, Harry, Final Harbor. New York: McGraw-Hill, 1980. LC 79-24174/ISBN 0-07-029694-4

_____, O God of Battles. New York: William Morrow, 1983. LC 82-24894/ISBN 0-688-01915-3

_____, Silent Sea. New York: McGraw-Hill, 1981. LC 80-27561/ISBN 0-07-029695-2

_____, Torpedo. New York: McGraw-Hill, 1982. LC 81-20689/ISBN 0-07-029698-7

Hudson, Alec, Rendezvous. New York: The Press of the Readers Club, 1938, 1939, 1940, 1941, 1942. Reprinted 1992 by U.S. Naval Institute as Up Periscope and Other Stories, with foreword by E.L. Beach.

Jackson, Basil, Rage Under the Arctic. New York: W.W. Norton, 1974. LC 73-8991/ISBN 0-393-08379-9

Jenkins, Geoffrey, Hunter-Killer. New York: G.P.Putnam's Sons, 1967. LC 67-15123

_____, A Twist of Sand. London: Fontana/Collins, 1959

Kobryn, A.P., Poseidon's Shadow. New York: Rawson, Wade, 1979. LC 78-72896/ISBN 0-89256-087-8

Lavallee, David, Event 1000. New York: Holt, Rinehart and Winston, 1971. LC 73-138881/ISBN 03-085969-7

Leasor, James, Code Name Nimrod. Boston: Houghton Mifflin, 1981. LC 80-26612/ISBN 0-395-30228-5

MacHardy, Charles, Send Down a Dove. New York: Coward-McCann, 1968. LC 68-23370

MacLean, Alistair, Ice Station Zebra. New York: Doubleday, 1963

Mars, Alastair, Arctic Submarine. London: Elek Books, 1955

Monroe, Stanley C. and Szilagye, Robert J., The Trident Tragedy. New York: Dell, 1983. ISBN 0-440-18769-9

Rascovich, Mark, The Bedford Incident. New York: Pocket Books, 1963

Rayner, D.A., The Enemy Below. New York: Pocket Books, 1957

Reeman, Douglas, Dive in the Sun. New York: Berkley, 1961

_____, His Majesty's U-Boat. New York: G.P. Putnam's Sons, 1973. LC 73-78604/SBN 399-11195-6

_____, Strike from the Sea. New York: William Morrow, 1978. LC 78-58389/ISBN 0-688-03319-9

_____, Surface with Daring. New York: Berkley, 1976. SBN 425-04006-2

_____, The Deep Silence. New York: Berkley, 1967. SBN 425-04025-9

Robertson, Morgan, Down to the Sea. New York: Harper & Brothers, 1905

Rohmer, Richard, Periscope Red. New York: Beaufort Books, 1980. ISBN 0-8253-0020-7

Scortia, Thomas N. and Robinson, Frank M., The Gold Crew. New York: Warner Books, 1980

Scott, Justin, The Normandie Triangle. New York: Arbor House, 1981. LC 81-67220-/ISBN 0-87795-346-5

Shute, Nevil, On the Beach. New York: Signet, 1957

Simpson, George E. and Burger, Neal R., Ghost Boat. New York: Dell, 1976

Stephens, Edward, Blow Negative!. New York: Dell, 1962

Taylor, Charles D., Silent Hunter. New York: Jove Books, 1987. ISBN 0-515-09814-0

Thomas, Craig, Sea Leopard. New York: Viking Press, 1981. LC 81-65277/ISBN 0-670-62622-8

Trew, Anthony, The Zhukov Briefing. New York: St. Martin's Press, 1975. LC 74-83584

Vorhies, John R., Pre-emnt. Chicago: Henry Regnery Company, 1967. LC 67-28491

Wheeler, Keith, The Last Mayday. New York: Doubleday, 1968. LC 68-22627

White, Bob, Up Periscope. New York: Scholastic Book Services, 1956

Wingate, John, The Sea Above Them. New York: St. Martin's Press, 1975. LC 75-24661

Wouk, Herman, The Winds of War. New York: Pocket Books, 1971. LC 72-161857/ISBN 0-671-46319-5

_____, War and Remembrance. Boston: Little, Brown, 1978. LC 78-17746/ISBN 0-316-95501-9

Zhdanov, Aleksandr I., Shadow of Peril. Garden City: Doubleday, 1963. LC 63-18033

■

ON PATROL FIFTY YEARS AGO

by Dr. Gary Weir

U.S.S SAILFISH - Report of Tenth War Patrol
Period from 17 November 1943 to 5 January 1944

[Ed. Note: LCDR R.E.M. Ward, USN relieved as Commanding Officer on 21 October 1943. He had previously served as Executive Officer of GURNARD. LCDR Ward received the Navy Cross for this patrol. He retired as a Rear Admiral. It may be recalled that SAILFISH was the ex-SQUALUS.]

NARRATIVE: 17 November 1943

1315 VW Departed Pearl Harbor.

25-29 November 1943

Heavy seas and winds with a continuous succession of storm centers.

30 November 1943

1500 L Hot run in No. 8 tube while checking torpedoes.

1730 L Lieutenant W.P. Murphy, Jr., U.S. Navy, went over the side in a very rough sea to inspect No. 8 tube and found the torpedo partially ejected. Expended this torpedo by firing with 375 lb. impulse pressure. No. 8 tube out of commission for remainder of patrol.

1-2 December 1943

Patrolling submerged across Wake, Marcus, Truk—Empire routes.

3 December 1943

1745 K Surfaced in typhoon weather. Tremendous seas, 40-50 knot wind, driving rain, and visibility, after twilight, varying from zero to 500 yards.

2348 K Radar contact bearing 114°T, range 9,500 yards. Commenced tracking.

2351 K Estimated target course 320°T, speed 18 knots.

2352 K Radar contact on another and smaller target just to right of and 900 yards closer than first contact.

2353 K Radar contact on a third target about same size as first contact and located 1,000 yards beyond the first contact.

2355 K Radar contact on a fourth target smaller than the other contacts and 900 yards closer than No. 2 contact.

2356 K Have still only managed to build up speed to twelve knots since initial contact. With these fast targets at close range, have abandoned any idea of a methodical approach. The seas are mountainous with a driving rain. Can't see a thing but blackness and water with the water mostly in my face.

2358 K Came left to 300°T to get off the track of the near target.

4 December 1943

0001 K Dove to 40 feet and came right to course 340°T for bow shot at biggest pip. We are 500 yards off track of near destroyer. All targets seem to be in line of bearing, roughly 280-100 degrees true with 900-1,000 yards between targets. Although initial radar contact was not made until a range of 9,500 yards the picture looks as though we are on the left flank of a fast group of men of war, consisting of a destroyer, then possibly a cruiser, then a carrier or battleship, then another carrier or battleship with possibly something beyond that. Selected nearest of the two largest pips as our target.

0009 K Near destroyer passing close aboard to starboard and ahead.

0012 K Fired tubes 1, 2, 3, and 4, by radar setup, range 2,100 yards. Times of hits indicate torpedoes one and four were the hitting torpedoes. Commenced swinging left to bring stern tubes to bear. Heard two torpedoes hit.

0016 K Two depth charges fairly close. Went deep and started crossing astern of target.

0017-0152 K Nineteen depth charges, none very close. Completed reload.

0158 K Surfaced and commenced running up target track to intercept possible cripple. Unable to make much speed without shipping black water.

0230 K Radar contact bearing 310°T, range 8,400 yards. Commenced tracking.

0240 K Tracking shows target to be circling. The pip is small, yet can't believe radar would pick up a destroyer at 8,400 yards tonight. Commenced easing in slowly. At times the pip has an edge on it giving a momentary indication of another target very close to the one we are tracking.

0550 K Morning twilight and visibility improving fast, rain has stopped, but bridge is still shipping water, targets tracking with speed varying from 1 to 3 knots, range 3,500 yards. With visibility improving so rapidly must fire soon, hence have decided to fire three bow tubes on the surface and then attack again in daylight by periscope, making reload during approach.

0552 K Fired tubes, 1, 2, and 3, range 3,200 yards.

0557 K Observed and heard two torpedo hits. First hit looked like a momentary puff of fire, second hit looked like and sounded (on the bridge) like a battleship firing a broadside—even with the locomotive rumble so characteristic of sixteen inch shells. Commenced swinging ship to bring stern tubes to bear in case target started going somewhere.

0558 K The Nips started celebrating by firing star shells and heavy AA tracers from at least a dozen guns located at the point of the torpedo explosions, but didn't seem to know where we were because the shooting was directed everyplace but towards us. It's a good show but despite the illumination I can't see the target.

0601 K Submerged. Commenced checking torpedoes and reloading.

0748 K Finally see something—aircraft carrier, range about 10,000 yards, dead in water. Nothing else in sight. Impatiently continuing check of torpedoes.

0912 K Momentarily sighted tops of a destroyer apparently standing by the carrier. The picture now indicates that we have a badly damaged carrier plus one destroyer. Depth control is extremely difficult due to mountainous seas. When we are at 60 feet there is nothing but green waves with the scope looking into or under a wave most of the time. At 55 feet we damn near broach and still can only see about twenty percent of the time. Am passing carrier down port side from aft forward, range about 1,500 yards. He has many planes on deck forward and enough people on deck aft to populate a fair size village. The number of people on deck indicates they are prepared to abandon ship—a reassuring picture.

0937 K Abeam of the carrier and still nothing else in sight. Came around for a straight stern shot.

0940 K Fired tubes, 5, 6, and 7. T.D.C. range 1,700 yards. All torpedoes heard running normal.

0942 K Two hits (time indicates 2,700 yard torpedo run) heard on sound and throughout the boat, followed by a very heavy swish on sound then by exceptionally loud breaking up noises heard not only on sound but also very clearly throughout the boat. Although I had the periscope up anticipating the pleasure of watching the hits, depth control was so lousy that we were at 60 feet when the torpedoes hit and all I could see when the scope was out of the waves was a skyfull of tracers being shot up into the air from the carrier's bearing. Ordered right full rudder and 70 feet to come around for bow shots. Can't figure how I made the range error. Have been using a carrier flight deck height of 60 feet on the stadimeter.

0951 K At 55 feet for a look. Nothing in sight on, or either side of, generated bearing. Made sweep to look for the destroyer and sighted a heavy cruiser of the TAKAO or NACHI Class. Bearing 290° relative, angle on the bow 40 starboard decreasing rapidly, making high speed, with his bow biting over the top of the waves, range 4,000 yards. Commenced swinging hard left to bring bow tubes to bear.

0952 K Angle on the bow 10 starboard and he is still swinging towards, range 3,300 yards. Between my surprise at having

underestimated the range to the carrier (2,700 yard torpedo run instead of 1,700), the fairly close depth charges from a destroyer I still hadn't been able to see, the surprise sighting of the cruiser racing our way with her forefoot showing over the waves, and the boat starting to broach with her left full rudder, I ordered 90 feet, and thus threw away the chance of a lifetime. The Monday morning quarterbacks can have a field day on this attack! To top it all off, I have personally criticized the sinking of the SORYU, where the towing cruiser could have been gotten first, then the carrier at leisure—yet, I didn't go up ahead of the carrier and make **absolutely** certain that this wasn't a similar set up. This cruiser was undoubtedly on the off bow of the carrier.

1330 K Periscope depth. A careful fifteen minute look at depths between 52 and 60 feet reveals nothing. If the cruiser (or carrier) were in the vicinity they would be seen. I am convinced the carrier has been sunk and the cruiser has gotten clear.

7 December 1943

1440 K Strafed and bombed (2 bombs) by ZEKE type fighter plane. This plane was not picked up on radar nor was he seen until he dove out of low hanging clouds with his wing machine guns chattering. Fortunately no one was injured but the second bomb which fell close aboard on the starboard side abreast the after machinery space lifted the deck gratings, knocked a secured heater six feet in the air, caused loss of main power for a minute during the dive, and in general was too damn close. As a result we have lost the use of #1 main motor due to a flash over and have a jack inserted on top the bonnet of the main motor circulating water suction sea valve to insure that the valve will not come off the hull flange should a depth charge shear the studs which were elongated by this bomb.

13 December 1943

1154 I Sighted light smoke bearing 282°T, distant about 30,000 yards and drawing to south. Commenced approach on normal approach course at six hour rate.

1333 I Sound picked up echo ranging in direction of target. This echo ranging assisted our tracking since someone in the target group conscientiously used echo ranging on 19.5 KCs for five

minutes every half hour.

1408 I With ten feet of periscope exposed sighted the tops of two sets of masts plus an additional set of black smoke puffs. This looks better but can't get to them submerged and we can't surface now because of their plane coverage. We are going to have to make a high speed end around and catch them tonight. They are tracking on a course of 170°T at a speed of 9 knots.

1747 I Surfaced and commenced chase at 16 knots while charging a very flat can (1140 gravity).

1917 I Radar contact on single small pip bearing 195°T, distant 20,000 yards.

1920 I We have plenty of time to get the picture down well before attacking so will cross over the westward (down moon) side and put around to his starboard bow. The moon is only one hour up and has been hidden by clouds but it is now beginning to break through making visibility variable from good to excellent.

2003 I At a range of 14,100 yards we can see two AKs.

2220 I Unfortunately two basic fundamentals (or rather the lack of them) marred this approach. First, the radar operator who is otherwise a superb technician and operator had practically no previous experience at convoy tracking—hence he has more often than not been on a different AK each time he was told to mark a range and bearing. Second, the T.D.C. operator and plotter who are both exceptionally good on single targets were not experienced in the problem presented by tracking multiple targets. Hence, the true picture of what the zig zag plan was did not materialize until the data was all rehashed on the following day. A P.P.I. could have been used very advantageously.

2222 I We are dead ahead, due south, of the convoy and on their track. Stopped and flooded down to reduce our silhouette, while offering tracking party opportunity to make very accurate check of speed solution.

2224 I At a range of 13,000 yards four ships are visible from the bridge, two AKs, one fair sized escort and one small escort.

2229 I Range 11,500. The picture is as follows — Two good sized AKs with the biggest on the west flank, one escort who looks as though he might be a large destroyer or 1,500 ton A/S vessel and a small escort who looks no larger than 700-800 tons, are steaming on a line of bearing 220°-040°. They are zigging with ship movements. The two escorts are working one on either flank moving up and down along their flanks covering area 1,500-2,000 yards between bow and beam of convoy. Distance between AKs 900-1,000 yards. Base course 185°T, speed 9 knots. The larger escort is on the east side.

2245 I Targets have been in sight since 14,000 yards and small escort since 11,500. Range is now 7,800. Submerged—45 ft.

2248 I Targets are visible in periscope, range 7,000 yards. Radar has picked this time to start going sour because of poor voltage regulation. We can continue without the radar for our speed dope is excellent.

2258 I At 50 feet using #1 periscope. Have swung right to course 320°. We are now on the track of the eastern escort with his angle on the bow zero and the expected left zig should put us in the ideal spot.

2302 I Targets zigged to their right instead of left. Their course now is 200°T, putting us on the port bow of the east AK. We cannot get between the AKs. However, our present relative position will be satisfactory for a 70 port track, zero gyro, if the east escort doesn't bother us.

2304 I Targets are going to overlap. The east escort will pass about 400 yards ahead of us. Can't resist the overlapped targets so selected point of aim as point of overlap of near ship on the far ship and ordered spread of four torpedoes for 500 foot target at 2000 yards.

2306-10 IFired four bow tubes with actual spreads of 0, 0, 2R, and 2L, tracks 67-70 port. T.D.C. range, 2,500 yards.

2307 I Swinging hard right to bring stern tubes to bear. Near escort (500-800 yards) turning this way.

2308 I Escort too close for comfort, went deep and commenced evasion.

2308-16 ITwo good solid hits, each followed by an explosion.

2310 I Two depth charges, heavy charges but not close. Escort is echo ranging on 19.5 KC.

2315 I Continuing characteristic breaking up noises of sinking target.

2359 I Escort is getting an echo on us. We are deep and running silently if our extremely noisy bow and stern planes, reduction gears, and rudder can be called silent.

14 December 1943

0125 I Surfaced and began to close attack point.

0220 I Can see one AK bearing 285°T and one smaller ship, probably the larger escort. Range 12,500 yards. From the bridge I believe the AK remaining afloat is the larger of the two AKs of the convoy.

0245 I Can now make out one stopped AK, the medium sized eastern escort plus four others about the same size as the convoy's western escort. Radar cannot pick up the nearest fellow who has a zero angle on the bow and is signalling at us. Range 6,000 yards.

0246 I Near patrol boat still signalling with a light near top of his foremast and we read it as KKK then AA AA AA. Can see no one astern of us so guess he's trying to tell us to join the party. Had half a notion to send for the blinker lamp.

0250 I Reversed course and opened out.

0251 I Have one fish remaining forward and three aft, plus one reload for #7 tube aft. Would like to go in and finish off the damaged AK but with twilight not too far off and with that mess milling around, prudence appears to be the better part of valor.

0515 I Submerged.

1120 I Sighted OTORI type destroyer bearing 330°T, distant 4,000 yards. He is making 23 knots on course 345°T which heads him for the scene of our attack.

21 December 1943

0240 I Set course to close entrance to BUNGO SUIDO.

0545 I Submerged to patrol OKINO SHIMA - SHIMANOURA line.

1020 I Sighted smoke bearing 300°T, distant about 10 miles. Commenced approach.

1040 I Sighted tops of four ships under the smoke. This looks like a jackpot and we've only five torpedoes—three aft and one forward, plus one reload for #7 tube aft.

1054 I Now have the complete picture. We have a convoy of six heavily loaded AKs with an escort of two CHIDORI DDs plus a light draft, stack aft, Maru type A/S vessel. The formation is made up of two columns of 3 AKs each, a CHIDORI Class DD on the outboard bow of each column and the patrol boat astern and to port. The AKs are all goal posters, probably none of them are less than 5,000 tons, but the fellow who really stands out in the crowd is middle ship of the southern column. There are several possible solutions to the problem of unloading all our fish on this beautiful convoy. Am tempted to fire one torpedo at each of three ships then reload aft while firing the single fish forward. Another solution is to fire two aft then one forward then two aft.

1112 I The CHIDORIs are keeping their same positions relative to the convoy columns and echo ranging but the trailing patrol boat is shifting from astern to the port quarter. The near CHIDORI will pass ahead but we are going to be almost on the track of the patrol boat (his angle on the bow 5° port).

1122 I Swung hard left to course 340° for stern shot. Have decided to use all three fish aft on the big fellow in the far column. He is worth it. Then will take what we can with the bow tube on the near column while we reload #7 aft.

1133 I With the near CHIDORI nicely clear of us and a big

wide gap between #1 and #2 in near column giving a clear shot between them at our target, fired a three torpedo salvo at the large AK (second ship in far column), torpedo run of 2,800 yards. Commenced swing hard left to bring bow tube to bear and started reloading #7.

1135 I Heard two good hits on target followed by the characteristic breaking up noises.

1136 I Lost depth control and started to broach with 5° up angle. Flooded negative. Ordered all idlers forward and opened flood and vent valves on variable tank manifold. Caught ourselves at 52 feet then started deep fast like a rock but regained control. Commenced evading the near CHIDORI whose screws are coming in fast.

1138 I Heavy depth charge—close.

1141 I Finally caught the boat at 327 feet with 10° up angle blowing auxiliary to sea. Eased up to 280 feet under the negative break in the temperature gradient.

1141-46 IFifteen depth charges in salvos of two and three.

1148 I Continuing loud noises of ship breaking up on bearing 168°T. This is my fifth attack and I still haven't been able to visually check the accuracy of our shooting.

1310 I Starting up for a look.

1325 I Here they come again. Two sets of screws, one coming in fast. Eased back down to 200 feet.

1550 I All clear on sound. Commenced running out to the southeast to take advantage of easterly current and get closer of firing area before dark.

1815 I Surfaced.

22 December 1943

0130 I Starboard steady bearing running hot (168°). Slowed and began forcing oil to the bearing while cooling it externally.

0330 I Steady bearing appears to be partially wiped. Our material condition is not bad but it isn't worth playing off BUNGO just to get two single torpedo salvos off.

5 January 1944

0630 VWMade rendezvous with PC 1081 and proceeded to moor Subase Pearl Harbor.

From: The Commander Submarine Force, Pacific Fleet
To: The Commander-in-Chief, United States Fleet
Via: The Commander-in-Chief, U.S. Pacific Fleet

Subject: U.S.S. SAILFISH (SS192) - Report of Tenth War Patrol (17 November 1943 to 5 January 1944)

1. The tenth war patrol of the SAILFISH was the first for the new Commanding Officer, as such. The patrol was conducted in an area south of the Empire.

2. This patrol can be considered one of the outstanding patrols of the war, primarily because of the most aggressive and tenacious attack made on the large aircraft carrier the night and following day of 3-4 December. In spite of typhoon weather and the inability to see the target, the SAILFISH made two separate attacks at night which resulted in two hits out of four torpedoes fired in each case and which succeeded in stopping the carrier. The following morning the SAILFISH conducted a submerged approach and fired the final four torpedoes of which two were successful in making the kill. These brilliant attacks were driven home in spite of the destroyers and cruiser escort. This is the first known unassisted sinking of any enemy carrier by a submarine of this force. In addition to the above attacks, the SAILFISH conducted two other aggressive and successful attacks resulting in sinkings of enemy ships. It is of note that most of the patrol was made even though the SAILFISH had suffered material damage from an unexpected severe enemy bombing.

C.A. Lockwood, Jr.

■

REQUEST FOR TDC INFORMATION

July 26, 1993

I am involved with Russell Booth, the manager of the USS PAMPANITO, a submarine museum on the San Francisco waterfront, in the preservation and study of the Torpedo Data Computer (TDC) system, the mechanical analog fire control computer which was installed in the conning tower of all fleet submarines used in World War II.

We are writing this open letter to make your members aware of this project, and to open a dialog with anyone interested in this subject. You or your membership may have material which should be copied and added to our research on the TDC. We also desire any available information about the ARMA Corporation, Brooklyn, NY, the contractor who designed and built all American WWII TDCs.

Our research has three goals; the development of museum display panels explaining the fleet submarine fire control problem to the general public, collecting information about the American TDC, similar machines developed by other countries, and ARMA for a book, and the restoration and reactivating of the TDC in PAMPANITO. We have made significant progress on all fronts.

We have already developed a prototype museum display, complete with graphics, on paper. We have targeted the display at the general public, to inform them on how the submarine fire control problem really was solved. There are many torpedoes currently on display, but no explanation of the system behind the successful calculations required for targeting.

We have collected copies of documents on each component of the typical fleet boat TDC fire control system. We wish to collect operational information, histories, and first hand accounts of using the fleet submarine system. We have not found any consolidated source of information on the TDC and believe this to be an area of history which has not been well documented.

We have collected some comparative information about parallel systems used by Japan and Germany, and would like to find more. From the data collected so far we think it is fair to say that the American fleet submarine system is more advanced than the others

installed in submarines used during the war. We think that the fire control system is central to the reason the submersible boats were built, and that the fleet submarine delivery of torpedoes using the TDC was both accurate and efficient.

We are well on our way to restoring PAMPANITO's fire control system back to operating condition. The TDC's ability to track the target, solve the problem, and then update the solution in the torpedoes in real time is remarkable. This is especially true when considering that the calculus of curved shots was solved in this mechanical device before digital computers were even invented. We wish to operate the entire system so its error can be measured against a computer model we have developed. By measuring the operational error of the system, a better picture of the system's advantages and disadvantages can be developed.

We are interested in having this letter published so we can gather any opinions, comments, or suggestions which could make our project more successful.

Sincerely,
Terry Lindell
23415 100 W
Edmonds, WA 98020
(206) 542-0661
(206) 542-8396 (FAX)
■

TO THE FRIENDS OF ROY S. BENSON

August 3, 1993

On behalf of my father, I am writing to inform you of Roy's status and new address.

For the past year and a half, we have employed live-in nurse aides to enable Roy to continue living in his apartment at the Gingercove Life Care complex. While his mental and physical health continues to decline, he was able to maintain a peaceful yet active life style.

On June 30, 1993 it was necessary to move Roy into the Health Center (nursing home section) at Gingercove. Roy's main affliction is the continuing onset of senile dementia of the Alzheimer's type. Most of what he says and most of what is said to him is not comprehended. Of course this is a real shame since we all

have fond memories of him when he had his full mental faculties.

The Gingercove staff is outstanding. They are doing a superb job of caring for Roy and helping him deal with the challenges of his new home. There are many activities suited for Roy which include his saxophone teacher still coming regularly to play with and for him. One staff aide was born in Sweden and maintains an active Swedish interchange with Roy.

Roy has had some problems adjusting to the nursing home environment, primarily related to his inability to communicate. He also feels isolated.

Thus, I would like to solicit your help. Please send Roy a card or note to say "Hi". Please remember that Roy can no longer read or write and a staff member will read whatever you send (simpler, the better). Roy comprehends pictures and visual signs. Thus, it would be ideal if you could send a picture of yourself (past or current), so that he might understand who is sending him the note or card.

Thank you so much for your help. I hope this letter finds you healthy and happy.

Rick Connole
Address for Cards:
RADM Roy S. Benson
Gingercove Health Center
400 River Crescent Drive
Annapolis, MD 21401

■

NAVY ELF SUBMARINE COMMUNICATION SYSTEM

September 2, 1993

The Honorable Sam Nunn, Chairman
Armed Services Committee
U.S. Senate
Washington, DC 29510

Dear Sen. Nunn:

Two July articles in the Milwaukee Sentinel quote freshman Sen. Feingold as saying the ELF system is a relic of the Cold War and that he has written to both you and Sen. Inouye requesting its

termination. I believe such action would be foolish and that, without having sought the facts of the issue, he is reflecting the false claims of that small group of anti-military dissidents in Wisconsin who so hoodwinked Sen. Nelson that he singlehandedly delayed the program in the '60s and '70s. It was their antics too that paralyzed Pres. Carter's decision-making process so that he first scaled the program down and then let it languish for the remainder of his term.

I feel qualified to offer these comments since I was associated in various civilian contractor capacities with ELF from its outgrowth from the 1959 PANGLOSS Navy contract at RCA Labs in Princeton to its implementation by GTE's Communications Systems Division in the mid '80s. I retired from GTE in 1987 with the title ELF System Program Manager. I now have no affiliation with the Navy or GTE and am a spokesman for neither. I do hold the conviction that the ELF system enhanced the safety of our submarines then and still does in today's hostile global arena, and that it contributed in its small way to the demise of the USSR by helping (along with many other factors) to convince its leaders that they could never defeat us and so gave up.

In the years before retiring, I spent untold time in Wisconsin and Michigan as well, and grew to know very well the public issues and the delaying tactics employed by the bizarre group opposed to ELF. Although their numbers were small (much smaller than the veterans organizations, for instance, who supported the program without exception), I'll concede they were well organized, loud and flamboyant and therefore newsworthy, but they did not represent the view of the majority composed of rock-solid, patriotic, quiet citizens which the news media ignore.

I observed that it was not uncommon for the anti-ELF hard core to dupe religious and legitimate environmental organizations into opposing the program. I believe that is what has now happened with Sen. Feingold; his newspaper quotations reflect as much. I plan to suggest in a letter to him soon that he learn the facts of this matter by requesting a tour of submarine facilities and discussions with experienced submariners. Until he becomes educated in submarine operations, his ELF statements are invalid.

The purpose of this letter (and others to Sen. Inouye and my own Sen. Thurmond) now as Congress reconvenes, is to assure you that Sen. Feingold's public statements do not represent the majority viewpoint on this important issue and to urge you to

reject his bill by authorizing the modest FY94 funds requested for the program. Certainly you know, and the Navy witnesses at your committee hearings will confirm, that ELF now enhances all classes of submarine operations, not only the SSBN forces for which it was conceived. My concern is that an amendment to an unrelated bill may be offered as Sen. Feingold has intimated, and survive in the last minute rush to pass the authorization or appropriation bills. I further urge you to guard against that ploy.

I will close on a broader, personal note by telling you that I admire the professional way you chair your committee. I breathe a little easier knowing that our defense interests are in the hands of such stalwarts as you and Sens. Thurmond and Warner. I am fearful of those who seek a further *peace dividend* from the DoD budget to finance their own political agenda. I am not going to feel comfortable with one penny less for defense than your committee recommends until the dismantling of all those former Soviet warheads is confirmed; until Russia and the major Soviet republics stabilize; until we know more about ex-Soviet subs in Iranian hands; until peace comes to the Middle East and the terrorists are contained; until the North Korean and Pakistani nuclear programs are eliminated; until Iraq's Saddam is deposed and a sane government takes control; nor until the Somali and Bosnian situations are resolved. There is likely to be a role for our Submarine Forces as we confront each of those issues.

Of course we don't need as large a military establishment as we had during the Cold War. For that reason I regretfully concede the phaseout of the Charleston Navy complex. But, please let us not again get in the pants-down posture we found ourselves in when WWII broke out. Thank God we at least had the nucleus of a first rate Submarine Force on line then. That's a lesson that needs to be remembered lest we not always be that fortunate.

Very sincerely yours,
George V. Bradshaw
409 Long Reach Dr.
Salem, SC 29676

■

IN THE NEWS

A Submariner of Note

- The New York Times, August 22, 1993

"Robert R. Williams, the commander of the submarine that rescued George Bush when the Japanese shot down his bomber in World War II, died Thursday at a hospital in Bethesda, Md. He was 82 and lived in Rockville, Md.

The cause was pneumonia as a complication of emphysema, his family said.

Captain Williams, a career officer in the Navy, retired in 1960 with decorations that included a Silver Star and a commendation from the National Research Council.

His rescue of Mr. Bush, the future President and Commander in Chief, occurred a few minutes before noon on Sept. 2, 1944, in the Pacific Ocean off the Bonin Island, a few hundred miles south of Tokyo.

Mr. Bush, then a lieutenant junior grade, was flying an Avenger torpedo plane from the carrier SAN JACINTO in a bombing raid on a radio station on Chichi Jima Island. After ground fire struck his plane, Lieutenant Bush bailed out just before it crashed. About 10 miles away, the submarine FINBACK was on patrol. On receiving a message about the crash, Captain Williams ordered the FINBACK to the scene, where Lieutenant Bush was rescued from his emergency raft. The plane's two other crew members died in the mission.

When Mr. Bush became Vice President, he renewed contact with Captain Williams by writing to him, said Captain William's wife, Rose. Mr. Bush also invited the Williamses to the 40th anniversary celebration of the rescue and to his inauguration as President, but Captain Williams' illness prevented him from attending.

Bottom-Up Review

- Navy News & Undersea Technology, September 6, 1993

"The fight for survival between Electric Boat and Newport News has two winners.

The long-awaited Bottom-Up Review (BUR), made public last Wednesday, put a heavy emphasis on the industrial base issue.

The working group dealing with nuclear shipbuilding issues recommended the Navy buy a third SEAWOLF (SSN 21) attack submarine from Electric Boat in Groton, Conn.

The review also told the Navy to develop and build a new attack submarine (NAS). While the review did not specify who would build the NAS, the BUR briefings indicated EB had the inside track on the lead ship of the new class.

In explaining the BUR results last week, Defense Secretary Les Aspin said that "at the core of the problem is the industrial base problem. What would happen [to the submarine shipyards and their subcontractors] during the time we don't build submarines?"

"We preferred to bridge the gap" that occurs between now and the time a new submarine is actually needed, Aspin said. The third SEAWOLF is that bridge.

- Inside the Navy, September 6, 1993

"A Cold War icon has found itself with an expanded mission as a result of a reduced carrier base, Secretary of Defense Les Aspin said at a Sept. 1 press conference detailing the bottom-up review. Aspin justified the Pentagon's bottom-up review decision to keep the size of the attack submarine fleet to between 45 and 55 submarines and the size of the Trident ballistic missile submarine fleet to 18, stating that the role of submarines has become more important, with the submarines filling strategic gaps made by a smaller carrier force.

"There are a number of different ways of using submarines beyond the traditional uses which are going to be looked at," Aspin said.

The Navy has already made some changes to submarine operations. "If you were to go aboard a sub in the [Persian] Gulf you would find it operating so differently you would be able to greatly distinguish its operations from a year ago," a senior Navy official said. "You would find it operating in water of 100-120 feet, its periscope up most of the time linked with the carrier battle group. You would find it working for the minelayers in a region of third world contingencies."

As for the Trident submarines, Aspin said the numbers were driven by the START treaties, which require that the United States and the states of the former Soviet Union keep their missile levels at certain fixed numbers. "When we finish this bottom-up review, the presentation of it and getting it incorporated in the next rounds

of POMs [the services' program objective reviews], we will go back and look at the strategic forces," Aspin said."

Trident

- Inside the Pentagon, July 15, 1993

"The House Armed Services readiness subcommittee is recommending that the Navy cut in half the operating tempo of its strategic submarines, indicating that lawmakers are encouraging further reductions in U.S. strategic forces.

In its June 23 markup of the FY-94 defense budget, the subcommittee cut $100 million from the Navy's operations and maintenance budget for strategic submarines, according to congressional sources. The subcommittee recommended that the Navy absorb the cut either by moving from double crewing to single crewing of its strategic submarines or by simply keeping the boats in port for longer periods of time. The Navy is fighting the proposal, saying that Congress should not take action until the service completes its own study of single crewing, which is to be completed this fall.

A drawback of single crewing is that it would reduce by one-half the number of U.S. strategic missile warheads deployed at sea. Current plans under the U.S.-Russian Strategic Arms Reduction Talks (START II) Treaty call for a Navy fleet of 1,728 warheads—18 boats carrying 24 missiles with four warheads each. With single-crewed SSBNs, the Navy could deploy continuously only six boats with 576 warheads."

- Defense Week, August 2, 1993

"Rep. Tim Penny's (D-Minn.) plan to kill the Trident D-5 submarine-launched ballistic missile met a formidable opponent last week: President Clinton.

Penny, Senate defense appropriations subcommittee Democratic members Dale Bumpers (Ark.) and Jim Sasser (Tenn.), and Rep. Lynn Woolsey (Calif.) wrote to Clinton on July 9 asking for his comments on ending D-5 procurement after fiscal 1993.

"Your suggestion that we equip fewer D-5 missiles with more warheads and 'detube' our Tridents would open a Pandora's box in terms of proposals by our START partners for relief from other treaty dismantlement requirements they find onerous," wrote the president.

"For this and other reasons which Secretary [Les] Aspin has enunciated in a recent letter to the congressional defense committee, I am opposed to any proposal to terminate D-5 production after FY 1993." The letter is signed "Bill.""

- Navy Times, August 30, 1993

"WASHINGTON —Congress is moving toward a heated debate focusing on the Navy's Trident II nuclear missile, a program that President Clinton is fighting to save from congressional budget-cutters.

Although the administration and the Navy fought off initial attempts in both Senate and House Armed Services committees to end production of the missile, Penny's argument is likely to gain support from members of Congress during debate in September over the two versions of the 1994 defense authorization bill, said Carol Lessure, an analyst with the Defense Budget Project."

- Inside the Navy, September 13, 1993

"The Defense Department comptroller plans to appeal a provision in the House version of the FY-94 defense authorization bill that would prohibit the Navy from modifying any Trident I submarines to deploy the D-5 missile, according to Defense Department sources. This would keep the Navy's future Trident force to at least 10 D-5 capable submarines.

According to the sources, in a package of appeals to the House and Senate authorization conferees—dubbed the "heartburn letter—the comptroller maintains that some of the alternative strategic force structures under consideration would involve backfitting some or all of the eight Trident submarines that now carry the C-4 missile with the D-5 missile."

SEAWOLF

- Navy News & Undersea Technology, July 26, 1993

"The second ship of the SEAWOLF submarine class—the CONNECTICUT—has suffered an 18-month delay in its estimated delivery date, according to Navy documents.

The Naval Sea Systems Command's Quarterly Progress Report for Shipbuilding and Conversion in January indicated the CONNECTICUT was scheduled for delivery on June 1, 1997. The command's April report says delivery will be Dec. 18, 1998.

The 18-month slip in the delivery date is longer than the 12-month slip experienced during construction of the first ship, following discovery of cracks in the welds of the HY 100 steel used to build the pressure hull. The SEAWOLF and sister ship CONNECTICUT will be the first American submarines with hulls built entirely of HY 100 steel."

- Defense Week, August 9, 1993

"In new evidence that cost and schedule problems continue to haunt the SSN-21 SEAWOLF, congressional investigators have concluded that since December 1991 lead ship delivery has slipped five months and costs have jumped another $92 million.

The five-month delay is on top of previous year-long delays in the program, said the General Accounting Office (GAO), in a still unreleased Aug. 4 report obtained by Defense Week.

The delay means that General Dynamics Corp.'s Electric Boat division might fail to meet a May 1996 deliver date.

The Connecticut-based shipbuilder currently is assembling two SEAWOLFs. The Virginia-based Newport New Shipbuilding is designing the submarine. The GAO study focussed primarily on problems with the lead ship design and construction.

The GAO also noted that "an incompatibility between the design and construction schedules has the potential to further delay the SSN-21's delivery.""

World News

- Daily News (Halifax, N.S.), March 22, 1993

"An absence of Soviet nuclear submarines in the Eastern Atlantic has given Canada's small submarine fleet time to seek out other intruders—U.S. scallop fishing boats.

HMCS Ojibwa recently returned to Halifax from a patrol of Georges Bank where rogue New England fishermen are encroaching on the rich Canadian scallop fishing grounds south of Nova Scotia.

"We went out to the Hague line with a fisheries officer on board, in what was the first of what will probably be a series of patrols using submarines," says Navy spokesman Lt. Cmdr. Jeff Agnew.

Twelve U.S. boats were found near the line, and three New England crews were surprised to see a submarine surface beside

them.

"The Americans were warned off the line," says Agnew."

- Defense News, August 16-22, 1993

"SEOUL, South Korea — The launching of South Korea's third conventional submarine is a key step in that nation's effort to upgrade its antisubmarine warfare capability, said South Korean President Kim Young-Sam.

South Korea plans to launch six Type 209-class conventional submarines. Five of the submarines will be build by Daewoo Shipbuilding and Heavy Machinery Ltd. here, using designs supplied by Howaldtswerke-Deutsche Werft AG (HDW), Kiel, Germany. The sixth submarine will be build by HDW.

The medium-sized diesel submarine costs about $190 million, is 56 meters long, 6.2 meters wide and 5.5 meters high. The submarine was christened the Choemuson-Ham after a ranking 14th century official in the Koryo Dynasty who led Korea's efforts to repel Japanese pirates."

- The New York Times, August 20, 1993

"PARIS, Aug. 19 — A French nuclear submarine has collided with a supertanker off the south coast of France, tearing a hole in the tanker's hull and causing oil to spill into the Mediterranean, officials said today.

A spokesman for the French Navy said the accident occurred on Tuesday night while the submarine was surfacing and that it had failed to detect the enormous vessel overhead. He said the navy sub, the RUBIS, which normally carries missiles and torpedoes, had damaged its nose but suffered no nuclear leakage."

- Defense News, August 30-September 5, 1993

"Two U.S. Navy attack submarines are hunting for mines along the coastline of former Yugoslavia in anticipation of the deployment of up to 50,000 NATO forces, Navy sources said Aug. 27.

The submarines are focusing their efforts on the port city of Split along the Adriatic coast, the most likely entry point for U.S. Marines and a subsequent supply base for U.S. military forces, Navy sources said."

■

NAVAL SUBMARINE LEAGUE
HONOR ROLL

BENEFACTORS FOR MORE THAN TEN YEARS

ALLIED-SIGNAL AEROSPACE COMPANY
AMERICAN SYSTEMS CORPORATION
ARGOSYSTEMS, INC.
BOOZ-ALLEN & HAMILTON, INC.
GNB INDUSTRIAL BATTERY COMPANY
LORAL DEFENSE SYSTEMS - AKRON
NEWPORT NEWS SHIPBUILDING
PRC, INC.
PRESEARCH INCORPORATED
ROCKWELL INTERNATIONAL CORPORATION
SIPPICAN, INC.
TREADWELL CORPORATION
WESTINGHOUSE ELECTRIC CORPORATION

BENEFACTORS FOR MORE THAN FIVE YEARS

ALLIANT TECHSYSTEMS INC.
ANALYSIS & TECHNOLOGY, INC.
APPLIED MATHEMATICS, INC.
AT&T
ATLANTIC RESEARCH CORPORATION, DEFENSE SYSTEMS DIV.
BABCOCK AND WILCOX COMPANY
BATTELLE MEMORIAL INSTITUTE
BIRD-JOHNSON COMPANY
CAE-LINK CORPORATION
COMPUTER SCIENCES CORPORATION
DATATAPE, INC.
DIAGNOSTIC/RETRIEVAL SYSTEMS, INC.
EDO CORPORATION
EG&G, WASHINGTON ANALYTICAL SERVICES CENTER, INC.
ELIZABETH S. HOOPER FOUNDATION
GTE GOVERNMENT SYSTEMS CORPORATION
GENERAL DYNAMICS/ELECTRIC BOAT DIVISION
GENERAL DYNAMICS/UNDERSEA WARFARE
GENERAL ELECTRIC N&MS
GLOBAL ASSOCIATES, LTD.
HAZELTINE CORPORATION
HUGHES AIRCRAFT COMPANY
IBM CORPORATION, FEDERAL SYSTEMS DIVISION
KAMAN DIVERSIFIED TECHNOLOGIES CORPORATION
KPMG PEAT MARWICK
KOLLMORGEN CORPORATION, E-O DIVISION
LIBRASCOPE CORPORATION
LOCKHEED CORPORATION
LOCKHEED SANDERS INC.
LORAL CONTROL SYSTEMS
MARTIN MARIETTA AERO & NAVAL SYSTEMS
MARTIN MARIETTA CORPORATION, BETHESDA, MARYLAND

MARTIN MARIETTA OCEAN, RADAR & SENSOR SYSTEMS
PACIFIC FLEET SUBMARINE MEMORIAL ASSOCIATION
PLANNING SYSTEMS INCORPORATED
PURVIS SYSTEMS, INC.
RAYTHEON COMPANY, SUBMARINE SIGNAL DIVISION
SAIC
SCIENTIFIC ATLANTA, SIGNAL PROCESSSING SYSTEM
SEAKAY MANAGEMENT CORPORATION
SIGNAL CORPORATION
SPERRY MARINE, INC.
STONE AND WEBSTER ENGINEERING CORPORATION
SYSCON CORPORATION
SYSTEMS PLANNING & ANALYSIS, INC.
TASC, THE ANALYTIC SCIENCES CORPORATION
TECHNAUTICS CORPORATION
UNIFIED INDUSTRIES, INCORPORATED
VITRO CORPORATION

ADDITIONAL BENEFACTORS

ADI TECHNOLOGY CORPORATION
AMADIS, INC
ARETE' ASSOCIATES
CORTANA CORPORATION
DYNAMICS RESEARCH CORPORATION
ELS INC.
ESL INCORPORATED
FOSTER-MILLER, INC.
GARVEY PRECISION MACHINE, INC.
HYDROACOUSTICS, INC.
INTEGRATED SYSTEMS ANALYSTS, INC.
MAROTTA SCIENTIFIC CONTROLS, INC.
MCQ ASSOCIATES, INC.
PRECISION COMPONENTS CORPORATION
RADIX SYSTEMS, INC.
RICHARD S. CARSON AND ASSOCIATES, INC.
RIX INDUSTRIES
SARGENT CONTROLS
SONALYSTS, INC.
VEHICLE CONTROL TECHNOLOGIES, INC.

CHRISTMAS is COMING!

We can help you solve a gift problem.

NAVAL SUBMARINE LEAGUE

GIFT MEMBERSHIPS

NSL memberships cost less than most other valued gifts. Our rates are reasonable, so you can give NSL memberships to those special people you want to remember, but are sometimes hard to buy for. Perhaps your in-laws, or someone else who would be interested in the fascinating world of submarines and submarining.

Saves you time!

No crowds, no hurried decisions or poor selections. Ordering a gift membership takes only a minute!

Are always appreciated!

This is an excellent way to support our League and solve a gift problem, whether it be a holiday, birthday, or some special occasion that calls for a gift. NSL membership offers something for everyone. The positive feedback from our recipients, especially our civilian friends, has been terrific. Please consider this choice.

Just mark "gift" on the application in the back of this book. We will forward a gift announcement in your name.

* * * * * * * * * * *

REUNIONS

USS CLAMAGORE (SS 343) - Oct 21-24 '93, Charleston, SC. Contact:
Walt Simpson
20 Ledgewood Drive
Gales Ferry, CT 06335
(203) 464-6512

USS HUNLEY (AS 31) - Planning for 1994. Contact:
JO2 Marke Spahr
USS Hunley (AS 31)
Public Affairs Office
FPO AE 09559-2580
(804) 444-3336 X7592
DSN 564-3336

USS VON STEUBEN (SSBN 632) - Feb/Mar '94, Charleston, SC. Contact:
George Scharf
2131 Elm Village Drive
Summerville, SC 29483
(803) 873-3318

USS MACKEREL (SST-1), USS MARLIN (SST-2), USS BARRACUDA (SST-3), SQD 12 STAFF (Key West) - Oct 27-30 '94, Cocoa Beach, FL. Contact:
Paul Banks
Box 183
Horse Shoe, NC 28742
(704) 891-3598

MEMBERSHIP APPLICATION

Individual Membership Rates:

Regular (including Retired Military)

- ☐ 1 year $25.00
- ☐ 3 year $68.00

Active Duty, students, and naval Reserve Active Status (Drilling)

- ☐ 1 year $15.00
- ☐ 3 year $41.00

Life Membership Rates: (ALL)

- ☐ 34 years and under $585.00
- ☐ 35-50 years old $475.00
- ☐ 51-65 years old $320.00
- ☐ 66 years and older $175.00

Corporate Membership

1 - 50 employees	$ 400.00
51 - 100 employees	$ 800.00
100 - 500 employees	$1,200.00
over 500 employees	$1,600.00

Donor/Corporate Contribution

(in addition to dues)

- ☐ Patron $1,000.00
- ☐ Sponsor $ 500.00
- ☐ Skipper $ 100.00
- ☐ Advisor $ 50.00
- ☐ Associate $_____

Persons residing outside the U.S. please remit an additional $15.00 per year for mailing costs

The Naval Submarine League is a tax-exempt, Virginia not for profit corporation.
Two-thirds of Memberships Dues and 100% of donations are tax deductible

NAVAL SUBMARINE LEAGUE
P.O. Box 1146
Annandale, VA 22003
(703) 256-0891

MEMBERSHIP APPLICATION

Date _____

I hereby apply for membership in THE NAVAL SUBMARINE LEAGUE. I certify that I am a citizen of the United States or a citizen of an allied country _____

_____
Signature

Name _____
Rank, Service, if applicable

Address _____

_____

Phone (Business) _____ (Home) _____

Employer and Address _____

_____

_____

Position/Title _____

I was introduced to the Naval Submarine League by _____

ENCLOSED MONIES

☐ _____ Membership Dues

☐ _____ Donation

See Reverse Side for Rates

Your membership will bring you ....

- The Submarine Review
- Avenue to keep current on submarine issues
- Ability to contribute to public awareness of submarine capabilities
- Association with a dedicated group of people
- Invitation to Annual Meeting
- Forum for Exchange of thought on submarine matters

MEMBERSHIP APPLICATION

Individual Membership Rates:

Regular (including Retired Military)

- ☐ 1 year $25.00
- ☐ 3 year $68.00

Active Duty, students, and naval Reserve Active Status (Drilling)

- ☐ 1 year $15.00
- ☐ 3 year $41.00

Life Membership Rates: (ALL)

- ☐ 34 years and under $585.00
- ☐ 35-50 years old $475.00
- ☐ 51-65 years old $320.00
- ☐ 66 years and older $175.00

Corporate Membership

1 - 50 employees	$ 400.00
51 - 100 employees	$ 800.00
100 - 500 employees	$1,200.00
over 500 employees	$1,600.00

Donor/Corporate Contribution

(in addition to dues)

- ☐ Patron $1,000.00
- ☐ Sponsor $ 500.00
- ☐ Skipper $ 100.00
- ☐ Advisor $ 50.00
- ☐ Associate $_____

Persons residing outside the U.S. please remit an additional $15.00 per year for mailing costs

The Naval Submarine League is a tax-exempt, Virginia not for profit corporation.
Two-thirds of Membership Dues and 100% of donations are tax deductible

NAVAL SUBMARINE LEAGUE
P.O. Box 1146
Annandale, VA 22003
(703) 256-0891

MEMBERSHIP APPLICATION

Date _____

I hereby apply for membership in THE NAVAL SUBMARINE LEAGUE. I certify that I am a citizen of the United States or a citizen of an allied country _____

_____
Signature

Name _____
Rank, Service, if applicable

Address _____

_____

Phone (Business) _____ (Home) _____

Employer and Address _____

_____

_____

Position/Title _____

I was introduced to the Naval Submarine League by _____

ENCLOSED MONIES

☐ _____ Membership Dues

☐ _____ Donation

See Reverse Side for Rates

Your membership will bring you ....

- The Submarine Review
- Avenue to keep current on submarine issues
- Ability to contribute to public awareness of submarine capabilities
- Association with a dedicated group of people
- Invitation to Annual Meeting
- Forum for Exchange of thought on submarine matters

Entering Littoral Waters With Greater Confidence

"From the Sea" articulates a shift in the Navy's priorities from open ocean global conflict to regional contingencies in littoral waters. The AN/BQG-5 Wide Aperture Array (WAA) enhances the submarine's posture in support of the Navy's changing missions. The technology is mature and the system is in production, currently being installed on USS Augusta (SSN-710).

By providing significantly improved performance against a diesel submarine threat in littoral waters, offering greater acoustic advantage, better targeting solutions, quicker reaction times, and superior high speed performance, AN/BQG-5 will enhance submarine survivability.

With decreasing submarine force numbers and a change in the Navy's focus, AN/BQG-5 is the right investment at the right time.

MARTIN MARIETTA

MARTIN MARIETTA
OCEAN, RADAR & SENSOR SYSTEMS
Syracuse, New York

NAVAL SUBMARINE LEAGUE
P. O. Box 1146
Annandale, Virginia 22003