THE SUBMARINE REVIEW OCTOBER 1992

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EDITOR'S COMMENTS

T n his talk to the League's Symposium in June, Vice Admiral Roger Bacon, the Assistant CNO for Undersea Warfare, stressed two points. The first was the multi-mission nature of our submarines, both in the past for which he cited a number of specific employments from the '73 Yom Kippur War to the recent Desert Shield/Storm, and in the future for which he put concise substance to a description of the roles that submarines will play. His second point was about the substance with which the submarine community is looking to that future. For that he cited action by a convocation of 40 Submarine Flag Officers to draft a Vision Statement laying out the Force's purpose and objectives so that all concerned with national security can see how submariners relate themselves to the future. Admiral Bacon also stated that over 100 initiatives have been identified for action "to ensure the Submarine Force remains a preeminent force in the dramatically changed world of today."

Those same two points characterize the contents of this issue of THE SUBMARINE REVIEW: there is a lot that we can do so we have to be very clear in stating capabilities; and we are taking action to address our problems.

Admiral Bruce DeMars, in his symposium address printed as this issue's lead, cited the remarkable evolution of the submarine as the precursor for the tough job of getting "the public, Congress, scholars, and other military communities" involved in the possibilities of submarines. Vice Admiral Hank Chiles proceeded from that general statement of place and purpose to a description of specific actions being carried out in the Force to implement and illustrate the capabilities needed for the future.

Admiral DeMars also said that we have to stop talking in jargon in order to think clearly ourselves and to get others involved. In coming to grips with the new regional strategy, it seems that not many have a good understanding of the submarine's place in *Forward Presence*, one of the declared *Pillars* of that strategy. To the end of explaining the basic jargon, while also stating the submarine case, we present here a general discussion of *Maritime Presence* by Dr. Doug Johnston and a look by Dr. Jan Breemer at the arguments used to discount submarine utility in that role. We do not claim that we are, as yet, jargon-free, but it is our hope to pursue some of these points which obscure submarine employment potential until better understanding is possible and higher awareness is evident.

Another point that seems to cause problems in submarine relations with the rest of the Navy is the one about Command and Control. Captains Ken Cox and Tom Maloney have taken a critical look at the book by the Royal Navy's Admiral Woodward about his conduct of the Falklands War, and they raise just that question about the submarine involvement in that action. In his specific treatment of Command and Control, Rear Admiral Jerry Holland touches on that problem in the South Atlantic and draws some conclusions for the future.

Another book about the past of submarines which raises interesting points about their future has been written by Dr. Gary Weir, who does the <u>On Patrol Fifty Years Ago</u> feature for the **REVIEW**. Captain John Will has taken a lessons-learned approach to the period between World Wars I and II, and relates them to the problems being faced by the submarine community today.

As an editorial note, the promise of a submarine bibliography is being postponed to the January issue due to the already well-packed sea-bag of material for this issue. For the same reason of available space, <u>In the News</u> does not appear but will resurface in January.

A feature of most issues of THE SUBMARINE REVIEW is the <u>Discussion</u> section. The goal of that section is to both present further discussion of articles which have appeared in the **REVIEW**, and to provide a new aspect of a current issue or introduce a new topic which ought to prompt reply. For the former, Commander John Alden comments on the points discussed in the July issue. For the new topic, Mr. Stan Zimmerman offers his views of press relations, a subject about which all of us have expressed our opinions at one time or another. The comments of readers are invited about both viewpoints, or indeed about any of our material. An informed exchange is what a public forum is all about.

Jim Hay



FROM THE PRESIDENT

A t this writing, we are counting down the final weeks of a national election, the outcome of which will surely influence the course for defense for the remainder of this century! Meanwhile, the budget for Fiscal Year 1993 (beginning October 1992) remains unsettled, with little hope of resolution prior to the election, creating the potential for life under a Continuing Resolution for part or all of the year.

Projecting slightly ahead, the Fiscal Year 1994 budget may go forward as a product of the incumbents, or may be withdrawn, restructured, and resubmitted as a child of a new administration. In either case, that defense spending plan will likely face a largely repopulated Legislative Branch with a new agenda, and the prospect for reductions much larger than those presently programmed in the planned drawdown.

Anyone willing to predict a future for submarine programs under those circumstances? Clearly, our submarine leadership, those in the newly reorganized Washington headquarters staff, and those out in the re-empowered Type Commander staffs, have their work cut out for them. There will be an urgent need to educate/re-educate a new (or almost new) government on the importance of undersea warfare and the key role that submarines will play in the post-Cold War regional conflict world. (See my letter to the membership dated 4 August 1992 about how you can help in this important work.)

The news from the front is not all bad. In late August, the New Attack Submarine (NAS), or more familiar, CENTURION, was approved as a program at a Defense Acquisition Board hearing. This Milestone Zero was an essential first step, the official *blessing* to go forward. The next phase requires formulation of an operational concept and the initial elements of a design, and the conduct of a Cost and Operational Effectiveness Analysis (COEA) which trades off the proposed design against a variety of other options (e.g., SEAWOLF; SEAWOLF variants; diesels; Air Independent Propulsion (AIP) concepts; and others). The process, until Milestone One, spans several years and leads directly to finalization of the design and approval to begin construction of the first ship of the class. There is much to be done before that is a reality. I am pleased to pass on to you several attaboys. First, on 5 July 1992, Secretary of Defense Dick Cheney was interviewed by Bob Schieffer of CBS News Face the Nation. In response to a question on private organizations that support the military, the Secretary responded:

"There are a number of professional organizations... over the years that have been very useful, that have been very professional. I spoke recently at the Naval Submarine League. It's a first class organization headed up by Carl Trost, the former Chief of Naval Operations, dedicated to supporting submarine activities and doctrine and weapons systems, a collection of private and retired and active duty personnel. It's a very, very useful organization."

If that were not enough, I call your attention to the letter which follows from General Colin Powell, Chairman of the Joint Chiefs of Staff, to our Editor, Jim Hay. Well done James! We are all proud of your accomplishments with the REVIEW. You and your predecessor, Bill Ruhe, have created a professional voice of the Submarine Force.

In closing, you might be interested in knowing that applications for membership <u>are</u> trickling in, a response to my 4 August letter. The trend is up. Thank you for your support.

Bud Kauderer

Chairman of the Joint Chiefs of Staff Washington, D.C. 20318-0001 3 August 1992

CAPT James C. Hay, USN(Ret.) 11010 Gainsborough Road Potomac, Maryland 20854

Dear Captain Hay,

Thank you for your letter and the "hot off the press" copy of the July 1992 <u>Submarine Review</u>. I appreciate your thoughtfulness, and that of the membership of the Naval Submarine League.

With this issue the <u>Submarine Review</u> has again showed itself to be in the forefront of the responsible debate on the future of our Nation's defense posture.

The articles by Bob Murray, Jim Tritten, and Ron O'Rourke are both thoughtful and thought-provoking -- exactly the kinds of contributions we all need to read if we are to make wise decisions about America's National Security future. I thank you for bringing them to my attention. The Tritten article, using the concepts of our National Security Strategy and the Base Force to discuss the U.S. Navy submarine's role in the years to come, is especially in tune with the times.

Thank you again for thinking of me. With best wishes,

> Sincerely, /s/ COLIN L. POWELL Chairman of the Joint Chiefs of Staff



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ADDRESS AT THE 10th ANNUAL NSL SYMPOSIUM by ADMIRAL BRUCE DEMARS, USN 11 June 1992

[Ed. Note: Emphasis added]

The end of the Cold War, Desert Storm, and problems here at home have dramatically cast national security issues in a different light. People are looking to the defense budget as a source of funds -- but also concerned about the effect of sudden cutbacks on local economies, how to avoid losing critical skills, and how best to protect U.S. interests under a streamlined budget.

Years before the industrial base picture got as bleak as it is now, we made sure that our naval nuclear suppliers faced up to the prospects of dramatic reductions -- and we took action to downsize. A fuel factory, a core factory, a uranium enrichment plant, a chemical reprocessing plant are now either shut down or in the process of being shut down -- other firms are following suit. Survivors are cutting back sharply.

This was and is a painful process - severing ties that reach back to the early days of nuclear power; watching the breakup of teams of the nation's most highly skilled workers. But companies and employees have done a pretty good job of facing facts, sizing up the new situation, reassessing strengths, and adapting.

We need to do the same in restructuring our defense effort. As we change from a bipolar world to a multipolar world, the focus shifts from deterring global conflict on a regional basis to deterring regional conflict on a global basis. This calls for a significantly different approach to forces, roles and missions than that which won the Cold War.

Faced with competing interests and tight budgets, there is a tendency to pro rate – to continue doing the same things the same way, but on a reduced level. But to get maximum return, we have to reexamine traditional roles and missions and look for different, more cost-effective approaches.

Desert Storm, while a military success, is not something we would likely try again short of the most extreme provocation. But the performance of high-tech weapons there paves the way for a wide variety of new conventional deterrence options short of landing troops or stationing armadas on the horizon.

Quiet submarines are logical candidates for this kind of work. What else can operate alone and unsupported in hostile waters for months at a time - with the ability to destroy targets ashore, surface ships, and submarines; to gather intelligence, to land special forces, and the like -- all with a crew of a little more than a hundred?

Unfortunately, after four decades of successful preoccupation with the Soviet submarine threat, we have created an impression that submarines exist primarily to fight other submarines a job no longer in great demand. And they seem to be very expensive. This is the core of the discussion that must be aggressively and broadly engaged.

Nuclear-powered submarines are expensive to build, but cheap to operate. They are cost-effective. Considering what one or two attack submarines can do on their own, they are one of the great bargains in the defense budget. Consider some obvious points; a submarine:

- Requires no foreign bases, no tankers, no escorts, no air cover.
- Is invulnerable on station -- low risk of accidental escalation; low risk to the crew.
- Can be deployed covertly no need to justify each move on the stage of world opinion.

Small nations tend to want submarines - either diesel or nuclear-powered because they provide so much clout for the money. The Soviets specialized in submarines for the same reason. Fortunately, through technology and personnel, the U.S. Submarine Force was always able to hold the edge despite larger numbers and a variety of experimental designs on the other side.

Instead of being able to threaten U.S. supply lines and fleet units, the Cold War Soviet submarine force was reduced to staying near home and running escort duty for its strategic missile submarines tucked away in, by their own admission, bastions to avoid U.S. submarines. This is a prime example of why initial acquisition cost is not always a fair measure of value. The U.S. attack submarine force may be the best example of competitive strategy to emerge from the Cold War. Some defense officials are skeptical about the need for CENTURION, the lower-cost, next generation alternative to SEAWOLF. They point out that our top-line submarines should be able to handle their Russian counterparts and that no Third World nation will, in the foreseeable future, be able to field submarines competitive with even our 25 year old SSN-688 design.

The threat is not that Third World submarines will be able to find and defeat our submarines in the open ocean. The threat is that other countries will inevitably get access to improved signal-processing equipment, computers, and software. Even unsophisticated platforms with improved detection capability could seriously reduce the value of a relatively noisy submarine.

History can provide some solace.

Over the years, missions for submarines have evolved probably more than for any other military platform. In almost every case, there was resistance to change -- and concern about the relatively high acquisition costs.

- U.S. submarines moved from naval novelty to fleet scouting force; then quickly to commerce/warship killer with the loss of the fleet at Pearl Harbor. Although submariners comprised less than two percent of the U.S. Navy, submarines sank more than half the Japanese merchantmen and almost 40 percent of its naval vessels -- another example of cost-effectiveness.
- The nuclear-powered submarine revolutionalized naval warfare, but did not come on the scene without objection. Many, including some seasoned submariners, favored larger buys of less capable diesel boats, and challenged the need for improved speed and endurance. Then NAUTILUS went to sea, running circles around our own anti-submarine forces and demonstrating the ability to undertake unprecedented missions. Once again, acquisition cost proved to be an inappropriate measure of costeffectiveness.
- Cost was not a factor in the race to put forty-one POLARIS submarines to sea. But they came in under budget and quickly proved to be the most invulnerable, practical and cost effective leg of the TRIAD.

 The TRIDENT submarines that replaced Polaris were criticized at the outset for high acquisition cost. Today, they are widely recognized as one of the best bargains ever.

After World War II, the Navy eagerly experimented with alternate missions for submarines. It converted diesel submarines to radar pickets, cruise missile platforms, transports, oilers and hunter-killers. It established Submarine Development Group TWO, a spawning ground and test bed for anti-submarine warfare doctrine.

Today, we need the same kind of broad thinking and disciplined approach to meld SSN capabilities with current national security needs. After several decades of optimizing an established system, theme and concept, we are facing a fundamental change and we need a broader perspective.

The primary focus must shift toward conventional deterrence -- the persuasion of one's opponents that the costs and risks of a given course of action outweigh the benefits.

While this focus obviously finds its teeth primarily in conventional cruise missile land attack, we cannot ignore minelaying and special forces operations. Neither should we overlook other possibilities like enforcing quarantines and blockades with weapons that would disable, but not otherwise harm, those who challenge them. Overlaying this all is the submariner's highly developed skill in tactical intelligence gathering and disciplined communication regime. The Commander has a unit in the opponent's backyard, watching, listening, reporting and ready to cock the gun and then shoot or uncock as ordered.

We have the potential to develop a menu of credible options that can be triggered with minimal risk to U.S. servicemen and non-combatants. With increasingly effective satellite coverage, moving fire power underseas makes good sense. It greatly complicates an opponent's problems - he has to assume he is vulnerable without knowing there is actually a submarine in the area.

Ideally the objective is always to commit the smallest practical force that will not risk defeat or embarrassment. Why deploy ground forces if a carrier battle group will do? Why use a carrier battle group if a smaller group will do? Why risk surface ships if a submarine or two could do the job? Practically, however, there is a heavy penalty for underestimating the ground forces or fleet units required. Experience in the Middle East shows the difficulty of keeping ships on station in trouble spots - trying not to be provocative while at the same time defending against attack from seemingly innocuous sources.

With submarines, this tends to be less of a problem. The unit generally remains secure even if the mission is unsuccessful -- and the mission need not be carried out under the glare of world wide media coverage.

We need to get people outside the Silent Service thinking, writing, and talking about ways to lighten the load on the battle groups and about alternate methods of deterrence that lessen the likelihood of having to commit troops or entire battle groups.

To involve the public, Congress, scholars, and other military communities, we need to stop talking in jargon – Pillars, Mission Needs Statements, Forward Presence, Reconstitution, and so on. It is hard to think clearly in acronyms and cliches.

There is a lot of submarine expertise in the Submarine League and you benefit from your detachment. This forum must begin to grapple with the issue and help educate others as to the possibilities.

Others should be able to help. For example:

- There are lessons to be learned about deterrence theory from the new Strategic Command -- heavily populated by submariners.
- The War Colleges could develop conventional deterrence target sets and strategy.
- The Think Tanks could try to come up with a better measure of effectiveness that takes into account unique submarine characteristics -- one that measures affordability in terms of total assets required to conduct a mission, not just initial acquisition cost and historical budget shares. Then apply that metric to the 1986 Libyan raid -- as carried out and as it could be done today with two SSNs.

 Navy and Air Force Strike Schools and staffs, RAND, Center for Naval Analysis, etc. all have something to offer. Vice Admiral Roger Bacon, ACNO for Undersea Warfare, has already started Navy wheels in motion -- to refocus, to review organizational structure, operating doctrine, and so on. I am encouraged by his efforts and those of the Type Commanders. This issue is as much about form as it is about substance. Fortunately, form is easier to gain than substance.

We are, whether we understand it or not, at one of the historic points in the continuum of submarine warfare. It is not unlike the post WW II period. Then we faced a large potential capability in a dormant Russian Navy. We had a large submarine force with no real recognized mission and we were at the beginning of a realization for what a new technology (nuclear power) might offer.

Out of that setting came preeminence in ASW and strategic deterrence and a large share of credit for victory in the Cold War.

Now we must draw on our strengths: institutional loyalty and cohesion, broad but unfocused public support, and a keen sense of where we have been and where we must go. In this endeavor, there is great potential to contribute to the defense of this country's interests worldwide in a responsible, cost effective manner.

TODAY'S SUBMARINE FORCE

NSL has distributed to each Chapter copies of the Navy's new 19 minute VHS video: Today's Submarine Force. The video highlights the important role of submarines in our new national defense policy and is intended to be shown to groups not fully familiar with today's modern Submarine Force. The video contains some excellent original submarine underway footage which should be of great assistance to us in our efforts to help the American public understand submarine missions, capabilities and employment. Contact your local Chapter to borrow this important educational visual aid. Copies are also available for loan from NSL Headquarters.

ADDRESS TO NSL TENTH ANNUAL SYMPOSIUM 10 June 1992

by Vice Admiral H. G. Chiles, USN Commander Submarine Force, U.S. Atlantic Fleet

Distinguished flag officers and members of the Naval Submarine League, good afternoon. I'm glad to be here and see so many old friends and give you an update on the Atlantic Submarine Force.

An old Bob Dylan song sort of describes what is happening these days: "For the Times They are a'Changin'." What a difference the last year has made in the world situation!! The Cold War has been declared over. The Russian Navy is a lot closer to home and their troops are leaving Europe as the west helps to build them housing. Officials from the Republics of the former Soviet Union are going to NATO Headquarters in Brussels for meetings. Yogi Kaufman goes aboard a TYPHOON and brings home video tape of swimming pools and saunas. The Russian CNO went aboard and toured USS KEY WEST in Norfolk last year.

What the Russian CNO was most interested in during his tour of the ship was not its technology, but our sailors: How much we pay them, what was their education, whether they are married, own a car, live on or off base. Maybe he's trying to figure out how to run a Navy in a market economy. The U.S. and Russia are clearly not bosom buddies yet, but we aren't the same old Cold War enemies either.

Despite the accusations to the contrary, we have recognized these dramatic events and reacted. Accordingly, the Submarine Force is changing to meet the needs of our navy and our country. Today, I'll discuss the current status of the Atlantic Submarine Force and describe some of the more significant changes in progress with our strategic forces, attack submarines and personnel.

On Monday, the 1st of June, I sat in a hangar in Omaha and watched as the new Strategic Command was born and our SSBNs reported for duty to an Air Force General. STRAT-COM is now in place and there are a lot more Navy guys in the rolling hills of eastern Nebraska. The chain of command for SSBNs on patrol is directly from CINCSTRAT to the SSBNs through COMSUBLANT in our CTF 144 hat. We have shaken out the organization and it works. When the SSBNs are in port, the chain of command is essentially the same as it is for other fleet units from CINC-LANTFLT through the type commander, group and squadron. One thing that is different is the absence of USCINCLANT --J36 has been disbanded with some functions now shifted to CINCSTRAT and others to my N6 organization. The changes are really transparent to our SSBNs.

Another big change is the president's decision to take the strategic bombers off alert. In the day-to-day forces in place, the SSBNs now shoulder more of our country's strategic deterrence responsibility.

We now have four Trident II D-5 equipped SSBNs operational: TENNESSEE, PENNSYLVANIA, WEST VIRGINIA and KENTUCKY. The fifth Trident II, MARYLAND, was delivered on 5 June and will be commissioned on Saturday, 13 June, and soon will be on patrol after her shakedown period. Construction continues on schedule for the remaining five ships.

In parallel with new Tridents entering the fleet, we are retiring our older SSBNs. The C-3 Poseidon SSBNs were removed from strategic service as of October 1991. In addition, the C-4 backfit SSBNs will begin retirement soon such that they will be removed from strategic service by the mid-1990's, and Submarine Group SIX and Squadron 16 will standown. We are going from a force of 23 Atlantic Fleet SSBNs when I talked last June to 15 today, and to a force of 10 Trident II D-5 equipped SSBNs by the end of the decade.

In the midst of all this change, one thing remains constant -our SSBNs are always at sea as before, on patrol, invulnerable and keeping the peace. They remain the most cost effective, accurate, and survivable of the nation's strategic deterrent forces, providing almost half of our country's day-to-day deterrent posture for about 30 percent of the strategic budget. Keeping our SSBNs at sea ensures we will always have a credible deterrent force that can survive any threat -- a stabilizing influence in an uncertain world.

We recently commemorated the 3,000th patrol in Kings Bay on April 25th. That's over 80,000 man-years of cumulative time submerged since the first patrol by USS GEORGE WASHINGTON almost 32 years ago. The principal speaker at the April ceremony was the Chairman of the Joint Chiefs, General Colin Powell. He gave perhaps the strongest non-Navy endorsement of the strategic submarine fleet that I've heard in a long time. To quote from his remarks briefly: "No other members of America's armed forces have been given so great a burden of responsibility as the sailors of the ballistic missile submarine force. ...No other members of America's armed forces have so earned America's trust. ...We will always, always place our faith in our boomers. And not in anyone else." I couldn't agree more. [Editor's Note: See General Powell's complete remarks in July 1992 SUBMARINE REVIEW.]

Turning now to attack submarines: our focus has shifted dramatically away from independent ASW operations toward the less traditional roles of battle group support, special warfare, mining, and strike. The Secretary of Defense, Mr. Cheney, rode one of our ships earlier this year and was impressed with our capabilities in support of regional operations. We are on line and fully integrated with the carrier battle groups. This is not direct support. Two submarines are assigned to each carrier group in LANTFLT. These submarines report to their normal submarine operating authority and submarine squadron commander. They workup with the CVBG beginning about six months before deployment, and deploy with them. We now have over one year of experience with this arrangement, and eight submarines which have completed a deployment or are currently deployed with a CVBG. Feedback from the battle group commanders and the submarines is very positive.

In general terms, the battle group commander directs rules of engagement, weapons release authority and can influence tactical movements of the submarine. The submarine operating authority retains prevention of mutual interference (separation to prevent underwater collision), water space management (ASW weapons control to prevent blue on blue engagements), and the submarine broadcast. The support submarine manual, currently in the form of a COMSECONDFLT Tactical Note, will soon be a joint COMSUBLANT/COMSECONDFLT TACNOTE. It spells out these procedures and has been used successfully in four fleet exercises, four CVBG deployments, and two major NATO exercises. I emphasize that we are not in the outer screen maintaining station on the carrier but doing a variety of missions we are uniquely capable of doing in support of the battle group – and generally well away from the carrier.

To show the extent of how much we have shifted our focus, in round numbers, our deployed submarines are now spending about as much time in strike warfare and battle group support as they are in independent ASW, ASUW and surveillance operations. That contrasts to the past pattern of many years where we spent about 50 percent of our time in traditional roles with a very small fraction of our underway time in our *new* roles.

Power projection ashore is now a Navy top priority. Attack submarines have a powerful capability for strike warfare with the Tomahawk cruise missile. Both USS PITTSBURGH and USS LOUISVILLE launched Tomahawks against Iraq during Desert Storm, the first shots fired in anger from a U.S. submarine since World War II. Cruise missiles do not replace the need for tactical air forces, but complement it. Submarines will become increasingly important as the Navy gets smaller and we have fewer carriers, especially with smaller task forces without organic tactical air capability. In fact, in certain cases submarines alone could perform the entire strike mission, particularly where air and surface defenses make it very dangerous to risk our pilots and surface units. Today, SSNs deployed to the Med carry a considerable portion of the conventional Tomahawk strike assets for the European Command contingency plans.

Maritime Action Groups (or MAG for short) have become a necessity in the Med because of a lack of a permanent carrier presence due to the Persian Gulf situation. The MAG is composed of at least one submarine and any number of surface combatants less an aircraft carrier, but usually consists of two to three frigates or destroyers with their helicopters and one submarine. It provides an alternative credible force which uses movement, speed and stealth to offset the lack of organic tactical air assets. The MAG, due to its size, is less intimidating than a full carrier battle group and can be used with a variety of forces in response to a crisis. The SSN is a terrific force multiplier with its mobility, stealth and multi-mission capabilities. The ideal MAG would include a vertical launch 688 class SSN to provide increased strike capability.

We're continuing to exercise our mining capability in various exercises using submarine launched mobile mines. A mine pattern can be laid from several miles away using SLMMs with good accuracy. We have added SLMM capability to some 688 class SSNs, and we will have a sizable portion of that class which will have this capability in the future. This will compensate for the retirement of our 637 class SSNs, which were our primary mining platforms in the past.

Special warfare is an area where we have made great strides in the last three years with annual exercises that concentrate on the use of special operations forces from submarines. Beginning with a two submarine exercise in 1990, we have increased steadily the complexity of the operations and brought in joint forces. In exercise PHANTOM SHADOW last year, we embarked the Joint Commander in USS JOHN MARSHALL and included forces from the Army, Navy Seals, and Marine Corps embarked on three submarines. A total of 137 special operations forces were embarked. This year in OCEAN VENTURE, the submarine SPECWAR operations were fully integrated into the fleet exercise. The exercise was not scripted, but was run as a crisis action scenario. Tactical command of two SSNs was formally chopped for 18 days to the Joint Task Force Commander (Commander Carrier Group Eight), the Navy Component Commander at the Joint Command Center at Ft. Bragg and Camp Lejuene, North Carolina. Joint special warfare forces included elements of the Army, Navy and Air Force.

USS SILVERSIDES and USS JAMES K. POLK, with their embarked Special Operations Forces, were used against a variety of simulated targets located on Key West and Boca Chica islands. Some of the special operations forces were airdropped to the submarines using Air Force assets. During the eighteen days, 14 missions were tasked; over 85 percent of these missions were completed successfully. At the hot wash-up, the Commander of Special Operations Forces Atlantic (an Army COL.) stated that the submarine exercise was the most significant part of the Special Operations Forces play in OCEAN VENTURE.

Recognizing that the new threat in a regional crisis will probably be diesel submarines in shallow waters, we are placing more emphasis on this area. We are working on new tactics to get the best performance from our current weapons and sonar systems. In recent years after the retirement of U.S. diesel subs, most of our experience against diesels was in the Med or on UNITAS cruises. The Development Squadron has 9 anti-diesel exercises conducted or planned between July 91 and October 92, with an emphasis on active sonar employment in shallow water.

What about our old threat, the Russians? Their withdrawal to home waters and the changing political climate is clearly having a big impact on the perceived need for ASW forces. It's no secret that they are continuing to operate their submarines at sea. Older submarines are being retired while modern, capable nuclear submarines, like the AKULA and the KILO diesel-electric submarine are still being built. The submarine order of battle is down to about 230 today from 345 in 1986. The bottom line is: the CIS is going to have a smaller, but more modern and capable force that will be around for many years. We need to keep that in mind.

Not only is the CIS Navy getting smaller, but so are we. Squadrons 10, 14, and 19 are decommissioned and their tenders either scrapped or headed to relieve a tender which will decommission. USS FULTON was inactivated in September '91 and USS ORION and USS PROTEUS will be retired in '93. 'Squadron 16 and Submarine Group Six will go away in the mid-1990s after the retirement of the C-4 backfit SSBNs.

USS MEMPHIS is our dedicated Research and Development (R&D) submarine. We currently have four major R&D projects installed and the non-penetrating periscope is being installed now and will undergo at-sea testing in the near future. The advanced capability torpedo continues to come on line as more and more ships have it installed and torpedo inventories increase. Some reliability problems with ADCAP that emerged in early '91 have been corrected and reliability is back up in '92. And we are continuing to modernize our sonar and towed array systems with AN/BQQ-5D and AN/BQQ-5E equipment.

A number of areas challenge us. How many attack submarines can the country afford? The answer to the question affects all our planning, our people, our infrastructure. It's a major concern. We've made great strides in improving communications within the battle group with new equipment and procedures, but we need to continue to work on high data rate systems and tactical voice circuits. Countering the diesel submarine threat is no easy task, and it will take a concerted effort to improve our capabilities. We need to improve the special warfare capability of our 688 class submarines in submerged lock-in and lock-out of combat swimmers, and we need new dry deck shelter capable ships to replace those which will be retired by the end of the decade. Mine countermeasures is one of the most technically difficult problems to solve, and we need improved systems to assist in locating and avoiding mines. In addition, we need to take advantage of new technologies, such as unmanned underwater vehicles, that show promise.

So, the Cold War is over. OK, so where is the peace dividend? As a consequence of the reduced threat, we have already reduced the SSN operating tempo by about 10 percent. In the near future we will reduce the operating tempo for the Trident II D-5 equipped SSBNs somewhat by lengthening their refits and shortening their patrols. We have implemented changes that eliminate short term changes in SSBN schedules. A wide variety of work procedures have been changed to ease the administrative burden on our people and eliminate cumbersome practices. For example, the administration of the personnel reliability program has been simplified greatly. Other examples of actions we have taken include: a reduction in fire control system preventive maintenance by 40 percent; and a new quality assurance manual which reduces significantly the requirements for work packages.

Let me turn now to our greatest asset, our people. There are about 26,500 enlisted personnel, 2,300 officers, 3,500 reservists and 2,500 civilians working in the Atlantic Submarine Force. We are getting smaller proportionate to the rest of the Navy. Some ratings are more affected by the drawdown than others, but we are already redistributing our personnel assets such that our high quality personnel still have a productive future in the submarine force.

We have made some strides in improving quality of life including: better barracks, increased funding and self-help programs to improve our living quarters, and increased junior enlisted housing availability; we're working with manning issues to improve in-port watch rotations, and have improved PSD manning to provide better service to our people and families.

Our Submarine Force personnel are the best in the world, and it's exciting to work with such dedicated people.

In summary, I'd like to leave these thoughts with you: We have reacted and adapted to the new political reality; we believe that submarines are absolutely essential to the continued security of our country; the Submarine Force is more capable and ready than it has ever been -- we are ready, anytime, anywhere; and we can reach a long way. Finally, we are taking care of our greatest asset, the dedicated, well trained, and hard working sailors that make our Submarine Force so great.

NATO REALIGNMENT AND THE MARITIME COMPONENT by Douglas M. Johnston

[Ed.Note: Dr. Johnston is a qualified submariner and is presently Executive Vice President of the Center for Strategic & International Studies in Washington, DC.]

F or most of its existence, the North Atlantic Treaty Organization (NATO) has suffered from a chronic case of political disarray in one form or another. "Whither NATO?" was the enduring question. Yet NATO has proven to be one of the most effective, long-standing alliances in history. In short, its considerable strengths have more than offset its acknowledged weaknesses.

Among NATO's strengths have been its ability to adjudicate a similar strategic outlook among the member states (with the single possible exception of France) and to adapt to changed circumstances. This latter capability has never been brought to bear so quickly or effectively as it has over the past two years in accommodating the historic and unprecedented changes that have taken place in the geopolitical landscape. In remarkably short order, the alliance has absorbed a united Germany, accommodated the rapid disintegration of the Warsaw Pact and the Soviet Union, and adjusted to the new requirements for peacekeeping beyond its borders.

At the same time, NATO has adopted a new strategic concept based on mobility and flexibility and a political strategy that involves a declared partnership with Eastern Europe. Beyond their impact on ground and air forces, these changes will also have a major effect on the maritime component of the NATO force structure. It is already clear that the West's maritime strategy, which was geared to deal globally with the Soviet Union and Warsaw Pact at sea, will be undergoing dramatic change along with its associated naval force structure and operating methods and patterns.

General Predictions

There are four possible future courses for the alliance: (1) "NATO Present as Future," (2) "NATO Defunct," (3) "NATO (Rejuvenated) as a European Structure," and (4) "NATO Broadly Rejuvenated." Many observers forecast that either option two or three is the most likely to prevail. This prediction is driven by a strong feeling that U.S. domestic political realities are likely to overwhelm any strategic rationale that might be developed to support other options, no matter how compelling or well presented it may be. The prevailing mood at the recent annual Munich Conference on Security Policy --Wehrkunde (February 9, 1992) -- gave added credence to such skepticism as some American representatives advised their European counterparts that a rising tide of isolationism was dramatically changing U.S. attitudes toward Europe. As Senator William S. Cohen (R-Maine), a member of this study's Steering Group, warned: some view the North Atlantic Treaty Organization as "No longer necessary, relevant, or affordable."

Wehrkunde notwithstanding, it would appear that the public mood and support for NATO in the United States is likely to run along one of three tracks:

- Active support for major reductions or total withdrawal based on the disappearance of the Soviet threat and a feeling that the allies can assume their own defense.
- Apathy or indifference toward NATO which, in turn, leads to de facto disengagement driven by steep cuts in the U.S. defense budget and/or the impact of centrifugal forces within the alliance, which could act to drive the allies apart or at least in different directions.
- Sufficient support for an intelligent, well-argued strategic vision for a rejuvenated NATO.

Short of carrying the day with a compelling strategic rationale, the fallback challenge will be to fashion a NATO strategy and force structure that can accommodate itself to a U.S. defense budget that is driven primarily by economic and domestic political considerations. Such a budget could easily lead to hollow forces and little more than a barebones reconstitution capability. Thus, it is a major challenge to provide input that can help secure continued public support for meaningful U.S. engagement in Europe. There are numerous reasons why it makes sense to continue a credible U.S. military presence, some of which are listed below:

- NATO is the best instrument for maintaining security ties among the European states and the United States, even as prospects increase for heightened economic competition.
- In European eyes, the U.S. presence serves as insurance against German dominance by promoting a complementarity of forces.
- NATO provides a stable framework for assimilating Eastern European security concerns.

- A forward presence in Europe provides the United States with the greatest flexibility for responding to crises in that region and the Middle East.
- Because future major contingencies will require coalition forces, an existing structure with coordinated procedures and a high likelihood of use becomes an extremely important force multiplier during a period of reduced budgets and forces.
- NATO is the most effective forum for monitoring and verifying arms reduction agreements for the West.
- A continuing U.S. security presence in Europe can provide added leverage in the economic sphere as Europe becomes more integrated.
- For the near-to-intermediate term, there will be an ongoing requirement to hedge against a resurgent threat from the East. Although CIS military capabilities have clearly eroded, they remain formidable; and intentions can swing dramatically.

To maintain NATOs viability, NATO allies have undergone a fundamental shift in military outlook and accepted peacekeeping objectives that may require the application of military force beyond the current NATO Guidelines Area (NGA) boundaries. To accommodate this changed context and protect its own interests elsewhere, U.S. forces assigned to NATO will clearly need to have *dual-use* characteristics.

Implications for the Maritime Component

In evaluating what these changes mean for NATO's maritime component, it is useful to examine the alliance's new strategic concept, as ratified by the NATO heads of state at the November 1991 summit in Rome (and reinforced by the NATO foreign ministers at their June 1992 meeting in Oslo). Among other things, that concept reflects a greater reliance on multinational forces that has already involved changes in command relationships, force plans, and deployment patterns for NATO maritime forces. It also reflects a movement away from garrisoning armies and air forces on foreign soil.

Although there is no longer a requirement for extensive forces to be maintained ready, in-theater for the defense of NATO, it is nevertheless the case that potential areas of instability continue to line the seas that lap NATO's shores. These challenges, while smaller, are inherently less predictable than those for which the alliance had to prepare in the past. The confrontation with Libya in 1986 and the 1991 war in the Persian Gulf are suggestive of the kinds of threats that might be expected in the future. In addition, the remnants of former Soviet military power are substantial and their ownership still in some dispute. In the wrong hands, these remnants could pose a significant danger to NATO and its interests.

With all NATO members facing deep defense cuts and corresponding demands for peace dividends, a strong, visionary alliance partnership will be all the more difficult to maintain. In addition to being lighter and smaller, future forces will have to be more mobile and flexible than ever before. Despite major reductions that will take place over the next several years, U.S. naval forces will still need to be forward deployed and prepared to project power -- in conjunction with allied forces -- wherever and whenever it is called for. Forward presence continues to make as much sense now as it ever did in the past by enhancing deterrence, providing a quick response capability, and avoiding the high cost in lives and equipment that typically attends after-the-fact attempts at forced interdiction. While it appears that these expected reductions in force structure can be implemented within a framework that continues to protect NATO's interests, it is the unexpected reductions that could take the alliance below the critical mass required to protect its vital security interests.

According to William Kaufmann and John Steinbruner of the Brookings Institution, the U.S. contribution in Fiscal Year 1990 to the non-nuclear defense of Europe – from Norway, along the Central Front (including the Atlantic sea lanes) to NATO's southern flank – accounted for approximately \$136 billion, or more than 40 percent, of the FY1990 defense budget. If the costs of covering the strategic and tactical nuclear threats to Europe are also included, then the defense of Europe currently consumes nearly half of the U.S. national defense budget authority. On this basis, when one takes into account the demise of the Soviet/Warsaw Pact threat and the projected 25 percent (or greater) reduction in U.S. defense expenditures during the next five years, it is safe to assume that the portion of total obligation authority (TOA) devoted to European security will drop below \$100 billion a year.

Associated naval force structure reductions will take their toll on the forces available for assignment to the NATO area of responsibility. As the U.S. Navy drops from 549 ships to approximately 450 (a 25 percent decrease from the original 600ship goal), the respective shares of aircraft carrier battle groups, amphibious ready groups, ships, airwings, and marine forces assigned to the Atlantic and Pacific commands will remain approximately even. The differences will appear in their employment.

Reductions in the U.S. defense budget that exceed those currently planned would have an even more dramatic impact on the naval forces available for deployment/assignment to NATO. Congressional Budget Office estimates of the effects of force structure of an additional 10 percent cut in the defense budget (beyond the 25 percent) show a \$250 billion budget driving naval force levels down to 10 to 11 aircraft carriers and fewer than 400 ships overall. As a rough rule of thumb, for each additional \$50 billion across-the-board cut beyond that already built into the defense budget, a reduction of one to two aircraft carriers and about 50 ships can be expected. In other words, a \$200 billion defense budget would probably include eight aircraft carriers and 350 ships; a \$150 billion budget, six aircraft carriers and 300 (or fewer) ships.

In simple terms, a \$250 billion defense budget could support two carrier battle groups forward-deployed, \$200 billion -- one and a half, and \$150 billion -- one. In terms of area coverage, when the budget drops below \$250 billion, the U.S. Navy will begin to lose the ability to deploy aircraft carrier battle groups simultaneously to more than a single theater on a continuous basis. Because these budget levels would only be conceivable in a much more benign world than the one we appear to be leaving, it would have to be assumed that the former Soviet threat in the Atlantic region had totally disappeared. This, in turn, would lead to the conclusion that the U.S. Navy would no longer be able to keep forces continuously deployed to NATO -- that it would have constant coverage only in whatever part of the world represented the current zone of crisis.

In addition to the aircraft carrier, each carrier battle group currently contains four to six surface combatants, one to two replenishment ships, and one to two submarines. At the 450ship level, these numbers will drop to three to four surface combatants, one replenishment ship, and one to two submarines. Amphibious ready groups, which currently contain three to five ships, are expected to drop to three as new, larger, multipurpose ships replace smaller, single mission amphibious ships.

At the peak of the U.S. commitment, more than half of the Navy's force structure was earmarked for assignment to the NATO Guidelines Area. In the 1970s and for most of the 1980s, the continuous deployment of two robust carrier battle groups and one amphibious ready group in the Mediterranean became the requirement. However, the Navy was able to meet this requirement only about one-quarter of the time; and it has since been eased to one smaller carrier battle group and an amphibious ready group. Meanwhile, the <u>1992 National</u> <u>Military Strategy</u> states that two carrier battle groups and two amphibious ready groups are "required to support U.S. interests" in the Atlantic regions -- "including Europe, the Middle East, Africa, and Southwest Asia."

Assuming current operating parameters, at 450 ships and 12 aircraft carriers, the navy's ability to provide simultaneous, continuous coverage in three theaters (Mediterranean, North Arabian Sea, and Western Pacific) is lost. Constant coverage can now only be provided for two theaters, with partial coverage for the third. Below 450 ships, only partial coverage can be maintained in the second theater.

Because of the extensive capital and long lead times involved in the design and building of new ships, there is a fragility and irreversibility to naval force reductions that greatly exceed those associated with ground forces, which are inherently easier to reconstitute. This is a critical asymmetry that should not be overlooked in future force reductions.

Naval Forces: A Unique Out-of-Area Asset

Sea power offers a mobile, flexible, and easily manageable means of projecting alliance resolve in either a deterrence or conflict-resolving mode. It also offers the advantage of a graduated presence, as subtle and unobtrusive or as visible and threatening as the situation may demand. Naval forces can remain on station indefinitely if need be and can, in most instances, be employed without violating any state's territorial integrity. In short, they are a diplomatic rheostat, well suited to overseeing alliance interests on a worldwide basis.

In the past, NATO multinational naval forces and exercises provided much more than strength in numbers for containment of the Soviet Union and the Warsaw Pact. Combined forces provided a comprehensive and highly successful basis for multilateral cooperation and joint maritime operations outside the NATO area. The continuing value of this cooperation was apparent to all in the recent Persian Gulf War. Although NATO was not technically involved in the conflict, NATO's maritime forces provided an integrated defense line in the Mediterranean that involved not only ships from 12 different navies but also the use of numerous other alliance assets, such as the AWACS (airborne warning and control system). Among other things, this NATO umbrella facilitated the flow of forces to and from the region on the part of those member countries operating as a part of the coalition. The familiarity of the coalition partners with NATO operational concepts and procedures was invaluable and contributed to the many early and continuing successes of the naval interdiction against Iraq.

It should also be noted that naval forces offer more than simply an ability to project power and control the seas. They are uniquely capable of extending humanitarian assistance to nations in need and of providing non-combatant evacuation and disaster relief. In addition, port visits by NATO ships to non-NATO members do a great deal to strengthen political and cultural ties among nations.

Future military conflicts, whether they involve NATO itself or simply coalitions involving some of NATO's members, are likely to require the type of multinational naval response seen during the Persian Gulf War. As NATO's focus shifts to dealing with destabilizing contingencies, as troop levels on the Continent decline, and as collective interests arise in more remote areas of the world, NATO will come to rely even more than it has in the past on the inherent mobility and flexibility of seapower for providing both initial crisis response and stabilizing forward presence.

Outlook for the Future

Whether NATO remains in its present form, becomes defunct, is rejuvenated as a primarily European structure, or is broadly rejuvenated, the relative importance of maritime forces to NATO is likely to increase. Whatever form NATO takes in the future, it will adjust to future events much as it did to the Persian Gulf War, where coalition forces came in large part from NATO countries and where alliance forces were ready to back-fill U.S. requirements in the NATO area. NATO will also eventually adjust to more extensive out-of-area capabilities as it becomes clearer that the future of the alliance, along with that of its members, may be more determined by what happens outside the region than within.

If NATO remains robust, then the primary maritime event that will occur is the downsizing of the alliance's maritime forces. These forces will retain their importance, however, as the disproportionately greater reductions in land and air forces lead to an increased reliance on sealift and amphibious capabilities. By contrast, if NATO falls apart or is rejuvenated as a European entity in which the U.S. role becomes one of providing reinforcement in time of major crisis (and the ongoing coverage of its nuclear umbrella), the importance of U.S. naval forces in the region as the <u>only</u> U.S. military presence will be even greater. Paradoxically, such a situation would place severe demands on a naval force structure that has already been reduced -- perhaps to as few as 350 ships and six to eight carrier battle groups -- as a result of the U.S. de facto departure from NATO, whether driven by the perceived absence of a significant threat, compelling domestic priorities, or some combination of the two. In such a case, most of the U.S. forces would belong to CONUS-based contingency forces.

NATO's new strategic concept, adopted at the November 1991 Rome Summit, redirects it toward reassurance and the maintenance of stability. Although not fully articulated, the concept implies that the European Community (EC), Western European Union (WEU), and Conference on Security and Cooperation in Europe (CSCE) could develop security-related forces in parallel with NATO but that the United States would remain the leader of the alliance for the foreseeable future. As these other security organizations evolve, it should be possible to adjust U.S. force levels in proportion to their growing capabilities. Until these organizations have matured, however, it will be necessary to maintain sufficient naval force levels within the NATO area to cover the drawdowns of air and ground forces.

Recommendations

The alliance should actively seek to persuade U.S. executive and legislative branch officials of the continued need for a meaningful U.S. security presence in Europe. European military representatives should play a key role in this regard.

To accommodate NATO's growing reliance on its maritime component, the alliance should consider adopting the following recommendations wherever possible and appropriate:

- Continue to realign the NATO command structure to accommodate changes in the threat and the prospective increased role of the maritime component. Toward this end:
 - When feasible, upgrade CINCSOUTH (Commander in Chief, Allied Forces Southern Europe) to a major NATO command.
 - Assign individual SACLANT commanders for extended tours of duty.

- To complement STANAVFORLANT and STANAVFOR-MED, develop on-call multinational task groups tailored to perform alliance-related missions, including those that extend beyond the NGA.
- As NATO adjusts to an evolving out-of-area capability, take steps to disarm possible international concern and to develop added proficiency on a number of maritimerelated fronts:
 - Political Acclimation. STANAVFORLANT and STANAVFORMED should conduct occasional out-ofarea exercises and (later on) operations.
 - Humanitarian Assistance. Given the nature of most humanitarian assistance programs, more initiatives in this area should prove unthreatening and welcome.
 - Noncombatant Evacuation. In situations where the maritime evacuation of noncombatants is required, the interests of several NATO members are often similar, if not identical.
 - Chokepoint Control. NATO maritime forces should develop a focused capability to protect and control chokepoints.
- An integrated effort in the areas of adequate strategic lift and prepositioning should become an alliance priority as the NATO members downsize their naval forces.
- NATO should reexamine the need for a NATO frigate that can be optimized for Third World operations.
- 6. Provide a Tactical Ballistic Missile Defense capability for NATO forces both within and outside the NGA by using the maritime surveillance assets of the alliance in combination with the potential anti-tactical ballistic missile (ATBM) capabilities of U.S Navy Aegis ships.

The bipolarity of the Cold War has left in its wake a volatile set of antagonisms, especially among and within the countries of the former Warsaw Pact. In the midst of these new uncertainties, the NATO alliance represents stability. Its bold and creative responses to recent global change have been impressive and reassuring. It is hoped that ordered thinking in the face of budgetary imperatives for drastic drawdown will prove useful in continuing that trend.



DETERRENCE, NAVAL PRESENCE, AND THE SUBMARINE FLEET

by Jan S. Breemer Naval Post Graduate School

For ortunately, wars at sea are few and far between. As a result, the capital that is invested in warships, especially submarines, is commonly amortized without the fleet ever having to demonstrate its war-fighting capabilities. This may be the proof-in-the-pudding of a wise investment; the idea of a national investment in a general naval insurance policy sounds reasonable enough. But the matter is not that simple. The investors, i.e. the nation's taxpayers, have the unfortunate tendency to renew their premium with only the greatest reluctance if the insurance company's board of directors, in this case the naval leadership, fail to convince them that, even without disaster (war) their investment will be amortized at a peacetime profit.

This is precisely the dilemma that confronts the U.S. Navy's Submarine Force. The end of the Cold War superpower standoff means that the chances that the American underwater fleet will be used for the purpose it was built for is more remote than ever. It also signifies Navy-wide force and budget cuts. But in the fight for post-Cold War procurement dollars the surface fleet will have one important advantage: practice and popular perception have created an image of the surface navy -- aircraft carriers, cruisers, amphibious ships -- as a profitable investment short of outright war; that, unlike submarines, surface combatants are a usable force in peacetime. At hand is, of course, that bundle of naval activities that are variously called presence, showing-the-flag, crisis response, or naval diplomacy.

Why Submarines Won't Do.

Three arguments are typically advanced to declare the submarine inherently unsuitable for presence purpose. First, the submarine cannot be seen. Traditional treatments of naval diplomacy maintain that the craft's most striking feature, stealth, conflicts with the very essence of naval crisis management, namely visible presence. The evident reasoning is that for a threat to be credible it must be communicated and that, if naval forces are used, this communication must come in a form that is for all to behold. The second objection concerns the submarine's design as a war-making platform. It is said to be an all-or-nothing weapon without the ability to engage in *proportional* violence. Eric Grove put the problem this way:

"... the kind of damage they can inflict with their primary torpedo or missile weapons is almost always fatal and catastrophic. This rules them out as weapons of much utility in operations at the lower levels of intensity -- if they are unleashed then it usually marks a major escalation of the conflict."

The third reason marshalled against the submarine as a military-diplomatic instrument relates to the first. When students of naval diplomacy speak of *presence* they mean warships that impress, i.e. ships with a physical appearance that exudes power. Submarines are said to fall short on this count for, unlike surface combatants, they do not sprout gun barrels or missile launchers. Worse even than the submarine's clean lines, the knowledge that hidden within is an awesome killing machine is said to project the wrong image. "Even when surfaced," writes Grove, "submarines have the appearance of stealthy, silent killers which alienates rather than attracts."

There are good practical and theoretical grounds for reassessing this common wisdom about the submarine's shortcomings as a presence force.

Deterrence, Crisis Stability, and Presence

Perhaps the most basic *rule* of deterrence holds that for a threat to be credible and hence successfully deter, it must be communicated. Theorists and practitioners are less certain, however, on how a threat should be communicated and how much information should be contained in the communication. The question is this: should a threat leave no doubt in the adversary's mind about what the threatener intends and is capable of doing, or is deterrence better served by leaving room for uncertainty? And related is the question of how one *packages* the threat in a way that accommodates the political need on the one hand to prevent escalation but that, at the same time, prepares the military for the failure of deterrence?

Deterrence theorists and practitioners have long discovered that there are no hard and fast answers -- with one exception: for reasons that are not obvious in either theory or practice it has become dogma that the communication of threats by seagoing forces must be overt, certain, and for the whole world to see! The very translation of the idea of naval suasion into the word *presence* implies that it cannot be otherwise.

The notion that naval forces *impress* only when they are visible and that crises can be *managed* from the seas only by the overt deployment of naval forces, can be taken to task on a number of grounds.

The reclama that comes to mind first concerns the invisible nature of the centerpiece of strategic deterrence and strategic crisis management, the SSBN fleet. But this is arguably a special case that operates by different rules than *conventional* deterrence. It is not clear that this is so, but be that as it may, there are other compelling reasons to test the insistence that naval suasion be visible and is therefore the monopoly of surface fleets.

How Visible is Visible?

If it is true that visibility is a critical ingredient in the business of naval presence, then the case can be made that, practically speaking, surface navies too fall short. *Presence* conveys the image of a stately procession of warships in full view of those that are intended to receive-the-message. The reality is very different for the simple reason that fleet movements, especially during a crisis, do not take place in full view of observers on the beach. The straightforward explanation is that international law would hardly permit the commander of a carrier battle group or say other crisis management force to deploy within a nation's 12-nautical miles territorial sea and claim innocent passage.

In sum, for surface flects too, presence is little more than a metaphor - a left-over perhaps from the days when naval blockades were close and sea battles were witnessed by crowds on the beach.

Crisis Stability and the Value of Invisibility

Deterrence theory offers further grounds for questioning that naval presence must be visible. At hand in particular is the concept of *crisis stability*. This says that international crisis managers must take care that their actions, especially the packaging of particular military forces, do not trigger inadvertent escalation. Measures to ensure crisis stability have a political and a military component. At the political level, decision-makers are cautioned to avoid steps, especially public steps, that *corner* an opponent. Thus, Blechman and Kaplan found in their book <u>Forces Without War</u> (p. 524) that, "national leaders will resist demands for policy modifications most strenuously when such demands are made publicly, which is usually unavoidable when military power is used."

If it is true, that depending on the circumstances, crisis stability is served by more or less publicity of the deterrer's actions, and if it is also granted that the dispatch of high-profile naval forces is, by definition, a very public signal, then it follows that there may be occasions that a covert display of force is called for. This at least has long been recognized at the strategic nuclear level of crisis management. The question is, why have naval crisis managers failed to take advantage of the ability to engage in the low-visibility signaling that is inherent in the submarine!

As noted, crisis stability has a military component as well. Military capabilities promote crisis stability if both sides perceive them as able to survive a surprise attack and retaliate. Deterrence theory has mostly been preoccupied with the stability of strategic nuclear forces, but the concept is equally applicable to conventional forces.

Again, the answer to the question whether a particular military force posture is stable or not depends on both sides perceiving it as such. For the deterrer, it depends on his confidence that he can *ride out* a surprise attack and retaliate, and his confidence that the opponent knows this. For the other side it depends on his estimate that the opposing force is indeed survivable and is therefore under no pressure to launch a preemptive surprise attack. The anathema of crisis stability then is force vulnerability.

Are surface presence forces more vulnerable to surprise attack and therefore potentially more crisis-destabilizing than submarines? One answer is that it depends on the situation, in particular the military capabilities of the opponent at hand. Thus, an adversary who is highly qualified in anti-submarine warfare (ASW) could make a *stable* submarine presence untenable. However, the most likely targets of future naval crisis deployments will be ASW-poor countries in the Third World. Yet, those same countries will also likely possess relatively more advanced anti-surface capabilities in the form of aircraft and missiles. This intimates that, all things being equal (which they admittedly usually are not), a surface presence offers an inherently better target-of-opportunity than the unknown whereabouts of a submarine flotilla.

The other answer is that the practice of U.S. naval crisis management has already demonstrated that, because of vulnerability, a surface presence can be de-stabilizing. The prominent case in point is the VINCENNES incident. Here, vulnerability, or at least perceived vulnerability, compelled the ship's Commanding Officer to launch a preemptive defense strike. The Navy's long-standing reluctance to deploy its most visible weapon, the aircraft carrier, inside constricted waters offers another clue.

In sum, one can readily envisage circumstances in which, politically or militarily, a carrier battlegroup or surface action force may not be the presence-of-choice; that, depending on the opponent, his record of accommodation to the threat of force, and his military capabilities, a *quiet* underwater presence should be resorted to.

The Proportionality Issue

The second major argument that is held up against the submarine as a political weapon is that it lacks proportionality - it cannot fire a weapon without meaning to kill and thereby commit the act of war that crisis management is supposed to prevent. More important, so the argument goes, the party whose behavior the submarine is supposed to influence knows this and will therefore not likely be impressed unless war itself is expected.

The proposition that the credibility of a warship as a tool of crisis management rests on its ability to threaten and, if necessary, inflict *proportionate* violence, can be tested on the following grounds.

The debate during the 1950s over how to make a nuclear threat credible led to two schools of thought. The *finality of deterrence* school held that successful deterrence hinges on the threatener's resolve to inflict punishment in-excess-of-the-crime. According to this view, a threat that is sufficiently terrifying never needs implementing. By contrast, the *credibility of deterrence* school maintained that for a threat to deter it must be believed. Accordingly, credibility is largely in the eye of the threatened beholder, notably his perception of the relationship between the threatened punishment and the offense. If the two are asymmetrical, deterrence will probably fail, so that successful deterrence at all levels of provocation depends on an arsenal of graduated or proportionate threats.

Related to these two approaches are two different perspectives on the use of controlled escalation as a crisis management technique. One holds that escalatory measures to show resolve must be gradual and moderate in order to reassure the opponent that outright warfare is not intended. The other rejects the gradual approach for prolonging the risk that is inherent in a crisis and for tempting the opponent to match every move.

The point to all of this is there is a legitimate difference of opinion on the merits of proportionality that critics of the submarine as a political tool have basically chosen to ignore.

There is a related question: What is the measure of proportionality? Should it be measured by its immediate results or its long-term effect? A case in point is the sinking of the Argentine cruiser BELGRANO by the British submarine CONQUEROR during the Falklands war. Critics condemned the act as disproportionate; the Argentines had received no direct warning and BELGRANO posed no immediate danger to the advancing British task force. At a minimum, CONQUEROR should have fired a warning shot first. Defenders, on the other hand, have argued that the submarine's action was entirely appropriate and proportional to the broader issue at hand. The loss of BELGRANO sent a message that compelled the Argentine fleet to stay in port and thereby saved many lives, British and Argentine.

Proportionality Depends on the Crime

Proportionality says that the threat of punishment must be commensurate with the crime. It does not say that only minor crimes count. What is striking however about the indictment of the submarine as lacking in proportionality is that it rests on its shortcomings in a very small and relatively benign portion of the overall crisis spectrum. In other words, critics have generalized from the submarine's inability to point a gun, fire a shot-acrossthe-bow, and force a ship to heave to short of sinking it.

It is true that the modern submarine cannot fire a demonstrative shot-across-the-bow. It is certainly technically feasible to launch a torpedo that is deliberately fuzed short of the target, but at some one million dollars each, wasting a warshot is difficult to justify. The alternative is to prepare the submarine for surface action and reintroduce the gun mount that vanished when underwater hunting-and-killing of enemy submarines became the craft's first priority. Before this can happen however, submariners must first be persuaded that there is life after stealth.

But it is narrow-sighted to insist that the value of the submarine as a tool of naval diplomacy stands or falls on the ability to enforce a blockade of seagoing traffic short of an act of war. The recent war in the Persian Gulf has highlighted the value of naval forces to enforce an embargo, but most of the international crises in recent memory that involved the dispatch of naval forces did not involve warnings to shipping to heave to or be sunk. Instead, most of the episodes involved *latent* presence without the firing of a gun or missile. In those cases where latent violence did become *active* it was mostly done with the intent to kill.

The submarine may not be the platform-of-choice to enforce an embargo, but this does not automatically exclude it from the whole spectrum of naval suasive tasks. Would the threat of a salvo of submarine-fired Tomahawk missiles have been less proportional than the Sixth Fleet's carrier strike against Libya in 1986?

Warship Aesthetics and Politics

The tendency of skeptics of the submarine as a weapon-ofpresence to generalize from the particular is evident also in the claim that the craft's physical appearance makes it unsuitable for representational purposes. Most observers of the naval scene agree that some ships *look better* than others. The visual impressiveness of the Soviet Navy's cruisers and destroyers compared with Western ships has often been commented on favorably. But the aesthetics of a warship only matter at the bottom of the naval presence ladder: the friendly port call. Even then, there are exceptions.

Foreign port calls are made for a variety of reasons. Some are designed to show political support for a friend or ally in trouble; others are a routine reminder of a military link; and still others are operational visits for the purpose of crew rest and recreation and logistics. An important corollary purpose in any event is to garner the goodwill of the local populace.
The submarine is not a practical platform for popular goodwill visits, if for no other reason than that it cannot accommodate the hundreds, sometimes thousands of visitors that want to set foot on their first ship. But, depending on the message that wants getting across, the submarine can still be the political platform of choice. A prominent case in point is a visit by the Polaris submarine SAM HOUSTON to the Turkish port of Izmir in April 1963. Had this been a routine representational call the visitor would have been one of the Sixth Fleet's carriers or cruisers normally on duty in the area. At hand, however, was a distinct political signal -- as weighty as the one conveyed by the battleship MISSOURI 17 years earlier. The intent was to reassure Turkey and at the same time remind the Soviet Union that the recent removal of Jupiter missiles from Turkish soil did not signify a lessening of America's strategic nuclear guarantee. Some analysts have argued that the temporary visit of U.S. seabased missiles could not be an adequate substitute for the permanency of the ground-based Jupiters. But be that as it may, the point is that at this particular moment U.S. decision makers believed that only a submarine could send the appropriate signal.

Warship Capability and Appearance in the Third World

Implicit in the claim that foreign port calls to impress must be the business of *awe-inspiring* ships is the suggestion that foreigners, especially the citizens of the developing nations, cannot appreciate a warship that does not show its power by way of deck mounted guns and missile launchers. This may be true for the average viewer, but the claim grossly underestimates the sophistication of the audience that ultimately matters: the host country's political and military elite. Developed and developing nations transact business in the same global arms market; between <u>Jane's Fighting Ships</u> and other professional publications, and the proliferation of regional hardware shows, the modern Third World leader is fully aware of the submarine's hidden capacity for violence. If proof is needed, one has to only consider the submarine's popularity among Third World navies.

Conclusion

Today, the U.S. Navy confronts the necessity of finding innovative ways of doing more-with-less. Overall fleet levels are declining; the goal of a 600-ship navy with 15 aircraft carriers has already been down-sized to a 450-ship fleet centered around one dozen carriers. Even these numbers are not sacrosanct. At the same time, national policy dictates that forward presence remain one of the "pillars" of the Nation's security. The implication for the Navy and the Nation is obvious: neither will long be able to afford for *presence* to be the privilege of *visible* warships alone. Naval officers will need to turn their thoughts to new ways of efficiently amortizing all of their assets.

This observation matters especially for the submarine community. Given that the curtain has fallen on the Cold War, submariners will need to persuade the body politic that, even without the specter of another Atlantic tonnage war, the underwater platform is a capital investment in war and in peace.

[Ed. Note: A longer version of this article appears in the October edition of the Naval Institute Proceedings.]



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ONE HUNDRED DAYS: THE MEMOIRS OF THE FALKLANDS BATTLE GROUP COMMANDER

by Admiral Sir John Woodward with Patrick Robinson Annapolis, MD, Naval Institute Press, 1992 Pp. 351, Price: \$24.95 ISBN: 1-55750-651-5.

reviewed by Ken Cox and Tom Maloney

"One way and another it was emerging as a pretty good plan of operations. And somehow, we would manage to keep it, almost to the day."

The plan was Admiral Sandy Woodward's blueprint for Operation Corporate, the British campaign to retake the Falkland Islands from Argentine forces in the spring of 1982. Working backwards from the latest date the weather and endurance of Royal Navy forces could support the land battle, Woodward and his staff devised a plan to neutralize the Argentine Navy and Air Force, put the landing force ashore, and support the British Army and Royal Marines in their fight to recapture the Islands. And keep the plan they did; 8000 miles from the United Kingdom, with marginal forces for the task, with no airborne early warning and greatly outnumbered in the air, Admiral Woodward and his men skillfully executed an amphibious campaign that many observers believed was certain to fail. The story of Operation Corporate vividly demonstrates the great virtue of setting the objective, making a plan for success, and then sticking to that plan regardless of the adversity encountered in its execution.

<u>One Hundred Days</u> is Admiral Woodward's gripping tale of his one hundred days as the Falklands Battle Group Commander. His book may be a harbinger of how naval forces -originally designed for global warfare -- will be employed in regional conflict. <u>One Hundred Days</u> is particularly thoughtprovoking for those in the submarine community who are now struggling with submarine roles and missions in the post-Cold War world. One can easily find in this work a number of important *lessons learned* in the areas of politics, doctrine, training, motivation and maintenance philosophy. In the reviewers' opinion, Admiral Woodward made a wise choice to select as his collaborator an author who is neither a naval historian nor has a military background. As he explains in the Preface, "... it made the entire project more onerous, in that I would be permitted to take nothing for granted on behalf of my readers." His choice and the consequent unburdening to Patrick Robinson paid big dividends in the depth and lucidity of the work.

This decision would appear to be characteristic of this officer who in his own words, "...was one of a dying breed of officers who had effectively been in dark blue uniform since leaving preparatory school at the age of thirteen" and rose during a forty-three year career to the rank of admiral through a combination of talent, shrewd judgment and wise mentors like Admirals Squires, Herbert and Tait. Like General of the Army Douglas MacArthur, he choose his sponsors well, notwithstanding the underlying friction between Admiral Woodward and the late Admiral Sir John Fieldhouse related in the narrative. Woodward's experience in a career spanning the period from the close of World War II through the entire Cold War offers an interesting example for naval officers now enmeshed in the transition to the post-Cold War era. Interestingly, Woodward makes the point that he was not a volunteer for submarines and made some of his career decisions accordingly.

Woodward's memoir covers in considerable detail the Royal Navy's role in Great Britain's improbable, yet inevitable involvement in the Falklands War. Improbable in that few expected that a Navy rich in history and tradition, designed and trained to counter the Soviet threat in northern waters would experience what may have been its last hurrah against a brave, but professionally second-rate opponent, and would win by a nose through a combination of military skill, esprit de corps, guts, and often unreliable technology. Britain's involvement in the Falkland's War was inevitable, as one quickly appreciates from Prime Minister Margaret Thatcher's Foreword to the book. In her words, "The issue, from the start, was one of purest principle. Foreign governments all over the world waited ... for our reaction. But the British people, everywhere, knew there could only be one answer."

In making this answer there was a remarkable coincidence of national will and the good fortune that the Royal Navy had a task force in being, at-sea and more or less ready for war. The Royal Navy was not quite yet on the shelf, training with simulators and awaiting reconstitution. Had the Argentine junta waited six months to a year longer, the British spirit may still have been willing, but the wherewithal lacking, a casualty of Mr. John Nott's defense cuts. As it was, ships being deactivated were reloaded and sailed south to the Falklands, providing the thin margin required for victory. Admiral Woodward states that, at its inception, a number of "competent organizations" suspected that Operation Corporate was doomed. Among these naysayers were: the United States Navy, the Ministry of Defence in Whitehall, the British Army, the Royal Air Force, and the Secretary of State for Defence, Sir John Nott.

From the submariners' perspective, the minimal treatment given to the British submarine involvement in the war is surprising. Other than describing HMS COURAGEOUS' action against ARA BELGRANO -- including Woodward's energetic actions to precipitate the attack -- and relating the disagreement over who should control the submarines, the on-scene battle group commander (Woodward) or Flag Officer Submarines (FOSM), the author essentially ignores the presence or impact of the British submarines. Admiral Woodward describes his frustration with his inability to use HMS COURAGEOUS against the Argentina aircraft carrier, ARA VEINTECINCO DE MAYO, and while he indicates that he was doubly irritated when FOSM was proven right, he does not share with the reader why FOSM's decision was correct. Nowhere does he give the Royal Navy submarines credit for their work in intelligence and early warning or their use in special warfare. For some reason, the facts that submarines were the first ships on station in the Falklands, among the last to leave, and that a diesel-electric submarine participated were omitted. Perhaps these omissions generally relating to intelligence matters and special forces result from security considerations. Indeed, the very limited coverage of intelligence and C3I considerations throughout the book cannot be accidental. For completeness, and from the submarine-associated readers' viewpoint, Woodward's views on the effectiveness of submarines in tactical intelligence and special warfare missions would be of considerable interest today, when the submarine's role in regional conflicts is hotly debated. One also wonders whether or not serious consideration was given to establishing a submarine blockade of the Argentine coast, or if this strategy was too aggressive for even the Iron Lady.

Even granted that the Argentine Air Force posed the most evident and immediate threat to the British task force, the ASW threat to the force is given surprisingly short shrift. This makes an especially interesting contrast to the oft-repeated warnings in contemporary journals and forums of the disaster nearly visited upon the Battle Group by a single diesel-electric submarine. Admiral Woodward generally denigrates the skills of the Argentine submarines, especially ARA SAN LUIS, indicating that her commanding officer would not have passed a British PERISHER (Prospective Commanding Officer's Course). Nevertheless, there is a persistent discourse throughout the book on the vulnerability of his two "floating airfields" to submarines, as well as to other threats including aircraft, mines and commandos. It is interesting to speculate what the potential impact would have been had the Argentine submarines been armed with Exocet missiles as were their aircraft and surface ships.

A particularly germane issue is the unreliability the Royal Navy experienced with their latest and best weaponry such as Sea Dart and Sea Wolf. The weapons systems' inability to discriminate or lock on to targets and the missiles that failed to launch due to frozen microswitches and jammed doors, gives one pause to think how the same weapons would have performed in the North Atlantic against the adversary for which they were designed. Was this is the result of the difficult conditions under which the conflict was waged, or an endemic problem of material readiness due to limited resources or maintenance philosophy? Based on our experience with the Royal Navy, the reviewers suspect the latter. Indeed, one senses a bit of a modern day "There seems to be something wrong with our bloody ships today" flavor in the recounting of the weapons systems' failures and shortcomings. For instance, quoting Woodward on "poor old CONQUEROR" failing to receive the signal to attack ARA BELGRANO, he states: "They had, unfortunately, a very dicky radio mast that kept going wrong ... " As an interesting aside, Admiral Woodward brings in the issue of Britain's decision to trim conventional naval forces for Trident; an issue that directly related to the planned sale of HMS HERMES and HMS INVINCIBLE, which would have made the Falklands' affair moot. In light of the current world situation, it is intriguing to speculate whether the Trident decision is one that Britain will regret.

Jointness and Public Affairs, particularly face-to-face dealings with the press, are addressed appropriately. Admiral Woodward's self-admitted lack of appreciation of the ways and capabilities of other elements of his joint command, with special mention of special operations forces, is an important lesson for current and future naval officers who may be called upon to lead joint or combined operations. While not jointness in the current sense of the term, it is informative to learn how many of Woodward's Band of Brothers, the captains of the frigates, destroyers and carriers, were former submarine commanding officers or from the Fleet Air Arm. Admiral Woodward himself had at one time been the captain of the ill-fated HMS SHEFFIELD, which understandably figures significantly in his narration of the campaign. In most cases, he gives great credit to these officers for the professional skills and experience they brought to their surface commands from their respective backgrounds. Perhaps, it is not too far-fetched for the shrinking U.S. Navy to consider employing its officers across the union lines that have formed over the past three plus decades.

The British Press gets well-deserved rough treatment, especially for the release of information on impending task force or troop movements that many believe contributed to British casualties. One wonders about the efficacy of the Royal Navy's censorship system which had -- probably for the last time in history -- total control of the means of communications from the scene of the action. Admiral Woodward condemns the Press as not being on "our" side during the conflict, and for their self-portraval as fearless seekers and tellers of truth, consequences be damned. He cites the fact that, early in the war. Argentine bombs had not exploded on impact, but this was to change later in the conflict, presumably after a press announcement. He also credits the BBC with announcing to the world that the Amphibious Group had joined up with the Battle Group, and later tipping off the Argentines that an attack on Goose Green was imminent. (Shades of the Japanese resetting their depth charges in the Second World War after a public U.S. pronouncement that U.S. submarines were operating below them.) Woodward relates that, after the conflict, the Argentine generals and admirals admitted that they gained ninety percent of all of their intelligence from the British Press!

Particularly striking in Admiral Woodward's very personal commentary is his realization that after all his years as a serving officer, he was for the first time confronted with decisions that were truly life and death in implication. This is not a point to be missed by officers who are reared in a world of technological excellence, shipboard examinations and competitive exercises. As Lt-General Sir John Winthop Hackett stated at the Lees Knowles lectures given at Trinity College, Cambridge in 1962: "The essential basis of the military life is the ordered application of force under an *unlimited liability*. It is the unlimited liability which sets the man who embraces that life somewhat apart...."

Although not intended by the author, Americans can take a powerful message from Woodward's account of a narrowly-won campaign fought half-way around the world from the mother country. One forms the image of a once-formidable Navy, the victim of short-sighted budget cuts, unable to sustain deployed naval forces through the austral winter, forced into a risky strategic plan with few alternatives, and winning by a whisker against a Third World opponent armed with mainly obsolete equipment and a few modern weapons. Could this be the image of the future for America? With the prospect of unrestrained cuts in the U.S. defense budget, the United States Navy could be headed toward a similar fate by the turn of the century unless the message of the Falklands, and a somewhat similar signal from the Persian Gulf, are understood and acted upon by those setting national priorities.

The book's major shortcoming is the paucity of chartlets, maps and data tables; the reader is left wholly on his or her own in picturing the location and formation of the opposing forces, their number and movements, and in understanding the basic capabilities of the major combatants and their weapon systems. The reviewers were quickly forced into Jane's and other references in order to follow Woodward's concerns, plans and decisions. Special AAW defensive schemes such as the Type 42/Type 22 combination which Woodward referred to repeatedly make little sense without a minimum of background information. Understanding the Battle Group's support to the British Army and Royal Marines fighting ashore was impossible without reference to basic maps of the land battle in other sources. We recognize that One Hundred Days is a personal memoir rather than a definitive historical work; nonetheless, a more generous use of illustrations would greatly benefit both the casual reader and the serious historian, especially in an edition published for an American audience generally unfamiliar with British ships and weapons. The editors can readily eliminate this annoying deficiency in future editions, thereby materially improving an otherwise outstanding personal account.

While Britain's battle to recover the Falkland Islands may have been viewed as "A damned close run thing," to borrow the oft-used quote attributed to the Duke of Wellington after the battle of Waterloo, Admiral Woodward's memoir wins by an English mile as a unique and bold exposition of the inner thoughts, doubts and trepidations of a submariner thrown by history into a campaign with few precedents, and unlikely to be repeated. One Hundred Days provides us with a vivid and important reminder that naval battles are not won by high tech weapons, but rather by the professional skills, courage and steadfastness of sailors and their officers who, as Admiral Woodward tells the reader, go together into battle. As we in the United States, in the aftermath of the Cold War and the low loss - high tech victory in the Gulf, fashion a smaller Navy equipped with great emphasis on sophisticated smart weapons, we would do well to heed the valuable lessons Admiral Woodward has offered.



IN REMEMBRANCE

Captain Thomas Albee, USN(Ret.)

Rear Admiral Henry C. Bruton, USN(Ret.)

Captain John F. Campbell, USN(Ret.)

Lieutenant Commander Delbert A. Sexton, USN(Ret.)

Commander Jesse Z. Schultz, USN(Ret.)

Captain Robert D. Thompson, USN(Ret.)

Commander Peter Cremer Thursby, FDR Navy (Ret.)

SUBMARINE COMMAND AND CONTROL IN THE NEW WORLD ORDER

by Jerry Holland

A lthough touted as a model for any application requiring avoidance of detection, the submarine command and control methodologies developed since 1942 and perfected in the last twenty years may not be optimum for submarine operations in the immediate future. While present systems are robust and the command and control relationships vibrant, the conditions in which submarines are likely to be employed in the 1990's and early 21st century promise to be dramatically different than the ones for which these systems and methods have been built.

The present systems were crected assuming that the submarine campaign, either anti-submarine or anti-surface ship warfare or both, would be conducted on the high seas. The design assumes opposition, that an ASW capability would exist in the targets attacked and areas penetrated. And finally the procedures assume the potential enemy would be able to field effective electronic countermeasures. These conditions still exist when addressing the maritime forces of Russia, Britain, and in some circumstances, France. However, it is hard to envision any other country able to mount an effective ASW threat or a sophisticated ECCM effort.

The lack of an enemy ASW capability changes the nature of submarine conduct. When coupled with the absence of electronics countermeasures, the submarine can take a wide range of actions otherwise avoided in order to remain undetected. Finally, in foreseeable circumstances, submarine operations are more likely to be conducted as part of an area campaign, close inshore in support of power projection or covert actions.

In conducting some of the operations outlined in the ACNO (Undersea Warfare) white paper, <u>Submarine Roles in the 1990's</u> and Beyond of January 1992 (summarized in the SUBMARINE REVIEW, April 1992), two way real-time communications may be very helpful, perhaps even vital. Examining the roles and accompanying scenarios outlined in the Navy's paper, five of the seven areas described seem to be prime candidates where such capability would be useful. Peacetime Engagement and Deterrence remain functions best satisfied by the present mechanisms. The other five,

Surveillance

- Precision Strike
- Sea Denial
- Task Group Support
- Ground Warfare Support (covert insertion)

are situations in which real-time two way communications may be very helpful. Probably most importantly because these are scenarios in which current intelligence is at a premium and in which command authorities rarely make up their collective mind in a timely manner.

The actions leading up to the sinking of the Argentine cruiser BELGRANO during the Falkland Campaign evidence the difficulty attendant to submarine warfare in a limited war. In that case, the highest levels of government were involved in a decision to fire a torpedo, thereby initiating the major violence. Even with such a dynamic leader as Mrs. Thatcher, the decision was not easy to reach, was formulated in an aura of false intelligence and had to accommodate improper directives from the on-scene Task Force Commander. Communication limitations prevented direct communication among all involved and imposed significant time barriers in transmissions between the various actors.

While most of the difficulties in this case arose from social problems endemic to any political process and to all military command and control arrangements, technological improvements both caused some and solved many. Technology permitted government authorities at a national level to make real time decisions about the amount and type of force to be applied in a limited conflict. Those who suffered through selection of bombing targets in the White House during the Viet-Nam War may object strenuously to such decision making, but it is more likely to grow than to disappear. Submarines, which probably will be first on the scene and the closest-in observers, will be concerned about such processes because they will be a prime gatherer of information are very likely to be the first shooters in such a contest.

Some of the questions and cross talk exemplified in the BELGRANO episode can be eliminated. Two developments make possible highly accurate information exchange without the time delays and errors inherent in prose reports. First, data bases of immense size are now routine and promise to get larger as well as more easily and swiftly accessible. Second, the networking of computers, their use as communication devices and the concomitant display of information as symbols rather than as text, allow integration of vast amounts of information. Much is clarified by allowing all the players, wherever they may be, to view the same display.

The Naval Tactical Data System (NTDS) pioneered this world even though limited to small computer memories and relatively slow data rates inherent in HF radio communications. These technical limitations have been dramatically overcome. Communication satellites expanded the use of the higher frequency bands, which travel only in the line of sight, to long ranges. With this higher frequency, vastly more data can be transmitted per unit time. This move from HF to UHF increased the data rate by an order of magnitude.

Submarines were among the earliest beneficiaries of the opening of these higher spectra. The Submarine Satellite Exchange System (SSIXS) was among the earliest of the UHF Satellite users and became a model for other information exchange systems. Over-the-horizon targeting systems for submarine launched TOMAHAWK pioneered data exchange through this medium and launched the Tactical Data Exchange Systems (TADIXS).

Even higher data rates are available in the SHF and EHF bands above UHF. While limitations of the space segment essentially eliminate SHF from submarine support, the MILSTAR satellite which exploits the EHF band, conceived as a communications system for strategic nuclear systems, contained a dedicated link for SSBNs. Procurement of EHF receivers for submarines was planned early in this slowly developing program. MILSTAR is now being modified to serve more tactical uses and the last two UHF Satellites put into orbit carried EHF transceivers to test systems. The combination of these actions will put the submarine force into the EHF band well ahead of other service components.

The high data rate available in EHF will open the door to computer networking and will permit transmission of near realtime video. The Gulf War spawned a taste for video in command centers as well as in living rooms. Remotely piloted vehicles (RPV) carrying TV cameras became instruments for scouting and spotting naval gunfire. The manufacturers of this device advertise their product showing video tapes of Iraqi soldiers surrendering to an RPV. This taste for real-time intelligence will grow as technology closes in on Dick Tracy wrist watches and cameras the size of cigarette packages. The pervasiveness of CNN is likely to lead military and political leaders to expect video from submarines performing surveillance and reconnaissance operations. Data compression techniques coupled with EHF transmission capability make this expectation possible. Such data probably will have two effects. First, decision makers will become believers in what is being reported. And then they will demand more.

While it is almost inevitable that senior levels will overmanage the scene of action in situations where communications are readily available, the models of Desert Storm and Grenada testify that such dangers can be avoided or at least diminished by good information flow from the scene to the headquarters. The real dangers in such a situation are that the senior managers, primarily political actors, will not recognize messages which are not sent or will be unable to realistically estimate the time necessary to respond to an ordered action. These dangers do not, in themselves, argue to artificially limit communications. In any event, the submariners' historic response to these difficulties, "Lower all masts and antennas. Make your depth 150 feet", will not be an available option in the inshore waters and smallsea-area campaigns of the next ten years.

The result of all of these political, operational and technical circumstances will be to cause the submarine to work in the surface duct with antennae exposed most of the time. Such operating conditions are not novel. But in addition to listening, looking and recording, the submarine will be able to report with impunity and receive instructions almost instantaneously.

Much of the technology involved in these changes has or will come from outside the submarine force and its historically associated research and development centers. A Navy-wide information exchange architecture, labelled Copernicus, has been developed to absorb the immense demands of the intelligence system into a finite electromagnetic spectrum and a physically limited communications capability. The architecture links headquarters, including those afloat, providing an operating medium in which real-time high value information can be shared quickly among a vast audience.

The chief advance in Copernicus is its emphasis on the product users. Copernicus is essentially a large computer network in which information is exchanged in digits and displayed in symbols not in words. Messages are sent from one computer terminal to others through communications systems transparent to the user. These computers create new problems - interface compatibility, security of displays and data bases, virus protection, and more. But the concept has been proven in the Joint Visual Indications Display System, a JCS development which grew from the computer link pioneered in the Atlantic Fleet as JOTS. The Cruise Missile On-Board Targeting System in surface ships was a similarly successful scheme.

The submarine Over-the-Horizon Targeting System was an early scheme which linked computers through high data rate communications. The pilot effort in this regard, OUTLAW SHARK, was more expensive and more cumbersome than JOTS chiefly because it was a generation earlier in computer technology and was built using the customary defense acquisition process. JOTS, on the other hand, a jury rig of commercial computers in the hands of smart operators, was inexpensive and effective. The computer programs which ran JOTS were developed incrementally under the immediate direction of the users. Adaptation of these design philosophies in Copernicus related developments are sure to discomfort the Systems Commands and the Naval Laboratories but similar schemes have produced useful equipment at low cost with few of the drastic side effects predicted by the detractors.

Advances in data base manipulation are deluging civil applications. Military applications are just beginning -- and not without growing pains. But replacement of paper and then tape by compact disks and other memory devices containing vast amounts of information in a tiny space at next to no cost is occurring now in specific applications. Conversion of military systems to these very large, very dense media is just a matter of time.

Shared data bases have always been a feature of the submarine command and control designs - even when such sharing was only in the minds of the commanders. The advantages in such systems are not always appreciated. With huge data bases residing at each end of a communications path, only tiny amounts of information have to be transmitted electronically to update resident data to reflect current status.

Video is probably the best example of how these two technologies, high data rate transmission and common data bases of great dimensions have application. Instead of sending the data necessary to construct a whole picture, only changes to an existing picture are transmitted. This reduces the amount of data immensely and permits small camera apertures and small transmitters to send useful data over limited band widths. In application, a video-reconnaissance report of a previously surveyed beach would involve comparing the video recorded at the time with the picture residing in the common data base and sending only the changes to headquarters. The scene on the screen at the end of the path would present the amalgamation of the video in the data base with the changes transmitted from the reconnaissance vehicle. The presentation on the screen at both ends would be the current picture.

To make this sort of reporting work, the location of the reporter and reported must be accurately known by the computers which will assemble the picture from the two data bases. The Geographic Positioning System, GPS, a satellite navigation system provides just this capability. GPS represents a vast leap forward in command and control and coordination. The significance of having everyone know their own location is appreciated most by those with experience in command and control of coordinated arms. "I wonder where he really is?" is a routine question in such situations at sea. GPS makes these concerns disappear. For all scouts so equipped, reporting of precise locations is now possible. Targeting by using simple offsets – much like gunfire spotting – can be achieved easily.

With all of these considerations, where are submarine command and control and communications likely to go? Easy to envision is a return to Direct Support, with a Submarine Element Commander serving as a Submarine Operating Authority for some local area in the Flagship or Theater Headquarters. Supporting communications for this and more customary arrangements where battle groups or other forces are not in close proximity are likely to change as the threat to American submarines is recognized to be small or non-existent. Past efforts to extend communications coverage further into the submarine's operating envelope, i.e. deeper into the ocean, will give way to demands for higher data rates, more reliable antennae which can be used at higher speeds and improvements in data base configurations, manipulations and size.

VLF radio will continue to provide the backbone of the communications for routine operations, long transits and support of the strategic submarine force. Its reliability and long range cannot be duplicated. VLF's lower register sister, ELF, now requires only maintenance costs while providing a full time alerting system for SSBN operations and communications under the icecap. These two systems must be maintained because they are the only ones which can reach into the ocean and which can provide the surety which is a hallmark of strategic deterrence.

However the new backbone for submarine operations in the five roles described above will become satellite communications. The UHF Satellites, FLEETSAT and LEASAT, provide that service now. Submarines continue to own a dedicated slice of what has become a severely limited national resource. The techniques to get more capacity out of this part of the spectrum through shared time and demand multiplication (DAMA) can be expected to heighten as ever more services and forces try to exploit this system. When MILSTAR finally achieves orbit, submarines will be an early user for the reasons outlined earlier.

Learning how to use commercial communication satellites will have to be examined as well. Commercial links were vital in Desert Shield/Desert Storm logistics and opened the door to Defense Department use of a wide range of commercial communications systems. Of particular interest will be a commercial telephone satellite system, planned by Motorola, which promises to link cellular telephones throughout the land masses of the world by the year 2000. A call home from the Crew's Mess will not be unrealistic for the next generation of submariners.

Finally HF radio – those *short wave* frequencies which not too many years ago were the only path for submarine originated messages – will remain a useful and necessary backup. This frequency band is simple to use, equipment is inexpensive, and use is world wide. The medium is fickle however. Reliable paths have been hard to find, impossible to guarantee. The problem has been attacked vigorously over the past few years and real progress has been made in developing equipment which identifies paths which are reliable. Desert Storm rejuvenated military HF when the Army and Air Force found themselves on a battle ground much larger than expected, one in which the ranges of UHF and VHF were inadequate to keep the tooth and tail of fast moving armored columns tied together. Similar battlefield conditions are sure to be settings in the campaigns ahead.

Because procurement will be small in number, submarines must avoid equipments which are peculiar or unique. Common hardware and software has the advantage of promoting interoperability. While this may delay introduction of new technology, homogeneity of communications among all forces will become an increasingly important requirement in the future as joint operations become the norm.

In this new climate, exotic systems for communicating with submarines at speed and depth are less attractive than ever. On the other hand, better submarine antennae will be in big demand. Getting more gain and wider bandwidth out of smaller size is a real engineering challenge because the physics works against this combination. Improved mechanical reliability will always be sought and of great importance to operations concentrated at periscope depth will be the ability to use the masts at higher speeds.

Direct downlinks from space based sensors is an advance not related to submarines themselves but one which will effect the submarine operations significantly. Direct communications from some satellites to some ships are present now but generally these have been ignored by submarines built and trained for war in the great scas. The natural marriage of submarines and space based sensors will be consummated in operations where periscope depth operations are the norm and not the exception. This development will give the submarine the ability to get over-the-horizon observations in real time.

With all of these improvements there will remain some limitations on submarine operations caused by lack of communications. Such areas offer opportunities for future invention. While not vitally necessary, it would be nice to have a really good long range underwater telephone – even nicer if it was secure. Acoustic IFF and covert ranging devices would permit cooperative engagements and reduce water management problems. Autonomous or remotely piloted vehicles launched from submarines, which could serve as couriers and as sensors, are obvious areas of opportunity. However, the likelihood of large new investment in any of these fields seems remote.

The submarine's role in the inventory of a single superpower is less substantial than it was in the old order. However, the submarine is by no means passe. It offers great advantages to any nation other than the super power in a guerre de course. It is the one conventional weapon system with which a small navy, if it can master the tool, can intimidate or inhibit a much larger one. The nuclear submarine dominates the seas: no ship can operate very long where a nuclear submarine opposes it. Where employed, the submarine denies the sea to the enemy and opens it to the friend. These are all traditional missions. In the other missions of the new order for which it is fitted, submarines can make the real contributions. In these applications, advances in information transmission and management technology will be among the most important improvements in the capabilities to be pursued. In the campaigns of the next thirty years, information is likely to be more important than ordnance.

SUBMARINE WARFARE - NEW CHALLENGES

by Jerry Green

Introduction.

The dramatic change in the international situation and the rapid evolution of technology presents the submarine force with opportunities to expand submarine missions and to increase submarine military effectiveness.

Regional uncertainties have resulted in threats to U.S. military forces which are more complex and much less focused than at anytime in recent memory. In addition, the dramatic changes in the former Soviet Union have created a situation in which the world's largest military force is potentially for sale.

Those nations with aggressive tendencies in the Third World can see from the Desert Storm experience the high leverage that can be gained by submarines for both defense against, and disruption of, a long-range intervention effort. They can also appreciate that a hole exists in their littoral defense without some anti-U.S. submarine protection.

It is not hard to imagine Third World countries buying former Soviet submarines and ASW systems in substantial numbers. Further, increased investment in underseas technologies by these same countries could make the former Soviet systems even more effective.

This threat change challenges U.S. naval forces credibility, flexibility and deterrence capabilities. USN Battle Groups, Amphibious Assault and Military Sealift units can become seriously threatened by Third World submarine forces enhanced with ex-Soviet systems and technology.

The potential development of credible undersea warfare capability in a Third World adventurist nation is not necessarily limited to a regional, wholly defensive concern. Because submarine warfare is not dependent on sea control, or supremacy of force, offensive operations can be carried out much as the U-Boats did in two world wars. This potential creates the requirement to counter this threat with new approaches to U.S. submarine effectiveness - both offensively and defensively.

Submarine Force Strengths and Vulnerabilities.

At this point in the development of U.S. submarines, the Force represents an overwhelming challenge to any threat or potential threat. At the technical-tactical level this is primarily as a result of superior sensor and stealth technologies, especially acoustic. At the strategic-operational level U.S. submarines are a formidable force because of their self-sufficiency, mobility and multi-mission capabilities.

Nevertheless, there are vulnerabilities which cause some concerns. U.S. submarines, for example:

- operate out of a small number of easily approachable bases.
- · are decreasing in force levels as budgets are cut, and
- employ weapons which are noisy and easily detected.

The March of Technologies.

It is reasonable to postulate that the push of technology will provide other nations with submarines and submarine systems with substantially increased capabilities. Without forecasting a specific date when these capabilities will be achieved, the list below describes some of them:

Stealth

- Radiated noise of 110 db or less at speeds below 15 knots.
- Target strength reduction (12 db stealth) coatings.

Sensors

- High gain (20 to 30 db) towed arrays.
- Narrow and broad band processing improvement (20db).

Weapons

- Quiet launch, quiet run-out 30-inch weapons.
- Smart mobile mines with ranges of 100 to 300 nm.
- Highly accurate cruise missiles with ranges out to 1500nm.

Off-Board Systems

- UUVs capable of penetration into harbors/anchorages with a variety of sensors and devices.
- UUVs with low speed/long range profiles capable of deploying hundreds of miles of low-loss fiber optic cable and sensors.
- Submarines capable of deploying and managing the operations of such UUVs.
- Swimmer delivery vehicles capable of delivering and retrieving special warfare forces at ranges up to 100 nm or more.

It is assumed that the US will develop these capabilities where they do not presently exist. Other nations will obtain them through outright purchase, barter and espionage, or through their own indigenous R&D programs. While any one of these programs would not in itself present an overwhelming problem, combinations of them would require restructuring of U.S. programs and would compel significant changes in operating modes and tactical doctrine.

Implications of Improved Foreign Submarine Capabilities Submarine Quieting

It is difficult to estimate precisely what quieting levels may be achieved by future generations of submarines. If, for instance, radiated acoustic levels do not exceed 100 or 110 db, then passive detection of them would occur only at extremely short ranges.

Even if the radiated noise levels of U.S. submarines were below ambient and even if U.S. submarines had detection and signal processing systems that provided a total of 35 db of system gain, ultra-quiet aggressor submarines could not be detected at ranges greater than 1 to 2 miles.

It should be noted that, modern U.S. submarines would still have a figure-of-merit advantage, and would be able to detect other submarines before we were counter-detected. However, all detection and counterdetections would occur at very short ranges.

Submarine Sonar Target Strength Reduction

Target strength is a measure of submarine vulnerability to detection by active sonars. As a result, substantial efforts have been made to develop coatings (among other techniques) to reduce active sonar target strength.

It is reasonable to postulate that non-U.S. submarine designers are intensely interested in coating technology. Eventually, coating, the performance of which might achieve as much as a 10-12 db reduction in sonar target strengths, will be available. A reduction of 12 db in sonar target strength will reduce the active detection range by a factor of 2.

Assuming U.S. sonar performance did not improve by a comparable amount, then the average range for active detection would be reduced to several miles or less. From the standpoint of enemy submarines being able to attack U.S. naval vessels employing sonars in the 3-10 Khz range, this would be a considerable advantage.

Other target strength technologies could cause similar concerns.

High Gain (20 to 30 db) Towed Arrays

At present, U.S. towed array technology is believed to be significantly more developed than that of other nations. Though considerable sophistication is employed in U.S. arrays, there is no intrinsic reason why eventually others can not field high gain towed arrays.

In principal, any modern Navy could develop and deploy very long towed arrays. Given the proven capabilities of fiber optic technology, there is no reason why they can not develop arrays with gains of 20 db or greater.

If several such arrays were multiplexed on the same cable, the effective gain could be on the order of 25-30 db. With such a capability a non-U.S. submarine might have a significant capability against U.S. submarines. Detection ranges as great as 3-5 miles might be achieved.

Narrow and Broad Band Processing Capability

Foreign signal processing techniques have been considered to be behind those of the U.S. The most likely cause for this lag is probably related to deficiencies in computer processing technology.

Certainly, the principals of signal processing are no mystery to competent engineers and scientists. It would therefore be safe to assume that within the next 5-20 years the availability of 20 db of processing gain would increase their detection range proportionally to the number of db of improvement they might achieve.

In affect it can be assumed that the acoustic figure-of-merit of next generation passive sonar systems will increase significantly, and unless the radiated noise levels of U.S. submarines are reduced correspondingly, it will allow improved capabilities against U.S. submarines.

Quiet Launch, Quiet Run-Out Torpedoes

Submariners are aware of the importance of quiet weapons launch and run out. It would be prudent to assume that over the next 5-20 years some significant progress will be made toward the development of quiet launch, quiet run-out weapons.

At present, it is understood that the U.S. has a modest torpedo counter-measures program which is: (1) of limited effectiveness and (2) dependent on the capability to detect the launch of enemy torpedoes. If launch cues are lost as a result of a successful torpedo quieting program, the effect on the outcome of potential hostile encounters could be serious. Submarine Launched Mobile Mines (100-300 mile Ranges)

While it is expected that much of a potential enemy's mine effort is or will be defensive in nature, there is the possibility that they might develop an offensive mine warfare capability.

Long range mobile mines could be employed to mine the exit and entrance channels to any or all U.S. submarine bases prior to hostilities. While such activities would not effect U.S. submarines which were already at sea, it would interfere with port reentry and exits after hostilities commenced.

While it may be argued that great care is taken to examine submarine port entry and exit routes, it is obvious that the deployment and tactical use of smart mines, for example, would greatly complicate the problem.

Submarine Launched UUVs with Capabilities to Deploy and Operate Sensor Fields and other Devices near U.S. Naval Bases.

The current state of the art probably does not allow anyone to launch UUVs that are capable of reliable performance in offensive actions against submarines in port. However, the technologies do exist which could be used to develop such capabilities.

It is expected that a number of nations are deeply involved in UUV technology programs. For example, low loss fiber optic cables have been developed and are available from the French and Japanese. There is certainly no reason to assume that the importance of fiber optic connected sensor fields deployed by UUVs is not clearly appreciated by a number of potential enemies. One must assume that in the future, a number of them will have such capabilities.

Unless specific countermeasures are taken to defeat UUVs, the availability of such capabilities to potential aggressors will put U.S. ports at risk. Defending a port or submarine base against UUVs should not be difficult, but if efforts are not undertaken, a significant vulnerability will exist.

Submarine Launched Swimmer Delivery Vehicles (SDV)

The strong interest by several nations in Special Warfare is well established. There is every reason to assume that in the next 5-20 years there will be a continuous upgrade of SDV capabilities. Enhanced SDV capabilities will allow any nation, and especially those nations involved in terrorist activities, to undertake attacks on critical submarine shore facilities. The effectiveness of such attacks would be limited if such facilities were defended. On the other hand, if they were not defended, Special Warfare forces could have a significant impact on several aspects of U.S. submarine operations.

Scenarios

Diverse scenarios involving combinations of former Soviet and Third World Naval forces can be postulated. Two scenarios are chosen to illustrate the kinds of challenges which could confront future US submarines.

The first scenario involves Third World country aggression that provokes a U.S. response in which U.S. submarines provide the first significant capability to respond. Depending on the situation, submarines would provide crucial surveillance followed by attack on key enemy military forces. U.S. smart weapons would be capable of inflicting significant damage as demonstrated in the Persian Gulf War.

The enemy could counter this U.S. submarine threat with a variety of ASW systems including ultra-quiet submarines with improved sensors and weapons augmented by sea-bed based sensors and weapons.

A second scenario involves high technology, sea-based attacks against U.S. naval facilities. Such a scenario might develop out of the confrontation in scenario one, or a completely separate situation.

In any event, the kinds of threat systems which employ Standoff Weapons, Special Forces, UUVs or cruise missiles to conduct attacks against virtually undefended U.S. bases offers the potential for significant political as well as physical damage. These would have to be met with ASW forces that include the most modern SSN capabilities available.

U.S. Countermeasures to Improvements in Foreign Submarine and ASW Capabilities

In general, foreign anti-submarine improvements may be countered in part by changes in U.S. tactics or doctrine. However, when long lead procurement or substantial funds are required, it is doubtful that the U.S. could respond in a timely fashion unless programs are already in place and well along.

Defensive Barriers in Coastal Areas

In order to attack in and around defensive barriers in Third World littoral seas, their high technology systems will have to be countered by even higher technology U.S. submarine systems. Achieving these capabilities will require considerable investment in U.S. systems. Some of the most significant of these are discussed below as counter-measures to Third World systems.

Improvements in Enemy Surveillance and Long Range ASW Weapon Systems

Fundamentally this capability can be countered by:

- Avoiding areas where the enemy may have covertly installed a sensor field,
- Reducing to a minimum the detectibility of communications from submarines,
- Reducing the signature (acoustic, radar and heat) of weapons launch,
- Development of decoys to confuse sensors and increase system noise.

Two of the approaches listed here are primarily operational and two are technical. Limiting operations is achievable and the investment in technologies should be affordable.

Quiet Torpedoes

There are few countermeasure to a torpedo that is so quiet that it cannot be detected. Counters to weapon quieting are:

- Not allowing enemy submarines to detect U.S. SSNs first acoustic advantage,
- Quieting U.S. torpedoes so that their launch and run-out does not cause the enemy submarine to counter-fire,
- Improving sensitivity of systems that detect weapons launch,
- Developing a family of hard kill and soft kill devices to counter torpedoes.

All of these approaches are believed to be at least in the development stage.

Enemy Quieting, Improved Sensors and Improved Signal Processing

Assuming that it were not possible to recover the figure-ofmerit and initial detection ranges the U.S. enjoyed in past years, the U.S. Navy might invest in:

- UUVs as decoys and to extend submarine sensor baselines,
- ASW Stand-Off Weapons and targeting to support them,
- Bi-static active sonars.

Increasing the Security of U.S. SSNs and SSBNs in and Around U.S. Ports

As indicated above, U.S. naval forces and critical facilities may be at risk to attacks by: Standoff Weapons, Cruise Missiles, UUVs, and Special Forces.

The basic countermeasure is also probably the lowest cost. Any number of schemes can be envisioned but the preferred option appears to be dispersal to alternative facilities. This factor alone would greatly complicate targeting problems if an aggressor wished to attack U.S. naval forces in port.

Attacks by Mobile Mines and UUVs While Entering or Exiting Port

Countering this problem is essentially a problem in sweeping future high performance mines. Mine hunting is difficult at best. It is not possible without an adequate number of highly capable search platforms equipped with mine neutralization vehicles. Internationally there is considerable high resolution mine hunting technology available and under development. Unmanned mine neutralization vehicles are also available.

For the U.S. Navy the mobile mine and UUV problem would be manageable if an appropriate investment were made in establishing and maintaining a competent mine hunting force. In the past, and for the foresecable future, the problem will be one of investment and commitment to resolve the problem.

Enemy Intercept at Port Entry and Exit

In the vicinity of port entry and exit channels the U.S. Navy may resort to:

- Extensive patrolling and monitoring of these areas,
- Extensive use of decoys and escorts,
- High resolution detailed surveys of exit routes to detect emplaced sensors or other devices.

Recommended U.S. Actions

In sum, over the next five year defense plan and beyond, the U.S. should implement the suggested courses of action outlined above.

Priority should be given to:

- Continued development of UUVs and Undersea Warfare,
- Maintenance of control of port exit and entrance channels,
- Development of effective torpedo counter-measures,
- Development of a quiet launch, quiet run-out torpedo.

COLD WAR - THE WAR TO END ALL WARS? by John Will

Dr. Gary E. Weir, author of <u>Building American Submarines</u> <u>1914-1940</u>, an historian with the Naval Historical Center, has commendably traced the path of U.S. submarine design and construction during the period between the two World Wars. He describes the influence of the German U-boat, the debate regarding use of submarines, the relationships between the Navy's bureaus and private industry, and the development of essential related equipment.

After the war to end all wars -- World War I -- congressional appropriations were not being used for military procurement. Future roles and designs for U.S. submarines were in debate. Upon completion of the submarines currently under construction, one or both of the two principal shipbuilders might be forced out of the submarine construction business.

If the Cold War were considered the war to end all wars, the U.S. submarine community today could be compared to the conditions in 1918. Dr. Weir's work discusses the problems faced after World War I and the improvements precipitating the favorable status of submarine design, force levels and industrial base on the eve of World War II. Based on the initiatives taken during the 20 plus years between the two wars, might we, after the Cold War, not benefit from a review of those initiatives? The following are some of the highlights of Dr. Weir's history.

When the U.S. entered World War I, 16 years after its first submarine procurement, our Navy had 96 submarines, comprising 14 different classes, delivered or under construction. At that time, German ocean-going U-boat size had increased to almost 1200 tons and 17 knots, while U.S. submarine displacements ranged from 287 to 510 tons with a top surface speed of about 14 knots.

U.S. submarines were purchased from two commercial submarine construction companies - Electric Boat Company (EB) of Groton, CT (using Holland designs) and Lake Torpedo Boat Company of Bridgeport, CT, (Lake designs) or their subsidiary yards.

Great difficulties were endured by the Navy's technical bureaus in dealing with the two private submarine shipbuilders

and, in particular, with EB which dominated the U.S. submarine construction business at the time. As submarine inventors and patent holders, these two shipbuilders presented their designs for the Navy to take or leave. EB lobbied Congress to appropriate and authorize more submarines than the Navy had requested, enabling EB to get those appropriations, design the submarines and build them to their design. This civilian shipbuilder, therefore, was not only the market leader but the maker of naval submarine policy. However, the shipbuilders also had their difficulties with the government: changing requirements, contentious contract wording, low wartime material priorities, etc. The major difference between the Navy and the shipbuilders was that the Navy expected a quality product within contract price, and the shipbuilder felt required to deliver the product per contract specification, reliable or not. As a result, one of the biggest areas of contention centered on the unreliability of the EB-provided diesel engines built by the New London Ship and Engine Company (NELSECO) - an EB subsidiary.

On the brink of U.S. entry into World War I, the Navy's technical bureaus, then the Bureau of Construction and Repair and the Bureau of Steam Engineering ventured into the submarine design business. Because of the difficulties in dealing with the two private shipyards, the Navy developed Portsmouth Naval Shipyard as a capable alternative design and construction facility.

In order to mass produce a submarine in 1916, the Navy bureaus, with the help of EB and Lake, designed the 800-ton, 15-knot S class submarine. Fifty were built. At about that same time, the Navy gave EB a contract to design the three ship 1100-ton, 20-knot T class. This design reflected the current Navy thinking that the submarine should be able to operate with the battle fleet. Both designs emerged at the start of a period of debate and reevaluation within the American submarine community sparked by the course of the European war and the performance of the German U-boats. During the inter-war years, the S and T class boats (or rather the problems with their designs) helped the Navy determine the comparative state of American submarine design and construction capability as well as the strategic role of submarines in future conflicts.

After the war, the U.S. and other countries examined the various German U-boats. Of particular interest was the comparison of the German mobilization Ms boat with the (approximately) same sized American S class boat then under construction. In spite of their cramped conditions and terrible habitability, the U-boats exhibited remarkable reliability, and demonstrated technological superiority to the U.S. boats. One of these Ms boats, the U-111, was brought to this country and run through the same acceptance tests as the Lake-built S-2. The Board of Inspection and Survey noted that the Busch-Selzer Diesel in the S-2 was far more reliable than EB's S-1 NELSECO machinery, but exhibited fuel and lubrication leaks that did not appear in the U-111 diesels manufactured by Machinenfabrik Ausberg-Nurenberg (MAN). Tests showed the German MAN diesels provided 12 percent greater efficiency than the U.S. engines even with the German's more demanding auxiliaries.

The superiority of the U-boat Diesel engines and the unreliability of the NELSECO engines in the S and T class submarines caused the Navy to enter the submarine engine business. In an attempt to develop quality engines, the Navy, in the early 20s, sent out inquiries of interest to private industry. The poor response was indicative of the hazard of a limited market without an incentive provided by federal funds for research and development. As a result, the U.S. Navy's Bureau of Machinery commissioned the New York Navy Yard to develop a U.S. version of the MAN engine. The "Bu-MAN" engine weighed ten percent more than the German engine and, after a comparatively short time of operation, would suffer casualties resulting from cracked engine castings and air compressor failures. However, the Bu-MAN engine problems were less severe than those causing endless casualties in the NELSECO engines. The U.S. had been unable to duplicate the thin section steel castings of the Germans and did not possess a comparable knowledge of torsional vibration.

While the problems of finding a suitably sized, reliable diesel engine continued, the controversy over the submarine's role and future designs raged at full tilt. The dilemma resulted from the Navy General Board's specification for submarine surface speed to be about 20 knots to operate with the battle fleet versus the Secretary of the Navy's (budget driven?) direction that the submarine should be about the size of the S class (800-tons). The naval designers were unable to provide adequate crew and engine space in an 800-ton boat.

During the years 1921 to 1931, the submarine community could do little but debate the various issues. Any consensus on mission and design would have to please the General Board, the technical bureaus and the Submarine Officers Conference (SOC). The SOC was a group of experienced submarine officers established in 1926 to advise the Chief of Naval Operations and Secretary of the Navy on submarine matters.

As a result of America's growing responsibilities in the Pacific and a painstaking and detailed analysis of German strategy and design, the many viewpoints on submarine strategy and design gradually became a consensus in the years between 1927 and 1930. The previously accepted wisdom that the submarine functioned most effectively either in coastal defense or when tied directly to the battle fleet was being openly challenged. In 1928, a submarine division commander questioned the advisability of pursuing greater submarine speed at the expense of habitability and submerged performance. He urged naval planners and strategists to allow U.S. submarines to adopt an independent offensive posture. He argued that submarine reliability, improved habitability, and long range endurance would better serve the Navy than speed. This view fit well with a previous SOC recommendation that future submarine design be based on that of the 1175-ton U-135. For the first time in nearly ten years of postwar deliberations, the views of the leading submarine strategists began to coincide with the opinions of the designers on the significant points of mission and displacement requirements.

Following the construction of the 50 S-class boats, the only U.S. submarines built between 1921 and 1927 were the V-1 through V-6 with displacements of 2000 to 2730 tons. In the early 30s, the Bureau of Construction and Repair proposed 1560, 1110 and 1130-ton designs for the V-7 through V-9. An incentive to use lesser weight designs was provided by the London Naval Treaty of 1930 which stipulated a limit of 52,700 tons for the U.S. Navy's total operational submarine tonnage.

These events eventually led to a consensus fleet boat design of about 1500 tons displacement, 15 knots surface speed, 90 days at-sea endurance, and a 12,000 mile range. The only problem with the design was finding a diesel engine with adequate reliability and the requisite horsepower per pound.

During the inter-war years, the MAN Company of Germany exported its superior U-boat diesel engine design worldwide. Companies like Mitsubishi in Japan, Vilanova in Spain, and H. Stinnes in Sweden adopted submarine diesels either built by MAN or based on its design. At one point, Japan was taken to task for violation of the Versailles Peace Accords for importing German technicians as well as the engine.

In February 1931, the U.S. signed an agreement with MAN paying royalties to build their engines in the U.S. This arrangement permitted the Navy's technical bureau to wrest the initiative from the private sector, providing direction to be taken by the Navy and commercial industry in diesel engine research.

In 1932, the Bureau of Engineering initiated a competition to develop a light-weight, high speed diesel engine electric drive system. In light of the interest generated by the railroad industry, the Navy could not have timed its competition better. Five companies immediately entered the competition and two others followed. The Winton automobile company, founded by diesel engineer Alexander Winton (and previously absorbed by General Motors (GM) in 1930), produced an engine acceptable to the Navy. The other four immediate entrants, including EB, were unable to produce engines acceptable to the Navy. The late entrants, the Hooven, Owens, Rentschler (HOR) and Fairbanks-Morse (FM) companies, produced engines meeting Navy specifications.

The HOR engine, based on the MAN design, was first installed aboard POMPANO (SS-181). This engine virtually disintegrated due to steel embrittlement. Although the company was able to correct the problem, it is reputed that the HOR engine never gained much stature in the submarine community.

As to the FM engine, Dr. Weir, quoting other authors, incorrectly states, "Fairbanks-Morse adapted its basic design from the German Junkers Jumo aircraft engine, which commonly appeared in long-range flying boats." The first FM project officer for submarine engines was Mr. Henry Haase. Mr. Haase recently confirmed that the opposed piston engine design developed by FM for submarine and railroad application was the result of an original design by the FM designer, Heinrich Schneider.*

By 1938, after solving most of the difficulties with materials and welding techniques, the U.S. Navy had three suppliers of reliable submarine engines. As mentioned, the HOR was the least popular of the diesels. Also, some wartime commanding officers complained that their GM-Winton engines generated too much smoke. The FM engine gained the best reputation.

Subsequent to World War II, there was an effort to employ higher speed FM and GM diesels in the TANG (SS-563) class submarines. As some of us can relate, the GM pancake engines had lots of problems and had to be replaced by lower speed FMs. For the nuclear submarines, the U.S. Navy settled on smaller, lower speed GM and FM (now owned by Colt Industries) diesels to provide auxiliary power.

During the dry period in submarine construction between 1921 and 1931, EB was able to stay in business by building everything from pleasure boats to machinery. The market for commercial shipbuilding skills and related technology provided most private contractors with their only means of surviving the virtual absence of government business after the Great War.

Plagued by financial difficulties, the Lake Company went out of business in 1913, but remobilized in 1915. After the war, the Secretary of the Navy tried to get from Congress enough submarine construction funds to keep the two private yards in business and in competition. This he was unable to do. So, in spite of producing some of the U.S. Navy's best and most reliable submarines to date (primarily due to its Busch-Selzer diesel engines), in a time of few contracts, Lake was caught between the power of EB and the Navy's development of Portsmouth Naval Shipyard. As a result, the Lake company folded permanently in 1924.

With the exception of the diesel engine problem and the shipyards, Dr. Weir spends little time discussing other areas of

^{*} From 1934 to 1936, my father, then a lieutenant with a Masters degree in Diesel Engineering, was the first Resident Inspector of Naval Material at Fairbanks-Morse. I remember his stories of the first engine full load tests, the baling wire, etc. but do not recall him saying anything about modifying aircraft engines. My family and the Haases (currently in their 80's and living in York, PA) have kept in touch since our days together in Beloit, WI.

submarine technology and the industrial base, for which the survival and development during the inter-war period was crucial. He fails to compare U.S. capability with Germany or other countries in these important submarine technology areas, but points out that the naval authorities used the modest appropriations available after the war to improve the Navy's design and construction capability at Portsmouth and to advance private-sector submarine research and development. The commercial vendors were involved in the development and manufacture of electric drive motors, storage batteries, periscopes, gyroscopes, fire control, and auxiliaries (such as air compressors, ventilation, etc.).

Commercially built storage batteries have always posed problems for U.S. submarines. In 1916, the E-2 (SS-25) fitted with batteries supplied by the Edison Storage Battery Company experienced a series of Hydrogen induced battery case explosions. The Exide and Gould companies later provided much more reliable storage batteries for the S, T and V classes. However, battery casing deterioration remained a problem throughout the pre-1940 period.

All U.S. submarine periscopes, from the beginning, have been built and designed by commercial companies. The initial fixed position, fixed power periscopes were manufactured by the Bausch and Lomb Optical, Keuffel and Esser, and General Ordnance companies. In 1916, Dr. Frederick L. G. Kollmorgen, an optical designer for K&E, formed his own company and, in conjunction with Eastern Optical Company, manufactured the first moveable, adjustable sets of periscope optics. Due to the superiority of its optical set employing the better French optical glass, Kollmorgen was awarded a contract for the periscope optics for 23 of the S class submarines under construction. To do so, the government had to financially help Kollmorgen with plant expansion and payroll.* Further, the Government had to modify EB's S boat contract to designate periscopes as government furnished material. This contract modification caused EB to lose the material pass-through profit for which EB sued but never collected.

This information was verified by the grandson of Dr. Kollmorgen, Captain Frederick J. Kollmorgen, USN(Ret.), who is known to many of the readers.

Most of the other submarine technologies: sonar, weapons, communications and habitability were improved through the direction of the various naval bureaus and laboratories - e.g., Naval Experimental Station, New London, CT; Naval Torpedo Station, Newport, RI; Naval Research Laboratory, Washington, DC; Engineering Experiment Station, Annapolis, MD. The Navy's becoming the coordinator and catalyst in submarine design and construction during the 1914-1940 period proved to be one of its most important decisions.

Considering today's environment following the Cold War, what lessons can be learned and questions asked from Dr. Weir's history?

 First Lesson: <u>At the end of World War I</u>, the Germans possessed a clear lead in submarine technology but, due to financial need, squandered it in the inter-war period.

Question: <u>At the end of the Cold War</u>, the U.S. and CIS lead in submarine propulsion and quieting technology. What will become of the CIS technology? What does this country intend to do with its technology?

 Second Lesson: <u>At the end of World War I</u>, there were two U.S. commercial shipyards in the submarine design and construction business, but, with the post-war reduction in submarine orders, one of these yards was forced to go under by a stronger business position of the other private company and by the Navy's development and support of a naval shipyard to provide design direction and construction competition to the private yards.

Question: At the end of the Cold War, there are two U.S. commercial shipyards in the submarine design and construction business. However, with the exception of the nuclear plant, the Navy has essentially abdicated its design capability to the private yards. Orders for future submarines and ships have dropped and it is unlikely that both private shipyards can be kept in the submarine construction business. There is the concern that the few submarine orders will not be enough to sustain critical vendors which, due to the sophisticated technology of today's submarines, number in the hundreds. What does this country intend to do to maintain the industrial base to be able to design and build submarines? Third Lesson: <u>At the end of World War I</u>, there was controversy regarding submarines missions for which the submarine was to be designed: mission requirements and displacement limitations did not match the country's technology capabilities. Luckily, improvements in diesel engine technology plus accord between the strategists and designers were achieved in time to mass produce a submarine designed for the intended missions and flexible enough to accommodate some unforeseen missions. In only two calendar years since 1917 have U.S. attack submarine force levels been allowed to drop below 50 submarines.

Question: At the end of the Cold War, there is controversy regarding missions for U.S. submarines in the future. Each mission may dictate a submarine design different from that which resulted from the Cold War. Budgetary limitations will affect what type of submarine can be appropriated. Can this country's submarine strategists, designers and budget overseers achieve accord in time to prevent attack submarine force levels from dropping below the number required to support future missions?

To prevent repeating mistakes of the past, the similarities described in <u>Building American Submarines 1914-1940</u> with today's submarine debates make Dr. Weir's 117 page dissertation mandatory reading by the submarine strategists, designers and budgeteers.



HUNTERS OF THE DEEP

TIME-LIFE Books has recently released a submarine oriented book entitled <u>Hunters of the Deep</u>, which has some excellent photographs and a number of easy-tofollow explanations of basic submarine principles. This book could be of great assistance in efforts to help the public understand submarines.

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SUBGUIDE: THE END OF THE PERMIT CLASS by Norman Polmar

The last submarines of the THRESHER (SSN-593)/ PERMIT (SSN-594) class are in the process of being decommissioned. These were the U.S. Navy's first deep-diving, quiet, multi-purpose submarines of the nuclear era. The previous U.S. SSNs - the pioneer NAUTILUS (SSN-571) and SEAWOLF (SSN-575), the four SKATEs (SSN-578), and the six SKIPJACKs (SSN-585) -- did not exceed conventional submarines in most operational parameters; rather, it was in submerged endurance that these undersea craft excelled.

With THRESHER, authorized in the fiscal year 1957 budget, the Navy took revolutionary steps beyond the submarine's propulsion system. The principal changes were in three key areas: (1) depth, (2) quieting, and (3) combat systems. The basic THRESHER design, project No. 188, was an elongated version of the SKIPJACK, which had combined nuclear propulsion with the high-speed ALBACORE (AGSS-569) hull concept. The THRESHER had a greatly enlarged amidships section to accommodate the quieting of the propulsion plant and changes in machinery systems.

The THRESHER was probably the deepest-diving submarine built to that time by any navy. HY-80 steel had been used in the previous SKIPJACKs, but that class was rated at an operating depth of 750 feet, the same as other U.S. post-World War II submarines. The THRESHER employed HY-80 and advanced welding techniques to provide an operating depth of some 1,300 feet. Beyond the operating advantages of greater depth (e.g., going below sound *layers*), greater depth increased the margin for control error or malfunction during high-speed maneuvers. Thus, the THRESHER and her sister ships would be capable of almost twice the operating depth of previous U.S. submarines -- nuclear and diesel-electric.

HY-80 indicated High Yield steel capable of withstanding 80,000 pounds of pressure per square inch.

See, for example, Editors, Time-Life Books, <u>Hunters of the Deep</u> (Alexandria, VA: Time-Life Books, 1992), P. 41, and N. Friedman, <u>Submarine Design and</u> <u>Development</u> (Annapolis, MD: Naval Institute Press, 1984) p. 82.

The increase in depth became one of the most controversial aspects of the THRESHER design. While the lead ship was still under construction, the following exchange occurred between Admiral H.G. Rickover, head of Navy's nuclear-propulsion program, and Representative George Mahon, a member of the House Appropriations Committee:

<u>Mahon</u>. Are you over designing these ships? I am talking now mostly about submarines. Are you putting on refinements that are really not necessary? You spoke of the THRESHER diving to a very great depth.

Rickover. Yes, sir.

Mahon. How deep are you going?

<u>Rickover</u>. The World War II submarines were designed for [400] feet. Right after World War II we developed the present [750]-foot submarines. Now we are going to [classified] feet. The reason is that the deeper a ship goes, the less it is possible to detect it. It can take advantage of various thermal layers in the ocean. It also is less susceptible to damage by various types of depth charges and other anti-submarine devices. The greater depth gives it greater invisibility, greater invulnerability. We would like to go deeper if we could, but a point comes where existing hull steel may not be able safely to withstand the greater pressure.... However, there is considerable military advantage, Mr. Mahon, to be able to go deeper; it is somewhat analogous to having airplanes which can fly higher.

Three years later, after the THRESHER was lost at sea, the issue of going deep again came up in Congress, before the Joint Committee on Atomic Energy. At the 1964 hearing, Vice Admiral Lawson P. Ramage, a much-decorated submariner and at the time a Deputy Chief of Naval Operations, explained the advantage of going deeper, including added safety in certain maneuvering situations. Rickover responded to the committee:

Sure, you can intuitively say -- as Admiral Ramage said in the comparison he made -- you would like to go deeper. It is good to have a machine that can perform better. However, I claim we have to be realistic and find out how important this is first, because right now we are incurring considerable expenses in building these ships.... The THRESHER design also advanced machinery quieting to new levels, reducing the submarine's narrow-band acoustic signature. Previously little effort had been made to reduce machinery noises in U.S. nuclear submarines, with the noise of coolant pumps, fluids in the coolant piping, and turbine noises. THRESHER introduced turbines and related gearing mounted on a sound-isolating *raft* to reduce self-generated noises. The concept was successful, but increased the volume required for machinery and hence the overall submarine size, contributing to a two-foot increase in hull diameter over the SKIPJACKs.

Both classes had the same S5W reactor/twin turbine plant producing some 15,000 shaft horsepower. The larger size of THRESHER, however, resulted in a speed loss of several knots over the SKIPJACKs. One of the later submarines of this design, JACK (SSN-605), was provided a modified propulsion system with a direct-drive (ungeared) turbine. She had a largediameter, sleeve-like outer propeller shaft housing a smallerdiameter inner shaft, providing an arrangement of counterrotating propellers on essentially a single shaft. The scheme was used to increase efficiency and reduce turbulence. There was no increase in speed and the machinery spaces were ten feet longer than in other units of the class. The concept was not repeated in other submarines and, reportedly, JACK suffered problems with her turbine arrangement, with the unique arrangement being eventually replaced by a conventional, single-shaft arrangement.

THRESHER also introduced major improvements in submarine combat systems. She combined the features of a high-speed attack submarine (SKIPJACK) with those of a hunter-killer submarine (SSK/SSKN). For the latter role THRESHER was fitted with the AN/BQQ-2 sonar system that had a 15-foot diameter bow sphere mounting the active/passive BQS-series sonars. The BQR-7 conformal array of passive hydrophones was also carried within the large forward dome.

The sonar sphere forced the location of the four 21-inch torpedo tubes amidships, angled out two to each side. Significantly, previous U.S. combat submarines dating to 1941 had at least six bow tubes, the exceptions being specialized hunterkiller (SSK), guided missile (SSG/SSGN), and radar picket (SSRN) submarines. It was believed that THRESHER's quieting and sonar effectiveness could permit the detection of Soviet undersea craft long before they could make a detection; this, coupled with U.S. torpedo effectiveness, reduced the number of launch tubes required.

No stern tubes were provided in the SKIPJACK, THRESHER, and later submarines because of the tapering stern configuration and the guidance/homing capabilities of modern torpedoes.

Beyond torpedoes, the THRESHER design was the first to provide for the SUBROC anti-submarine weapon. With the long-range detection capabilities of the BQQ-2 exceeding existing torpedoes, and the proliferation of tactical nuclear weapons in the 1950s, the torpedo-tube launched SUBROC could fling a nuclear depth bomb (W55 warhead) to a distance of some 20 nautical miles.

The amidships, angled torpedo tube configuration, which originated with German U-boat designs of World War II, have followed in all subsequent U.S. nuclear attack submarine designs.

THRESHER was commissioned on 3 August 1961. Speaking at her commissioning, Vice Admiral Harold T. Deutermann, declared that in the THRESHER "We see a weapons system so advanced in concept and design that no other submarine in the world today can equal her range and fire power for antisubmarine weapons. We see the inclusion of a sonar system so sensitive and so powerful that the ocean around her for greater distances than ever before become her territory."

She was rapidly followed by four similar submarines that had been ordered as guided missile submarines (SSGN) to carry the Regulus missile. The Navy's long-range plan for the 1970s had called for 12 of these SSGNs -- the earlier HALIBUT (SSGN-587) and 11 of the PERMIT (SSGN-594) class. The first four SSGNs -- project No. 166A -- were reordered as attack submarines following cancellation of the Regulus II land-attack cruise missile in favor of the Polaris missile project in December 1958. As SSGNs these boats were to each carry four of the surface launched, supersonic missiles. As attack submarines they became the PERMIT (SSN-594), PLUNGER (SSN-595), BARB (SSN-596), and DACE (SSN-607). Subsequently, through fiscal year 1961 the Congress authorized nine additional THRESHERclass submarines for a class total of 14 units. Production of the design was curtailed in favor of the similar but larger STURGEON (SSN-637) class; the latter submarines had still quieter machinery, were provided with an under-ice capability, and their larger sail structures permitted the fitting of additional electronic surveillance equipment, a shortcoming in the THRESHERs.

THRESHER immediately established new records for operating depths as her crew, under Commander Dean Axene, put the submarine through her paces. There was a major problem in November 1961, when THRESHER moored at San Juan and the submarine suffered a diesel breakdown and was unable to restart the reactor until CAVALLA (SS-244), moored alongside, was able to provide electricity for a reactor restart.

From July 1962 until 9 April 1963, THRESHER underwent a major overhaul at the Portsmouth Naval Shipyard. When she returned to sea on trials, under Lieutenant Commander John W. Harvey, she carried a crew of 108, a SubLant staff officer, 3 officers and 13 civilians from the shipyard, a specialist from the Naval Ordnance Laboratory, and 3 civilians representing contractors - a total of 129.

On the morning of 10 April, while conducting trials to her maximum operating depth, THRESHER was lost with all hands. Apparently a reactor scram and piping failure doomed the submarine. In the aftermath of her loss, the Navy revised reactor restart procedures. Modifications were also made to all U.S. nuclear submarines to increase their emergency highpressure air blow capabilities, and in some cases additional ballast tanks were added. Known as the SUBSAFE procedures, these modifications delayed the completion of the later submarines of this class, which was officially renamed the PERMIT class after the THRESHER loss.

The remaining submarines of the class were completed through 1967. The 13 submarines of the PERMIT class have provided valuable service to the fleet during the ensuing years. DACE, commissioned in 1964, was the first submarine of the class to stand down, being formally decommissioned on 2 December 1988. Others have followed; by mid-1992 only two remained in commission, GREENLING (SSN-614) and GATO (SSN-615). They too will be gone shortly, marking the end of an important milestone design in the history of submarine development.

DISCUSSIONS

PERCEPTION IS THE ISSUE

by Stan Zimmerman

There are many lessons to be learned from the SEAWOLF affair. The piece by Ron O'Rourke of the Congressional Research Service in the July issue of the REVIEW described what the submarine community can do to improve its relations with Congress, especially in light of the coming debate over CENTURION.

There is room for improvement in another critical interface between the Navy and the public it serves - the press. It is no secret that relations between the Navy and the press have been strained in recent years. There are good and proper reasons for secrecy - such as national security and contractual propriety -but a perception exists that secrecy in submarine affairs goes beyond good reason, perhaps bordering on arrogance.

The coming years will be crucially important to the future of the submarine community, and it will need a press and public capable of understanding its needs and capabilities if it is to prosper. If these personal and perhaps unpleasant observations from the front lines can help to identify a problem, then the Navy can take an important step towards solving it.

In addition, I have a quite selfish reason for writing this article. As a reporter, editor and author, I cover submarines for a living, and if things hold on their present course, I'll be out of a job in a few years. As will almost everybody reading this quarterly. So in the interest of preserving our mutual livelihood, I'd like to interspace a few personal anecdotes with my exposition to illustrate the root of a problem that, in my opinion, portends great difficulty for the American submarine community.

On April 6 I attended the opening of a collection of submarine paintings at the art gallery in the Navy Yard in Washington. It was a small crowd around the lemonade bowl, and included two faces I immediately recognized -- both highly placed submarine admirals. Both left quickly after I arrived, without as much as a fare-thee-well. Perhaps their charm reserves were low that night, but the point is that they seemed to pass deliberately on the opportunity for bridge-building with the press in a social atmosphere. The problem is public relations. Apparently for a variety of reasons, some of which I'll touch on in a moment, the submarine community seems to seek in the public eye the same stealth it enjoys under the ocean. Unfortunately it's impossible for the press to support with enthusiasm what we neither see nor understand.

Traditionally the submarine community uses its charm sparingly. A few key congressmen and their staffers have been all that is required to gain Capitol Hill approval; a few key administration folks ensure undersea forces receive their due. Of public outreach, there is virtually none.

When I was a kid, I bought a model of the SSBN GEORGE WASHINGTON. I painted the missile tubes green in what the instructions called "Sherwood Forest," and marveled that men lived underwater in close proximity to both nuclear warheads and a reactor for months at time to protect me from atomic attack. It began a fascination with submarines that continues to this day.

Try to find a model of an American submarine today. As a member of the lay public, what could I give my son to spark a similar interest?

As a member of the press on the submarine beat, I bounce against the wall of secrecy and silence daily. It inculcates in my sources a sense of guilt when they quietly -- and against their impression of the rules -- explain why some multi-million dollar project needs continued funding, or why another critical multimillion dollar project was scrubbed.

In the world of the high-tech military, submariners are among the highest-tech of all. Frictionless bearings, optronic periscopes, closed ecologies, submarine psychology, hydrodynamic advances, elaborate mathematics -- all stuff ripe for the science section of the local newspaper, and all off limits to the general press. For those writers more specialized and knowledgeable about submarine affairs, the official wall of silence goes up even higher.

I made a bet with a particularly influential admiral one year at the Submarine League annual symposium. He'd made a speech criticizing press coverage of the undersea forces, and I approached him on a break. "The reason we don't do a good job, is that we can't get to talk to you guys," I said. Our bet: I'd go through channels to request an interview, and he could see what it was like on his end. One year later, at the next Submarine League symposium, I asked him about my request. "Never saw it," he said.

If it irritates you that most of the news accounts you read of submarine affairs quote only "official spokesmen" and "knowledgeable sources," understand it takes months to process an application through channels for an interview. I've got requests in that go back years. People retire before I can interview them.

As a consequence, to do the job, I've got to use other sources. People in industry, people on Capitol Hill, and naval officers, able to talk only on background because their contracts or reputations suffer if they back up their comments with their names. If the leaders and thinkers in the community won't talk for the record, then who will tell its story?

After construction of the first SEAWOLF began, somebody at Electric Boat gave a model of the ship to the Submarine Museum in Groton, Connecticut. It was the first time a member of the public could actually see what he was getting for his \$2 billion in taxes.

The model was deemed a peril to national security, and security agents removed it. To this day, there is one bad drawing and no model to give non-cleared personnel an idea of what they're buying.

It does not seem plausible that such a cascade of public relations errors is the result of ignorance. Its root appears to be arrogance, and in this era of budget retrenchment, roles-andmissions reviews, and reorganization, continued arrogance will be lethal.

The demise of the SEAWOLF demonstrated the fragility of congressional support for undersea superiority. While the common wisdom within the submarine community blames the end of the Cold War for the termination, congressional knives were drawing blood long before the Soviet Union folded its hammer and sickle. The administration didn't have the stomach to fight for SEAWOLF, and Congress seemed pleased to fund one more boat and be done with it.

Meanwhile the latest testimony introduced into the Congressional Record indicates the best Russian submarines are "at parity" with the best American subs. My first book on submarine affairs -- the only book in this country in the last 20 years to my knowledge that did more than look back -- was produced with virtually no help from the Navy. A review in these pages criticized it for its treatment of nuclear power.

I wrote the Director of Naval Nuclear Propulsion, asking for a brief and unclassified tutorial on the subject so I could strengthen my understanding. I haven't heard back yet.

I have read of another period in recent naval history when arrogance proceeded a fall. After World War II, President Harry Truman wanted to integrate the military services. The Navy was loath to give up its cabinet seat and independence, and used every bureaucratic trick to prevent its subjugation into a single Department of Defense.

In a new biography of James Forrestal, authors Townsend Hoopes and Douglas Brinkley show how the Navy's resistance and arrogance eventually alienated all its supporters, including Forrestal himself who as Navy Secretary fought so hard to retain the Navy's privileged position. The main issue at the time was naval aviation, and in the end all the admirals could do was revolt over the question of a new aircraft carrier.

Today the issue is submarines. And while a *revolt* is unlikely - today's admirals are too tame -- the old arrogance seems to live on. If history repeats itself, the next-generation CENTURION could fall victim to the backlash.

It took a lieutenant to lay it out for me in simple words. In preparing to write a second book looking ahead at submarines in the 21st century, I dropped off an outline of what I'd be researching with Navy public affairs and asked for help.

The lieutenant looked at my paper for a moment and then asked, "What's in it for the Navy?" In a nutshell, he captured the root of the problem. The heart of arrogance is selfishness, the unwillingness to share unless gratification is immediate.

The new Navy policy book, produced in May 1992, states: "As a public institution, the Navy has a legal and moral responsibility to keep our nation informed about matters under our cognizance. This policy, which applies to both negative and positive stories, ensures that reporting on matters of public interest includes the Navy point of view and gives us the opportunity to secure public recognition of the superb jobs our people do." Bureaucrats by nature are conservative and resist change; sailors are conservative because the sea is unforgiving of even the slightest mistake; naval officers are conservative because they are judged by an unforgiving standard; submariners are conservative because they sail the most dangerous sea of all; nuclear operators are conservative because the consequences of any mistake are profound. It is therefore understandable if a bureaucrat wearing dolphins may be the most risk-averse member of the human species.

To deal with the press is to court risk. One's fate is placed outside of one's control. Yet by minimizing this risk in maximum fashion, public understanding and support suffers a gradual but steady and unending erosion.

I'm always on the lookout for writers who might contribute a piece to my newsletter. Of particular interest are newspaper reporters in towns with critical naval facilities.

While covering a conference at a city with a submarine shipyard, I ran across a business page writer. Over coffee he admitted he'd covered the shipyard for five years because it was the biggest employer in the area. "Guess how many times I've been in that shipyard," he asked. "None."

To further the aims of the American submarine community, the public meeds more to evaluate than comparative life cycle costs. Without greater public understanding, the submarine community stands to become a shadow of its former self.

The trend line in authorization for new hulls between 1986-1996 - the transition between the old order and the new represents a force level of less than half the figure for the past 40 years. Unless the public and its representatives understand the sophistication and utility of the submarine, even this level will be a dream.

The alienation between the writer and the American submariner is nowhere better represented than the works of the man most responsible for the popularization of the modern submarine -- Tom Clancy. RED OCTOBER was the real hero of his first novel, a Soviet not American product, delivering an impression the Russians -- not the Americans -- were blazing new trails in undersea technology.

In his latest work, <u>Sum of All Fears</u>, the only major military casualty is an OHIO-class SSBN commanded by a prissy engineer, and speared by an AKULA II. Combine this with the popular impression of the Navy driven by the Tailhook episode, the outrageous cover stories given for the IOWA gun explosion and the VINCENNES incident, and you have the ingredients for mass antipathy for America's oldest service.

By including these personal anecdotes, I run the risk of you thinking I'm a whiner. I'll admit a more open submarine community, publicly proud of its accomplishments, would make my job easier. But I'm willing to take this risk in a public manner for a higher purpose: submarines are important to our national defense. Unless they are understood by -- and promoted to -- the American public, force structure will tumble as services fight for roles and missions in an environment of diminishing funding.

The press remains the principal conduit between the Navy and the public. If the press - reporters, editors, authors, columnists and freelance writers - are frozen out, not only will they refuse to entertain the topic of undersea warfare, they will avoid it. And, heaven forbid, should the submarine community ever need the understanding and compassion of the press and public, the stony ground will not turn fertile overnight.

This trend of personal experience and observation is not to denigrate the enormous contribution of the sailors, engineers, designers, craftsmen and leaders of the submarine community. Rather it is a warning that the old answers of the Cold War don't fit new conditions. I fear that unless long-held attitudes towards the press and the public it serves are changed, the road ahead will be cold, bleak and sad. The community deserves a better fate.

[Stan Zimmerman is editor of <u>Navy News & Undersea Technol-</u> ogy, and author of <u>Submarine Technology for the 21st Century</u>. He has won awards from the National Press Club and the Society for Professional Journalists.]



RE: THE ISSUES IN THE JULY '92 SUBMARINE REVIEW by CDR John Alden, USN(Ret.)

T here is much very significant meat in the papers by Robert J. Murray, James John Tritten, Sumner Shapiro, and Ronald O'Rourke in the July '92 issue of the SUBMARINE REVIEW. Their words need to be read, studied, and acted upon by those in positions to influence the Navy's course in the next few years, especially with regard to the future of our submarine force.

The various arguments in support of future submarine construction were generally well presented, but need to be repeated before broader audiences and in journals with larger and less parochial readerships than The SUBMARINE REVIEW. I would also make a strong pitch for the importance of continued technological development in addition to maintaining an adequate industrial base. The recent problems encountered in welding HY100 steel for the SEAWOLF, in contrast with the use of titanium for many Soviet (now Russian) subs, point up one area where we are currently well behind the Russian technology, namely materials and their fabrication, which in military characteristics translates to hull strength and diving depth capability.

We have also apparently failed to match the maximum speed achieved by the Russians in some of their submarine types, due at least in part to their ability to achieve higher power densities from their reactor plants. A third important area where they may well surpass us is in their design establishment, based on its experience with a wide variety of submarine types built in many yards while we have been limited to three types and two building yards. Indeed, we now seem determined to write off half of our submarine industrial plant. No one has pointed out the anomaly of having our most advanced attack submarine design capability in one shipyard (Newport News) while the construction expertise is in another (Electric Boat). Dropping either yard from future submarine construction will result in many problems for Naval Sea Systems Command as well as both shipyards.

The Navy and Congress seem to be forgetting the lesson learned after World War I about the critical importance of having competitive submarine design teams. The Navy's foresight in deliberately supporting competition between Electric Boat and Portsmouth in the 1930s was, in my opinion, a key factor in our developing the excellent GATO/BALAO fleet subs just in time for World War II. There are many other lessons about the problems of reconstituting a fleet to be learned from our experience in the last two great wars.

Our naval leaders need to pay close attention to the political factors pointed out by Ronald O'Rourke, but there are some elements in his presentation that are cause for concern. Apparently he, along with many influential advisers and members of Congress, has accepted certain premises that should be challenged. The most important of these is that the future composition of the Navy has to be budget-driven because of some arbitrary figure that is said to be the most that the American public will accept. I am not aware that Congress has ever asked the public what it is willing to accept in the way of national defense, but I do know that the public has not failed to support whatever Congress and the President have asked when presented with a well-defined need. It appears to me that we have to focus on convincing Congress and its staff advisers of the need, as so well presented by Drs. Murray and Tritten. Again, history offers many examples of the pitfalls in allowing ship characteristics to be determined by a budget. I will only cite the battleships IDAHO and MISSISSIPPI of 1903 (which were sold to Greece because they could not keep up with the battle line), the 800-ton "ideal" submarine limit that controlled the design of the S-boats (which were already obsolescent when launched in the early 1920s) and the MACKEREL and MARLIN of 1939 (which were unsuited for use in World War II), and the limitations of the "designed to price" frigates of the recent OLIVER HAZARD PERRY class.

Another assumption that needs to be challenged is that we will have eight to ten years of warning time during which to reconstitute our armed forces. This is an assumption based on a potential enemy's presumed intentions rather than his capabilities. A nuclear-armed missile could be fired at the United States tomorrow and we would be powerless to stop it! One only needs to remember the Falkland Islands War to realize how one renegade submarine can cause tremendous havoc at any time. We have to be very careful to define which threats are immediate and which are not.

I am also disquieted by certain elements of Mr. O'Rourke's presentation regarding the CENTURION. While his charts are useful for a broad-brush discussion of options, I feel they are so oversimplified as to be dangerous if used by Congress (as they probably will be) to establish performance requirements and funding parameters for a new class of submarine. It is little more than speculation to state that the SEAWOLF is three times as capable as the 688I and the latter twice as capable as the original 688, then extrapolate this to a "capability per dollar" figure and a set of notional cost/capability options. Any expectation of getting the same or greater capability from a new design at less cost than a 688I appears completely unrealistic, given the well-known problems involved in designing and producing any new prototype. The possibility of getting two CENTURIONs, no matter how debased in capability, for the price of one 688I is also an illusion. With the further budgetdriven constraint of a construction rate somewhere around one per year, it is irresponsible to predict that such a submarine could be built cheaply.

Maintaining an industrial base for submarine construction at a minimal building rate will be frightfully expensive in terms of sources of supply for all of the special components unique to a nuclear-powered submarine and of the skilled people needed to produce the equipment and build the sub itself. There is no way a properly balanced workforce can be kept profitably employed in a shipyard building a single submarine per year. If people in the requisite skilled trades are kept on the payroll until needed at the appropriate phase of construction, labor costs will soar. If labor is laid off to be rehired when needed, the best workers leave, training costs rise, and construction delays and errors increase. The Navy and industry are facing these problems already, and if they try to sell the CENTURION to Congress without adequate provision for the increased costs, we will have another submarine program to be scrapped before the prototype gets off the ways.

I am disturbed when I read that Admiral Kelso is on record with an estimated requirement for "a range of 50 to 60, maybe 65 submarines." With the Administration and Congress in their present state of mind, it seems that 50 submarines is tacitly conceded as a ceiling number to be attacked and further reduced. As soon as some reputable Navy spokesman comes out for one of the lower ranges suggested in Mr. O'Rourke's article, that too will be taken as setting a ceiling rather than a floor.

In conclusion, I hope our Navy leaders will take the recommendations and suggestions that came out of the Submarine Technology Symposium very seriously but will not accept dangerous assumptions without making a strong challenge. If worse comes to worse and funding falls so low that a capable submarine cannot be built, and it appears that we really have a warning period of eight to ten years, I suggest another look at history. Immediately after World War II we had a large inventory of modern ships in being and no credible threat on the immediate horizon. The Navy then invested in some experimental submarines with limited or no military capabilities. The K-class, designed as a cheap anti-submarine platform, was a failure but the research-oriented ALBACORE initiated a revolution in submarine construction.

CDR John D. Alden, USN(Ret.)

[Commander Alden served in submarines during and after World War II. He is the author of <u>The Fleet Submarine in the U.S.</u> <u>Navy</u>, <u>U.S. Submarine Attacks During World War II</u>, and other books and articles on naval subjects.]

	MEMBERSHIP ST.	ATUS	
	Current	Last Review	Year Ago
Active Duty	998	1003	1004
Others	2707	2711	2771
Life	239	240	230
Student	28	29	28
Foreign	84	79	72
Honorary	20	20	23
Total	4076	4082	4128

PLEASE RECRUIT 2 NEW MEMBERS FOR 1992!

APPLES AND ORANGES: THE ARGUMENTS FOR SINGLE-WARHEAD SLBMs by Joseph L. Tatner

[Ed Note: Joseph Tatner is a former Air Force Officer and is currently a defense research analyst. He has a Masters degree in National Security Studies. He is a member of the Naval Submarine League.]

"The cold war is over. The United States won. Hooray for our side. Now let's slash defense."

This type of thinking is sweeping through the nation as isolationism seems to be raising its ugly head once again. This should not be surprising, since after every major conflict in history (the Cold War can definitely be considered a prolonged conflict) America has rushed to divest itself of its weapons. While this is truly noble, it has in the past proven to have been unwise, and this time may well prove to be disastrous -especially regarding the current proposal to reduce SLBMs to one warhead each.

Not that it is unreasonable to make adjustments or even reductions in our current defense posture. Our major nemesis has disappeared virtually overnight and the sad state of our economy demands more attention at home. Nevertheless, it will be a hard fought battle to ensure that Congress only cuts defense rather than guts defense. Bombers, missiles, and submarines are far more technical nowadays than they have ever been, and to believe that they can be manufactured overnight when the need arises is sheer fantasy.

The only reason Operation Desert Shield was a success was because we had enough weapons available to be put into place on a moment's notice -- before Iraq could move into other countries and gain more territory. Had we not already had those weapons as a deterrent to the Soviets, Saddam Hussein would have finished building his nuclear arsenal long before we could have hoped to resuscitate a long-dead military-industrial complex. In the end, the entire Middle East would have fallen under the domination of Iraq and there would have been nothing we could do about it without facing a nuclear war (SCUDs do much better with nuclear warheads). Such a scenario involving another as yet unknown dictator becomes more and more plausible, yet steps are being taken to gut the most survivable leg of our strategic Triad: the SLBMs. In its fervor to cut defense and enhance nuclear stability, Congress is now considering reducing the warheads carried on our nuclear submarines to one per missile. The idea can be traced back to the Scowcroft Commission's recommendation for the small ICBM (SICBM – the Air Force never liked the name *Midgetman*). In its failed attempt to gain a political consensus of support from the Congress, the Commission recommended both the single warhead SICBM and the ten-warhead MX Peacekeeper despite the fact that the strategies behind the two missiles were diametrically opposed to each other.

The MX was endorsed because it would offset the dramatic warhead advantage of the Soviet Union. The SICBM was endorsed because it would enhance nuclear stability according to accepted strategy theory. Every missile targeted by an aggressor requires the allocation of not one but two warheads for attack in order to ensure the defender's missile will be destroyed if anything should go wrong. Trading two warheads for one SICBM was at best an unappealing situation to a potential aggressor since the SICBM carried only one warhead.

As the MX missile carried ten times the number of warheads, however, it became a target that was ten times more desirable than the SICBM and therefore more destabilizing, but the U.S. would have a lot more warheads without paying for a lot more missiles. During a conventional war or in any situation where a nuclear exchange might seem plausible, a ten warhead MX force would invite a nuclear attack where a single warhead SICBM would not. It was hoped that as an incentive to keep the United States from building more Peacekeepers, the Soviets would recognize the harmonious effect of having single-warhead missiles and would then build many of their own. They did not.

This situation was made even more critical when none of the hide-and-seek basing modes for the MX were ever agreed upon and all of the missiles ended up in vulnerable fixed silos, thereby rendering them even more destabilizing. It would have been less of a problem if the original concept had been put into effect, because even a missile with ten warheads would be an inequitable target if it was hidden in one of six or more possible locations. If one is going to try to deter a nuclear attack yet keep missiles in fixed, known, targetable locations, it then makes sense that the missiles kept in those vulnerable locations have only one warhead so as to present a less inviting target for an aggressor.

As one can see, this makes perfect sense regarding land based missiles, but the arguments have absolutely nothing to do with SLBMs which by their very nature are untargetable! Indeed, the original concept of the MX was that it would not be based in vulnerable silos. Integral to the ten-warhead philosophy was the idea that the whereabouts of the missiles should be unknown (or at least uncertain) to Soviet targeteers. Unfortunately, agreed upon strategic arms negotiations stipulated that the Soviets must know exactly where our missiles were, so every hide-and-seek basing mode had to allow the USSR to detect where our missiles were hidden, thereby rendering the entire concept meaningless. In the end, basing the MX in pre-existing silos was the only real alternative and the United States still ended up with only half the one hundred Peacekeepers and none of the SICBMs recommended by the Scowcroft Commission.

The whereabouts of nuclear submarines, of course, are very difficult for an enemy to determine, so there is no logical reason for reducing the number of SLBM warheads to one. It is in fact absurd to suggest a reduction of D-5 warheads from eight per missile to one, since the OHIO-class Trident submarine has only 24 missile tubes. While it is cost-effective and sensible to build and maintain a submarine as large as the OHIO to carry 192 warheads, it would be ridiculous to do so for a warhead count of only 24. Such a decision would almost certainly mean the death of the boomers, particularly in light of the success of Tomahawk cruise missiles on conventional attack subs.

The loss of the D-5 would be a catastrophe unparalleled in the history of strategic deterrence. The Trident D-5 SLBM is almost twice as accurate, nearly equal to the range and more than double the yield per warhead of our Minuteman III land based missiles but lacks the Minuteman's vulnerability problems. The D-5 also has nearly twice the range, more than three times the accuracy and four times the yield potential of the Trident C-4 SLBM, but if the warhead count is cut from eight to one the Navy can be almost certain that the long-promised refitting of the first eight OHIOs for D-5 missiles will never take place.

Although it would make perfect sense that limiting SLBMs to only one warhead each should necessitate placing that single warhead on the most accurate delivery system available, it is highly unlikely that the retrofit would be made as a consequence of the warhead reduction. Such a plan would require much broader thinking than has heretofore been evident in these types of budgetary considerations. Not that Congress is unable or unwilling to make allowances, but the process simply encourages linear thinking. It is difficult at best to build any sort of political consensus on defense issues. This difficulty becomes insurmountable when too many complications are thrown in, and impossible when referring back to decisions that have already been made.

Efforts and arguments must be made now to distinguish the SLBM from the ICBM and to demonstrate how the principles of each differ. Now more than ever the unique qualities and advantages of submarine missile carriers must be stressed in order to prevent the one-warhead limitation on SLBMs. Not only is the thought of reducing our naval warhead capacity by eight frightening (the C-4 also carries 8 warheads), but reducing SLBMs to a single warhead makes them equal to the proposed land based missiles. Since single warhead land based missiles are already considered stable weapons that have no need for concealment, there would be very little justification for missile-carrying submarines to exist.

If the decision to limit all nuclear missiles to one warhead should appear inevitable, the Navy should insist upon conditional acceptance. The decision to limit SLBMs to single warheads must be linked to the refitting of all OHIO's -- as well as every other submarine possible -- with D-5 missiles as the most accurate ones at our disposal. Meanwhile, future SLBM research must utilize the recent advancements in miniaturization and computer technology to shrink the D-5 until it can fit inside a C-4 missile tube.

In this manner the United States can increase the accuracy and quality of its SLBM force without paying for new submarines and the Navy will be prepared for any eventuality. If Congress should decide in the future to limit SLBMs to one warhead, it would soften the blow to have the accuracy of a D-5 in the shell of a smaller missile that all remaining submarines could use. If efforts are successful to preclude such a senseless warhead limitation, it would still be wise to replace the aging, less accurate missiles with a smaller, more accurate D-6 without counting on the government to build more submarines for an even newer missile. In these trying times of leaner budgets, the Navy must be prepared to do more with less. The nuclear genie, however, can never be put back into its bottle, so sooner or later the United States will be faced with another Hitler, Stalin, or Saddam Hussein who this time will have nuclear missiles. Sufficient nuclear deterrence must never be sacrificed to the economic axe, and SLBMs must never be judged according to the principles for land-based ICBMs. To attempt to do so is to compare apples and oranges -- and to leave our country unprepared to deal with the next nuclear-armed aggressor.

REMINDER

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WE NEED CONVENTIONAL WARHEAD SUBMARINE LAUNCHED BALLISTIC MISSILES by Captain F. Mark Conway III, USN(Ret.)

The recent dissolution of the Soviet Union into several autonomous states and the consequent transfer of sophisticated Soviet weaponry and technology to potentially belligerent Third World countries reflect a clear threat to U.S. security. Strategies to deter or to suppress biological or nuclear blackmail must be continuously upgraded to deal with these threats.

With the exception of somewhat limited capabilities of cruise missiles, the United States currently lacks an effective vehicle for deterring and if necessary, neutralizing terrorist threats without use of nuclear weapons or the introduction of manned aircraft and personnel into a hostile state. The resulting exposure of U.S. Forces personnel to risk of capture and loss of life, likely escalation of the crisis, and resulting adverse world reactions frequently preclude taking really effective action in response to terrorism or aggression. Sea launched and air launched cruise missiles provide reasonable effectiveness against some types of Third World or terrorist threats, but can not be used in many cases due to their several limitations which include such factors as obtaining permission to overfly adjacent nations, difficulty in mapping target approach routes (especially in nondescript desert terrain), masking of targets by adverse weather conditions and shootdown by point defense systems in the target area. Range limitations of cruise missiles further preclude their use in many inland areas.

Submarine Launched Ballistic Missiles carrying maximum payload conventional warheads (CSLBMs) offer the best capability to deter and respond to specific threats to world peace during the next one or two decades.

CSLBMs offer:

- Superb deterrence credibility from the perspective of a potential terrorist leader or third world aggressor leader because:
 - The CSLBM provides no warning of approach (is undetectable).

- b. The CSLBM cannot be intercepted/destroyed (no effective defense)
- c. The CSLBM can strike anytime, day or night irrespective of environmental conditions in the target area.
- d. A CSLBM with several maximum payload high explosive warheads (approx. 400 pounds TNT equivalent per warhead) can, in fact, destroy an individual or soft threat facility (biological weapons plant, terrorist headquarters/training camp, etc.)
- (2) No introduction of U.S. Forces into the host state.
- (3) Low (or zero) risk of capture or loss of life to U.S. Forces personnel.
- (4) Ability to penetrate heavily defended areas and reach the targeted individual or facility.
- (5) Capability to surgically neutralize soft targets near populated areas without excessive collateral damage to surrounding environment and innocent personnel.

A limited CSLBM capability can be deployed using existing Trident submarine hulls, crews, maintenance and training facilities for a surprisingly small cost. The only significant costs are those associated with development and manufacture of the conventional warheads and minor fire control systems software changes. One CSLBM Trident submarine on each coast, each manned by a single crew would provide an adequate conventional deterrent capability. Given the current euphoria that we have finally made the world safe for democracy it is likely that some of these highly capable Trident submarines will be decommissioned and scrapped, since they may be deemed to have no immediate strategic nuclear deterrent mission. CSLBM Trident submarines will not only result in retaining additional capable submarine(s) for training and submarine services; they could also be modified to support Navy Seals and other special operations as the current Special Operations submarine hulls reach mandatory retirement criteria.

Strategic arms limitations should not preclude CSLBM development; Trident launchers (tubes) are already included in the United States allowable numbers; the fact that CSLBMs are not carrying nuclear warheads can be easily verified by on site inspections (without physically going aboard the Trident hull by use of radiac equipment). Nor should there be valid concern that a CSLBM launch might be mistaken for a surprise nuclear strike. We routinely launch submarine ballistic missiles (without nuclear warheads) as part of operational testing. Pre-launch notification procedures have and should be used to notify other nuclear-capable nations of a CSLBM launch. Furthermore, the ICBM/SLBM detection capabilities of major nuclear powers are capable of early confirmation that the trajectory of a CSLBM is not a nuclear or conventional threat. By trading off missile range for maximum conventional warhead payload and using pattern footprints to optimize blast at DGZ, credible soft target kill can be realized. Additional accuracy (above system design CEP) can be achieved using empirical off-set data from test launches. If even more capability is desired, multiple missiles can be in-lined or programmed for simultaneous impact on the target.

We should deploy CSLBM systems now to deal with the possible threats of tomorrow. Conversion of one or two Trident submarines to carry conventional warhead missiles will provide a cost-effective deterrent/countermeasure to the next increasingly sophisticated threat to good order and world peace. Since no one can predict who will perpetrate or where the next confrontation will occur, CSLBMs offer the only credible, affordable system that can reach any hot spot on the globe without insertion of United States Forces. CSLBMs primary value would be to provide an overwhelmingly credible deterrent to terrorist operations. What terrorist leader could continue to operate from his headquarters (even his home in a sanctuary state such as Lebanon) if he knew he could be annihilated anytime day or night without any warning?!!!



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REFLECTIONS

PRESIDENTS AND SUBMARINES

by William Galvani Submarine Force Library & Museum Naval Submarine Base, Groton, CT

[Ed. Note: In order to give adequate notice to each President's association with submarines, this Reflection is being given in two parts. Part One was presented in the July 1992 issue of The SUBMARINE REVIEW, and covered the period through Mrs. Eisenhower's christening of NAUTILUS.]

S ubmarines have played a minor but interesting role in the history of the American presidency. Teddy Roosevelt was the first president to go aboard a submarine, and since Franklin Roosevelt every president has, at one time or another in his life, been aboard a submarine.

John F. Kennedy

John F. Kennedy was the first of many presidents who had served as officers in the U.S. Navy. He had commanded a PT boat in the South Pacific during World War Two.

The President visited USS THOMAS EDISON (SSBN-610) in April 1962 while the ship was alongside the pier at the Naval Station in Norfolk, Virginia. THOMAS EDISON was brand new, having been commissioned in Groton a month earlier.

A back injury suffered when his PT boat was sunk by enemy action made it difficult for JFK to climb the submarine's vertical ladders. He used a special elevator which barely fit through the submarine's narrow hatch. Crew members with block and tackle raised and lowered the elevator for the President. Kennedy's visit was brief and the submarine did not get underway.

President Kennedy made a surprise visit to USS CHOPPER (SS-342) in November 1962 during a tour of Key West Naval Station. While the presidential motorcade was proceeding through the base, he unexpectedly stopped it to go aboard CHOPPER, commanded by LCDR C. R. Miko. Though the officers and crew were drawn up in ranks for a presidential drive-by, the decision to go aboard CHOPPER was unplanned. The President talked briefly with the officers and crew before resuming his tour of the base.

Mr. Kennedy traveled to Cape Canaveral, Florida, in November 1963 to witness the launch of a Polaris A-2 missile from USS ANDREW JACKSON (SSBN-619), commanded by CDR James B. Wilson. JFK helicoptered to the USS OBSERVATION ISLAND (EAG-154) thirty miles off the Florida coast. ANDREW JACKSON submerged 1,200 yards from OBSERVATION ISLAND and began the countdown to launch. The missile broke the ocean's surface shortly before noon and continued downrange for a successful flight.

When the Polaris A-2 was out of sight, President Kennedy congratulated the crew of ANDREW JACKSON by radiotelephone. He called the launch "an excellent demonstration ...wonderful." Three days later he wrote Rear Admiral I. J. Galantin, the Navy's Special Projects Officer: "It is still incredible to me that a missile can be successfully and accurately fired from beneath the sea. Once one has seen a Polaris firing the efficacy of this weapons system as a deterrent is not debatable."

Mrs. Jacqueline Kennedy's 1962 visit to Groton to christen USS LAFAYETTE (SSBN-616) drew an enthusiastic response from the people of southeastern Connecticut. Jackie fever was rampant in the U.S., and Electric Boat received thousands of requests for invitations, most of which it had to turn down for lack of space.

May 8 brought gray skies and a chill wind as 12,000 people crowded into the shipyard to see Mrs. Kennedy. On the sponsor's platform with her were the French Ambassador to the United States, the Secretary of the Navy, and the Chairman of the Board of General Dynamics. Shortly after noon Mrs. Kennedy smashed a bottle of French champagne against LAFAYETTE's bow and said "I christen thee LAFAYETTE" and then in French "Je te baptiste LAFAYETTE." The sight of the 7,000 ton vessel sliding into the Thames River impressed her, and Jackie put her hand to her chin with a look of awe on her face.

After the ceremony Jackie went to the groundways area to meet the men who launched LAFAYETTE. As she was leaving her car, she spotted carpenter-diver Harold Blaney and asked him if she could have his hard hat. He offered her a new one, but she preferred his, which was old and battered, and he gave it to her. Mrs. Kennedy later said the launching "was probably one of the most enjoyable things I will ever have the pleasure of performing during my stay in the White House."

Lyndon B. Johnson

Lyndon Johnson officiated at three keel laying ceremonies, two more than any other president. His first was USS SAM RAYBURN (SSBN-635). Rayburn, a Texan and famed Speaker of the House of Representatives, had been Johnson's mentor when LBJ served as a Texas congressman. The ceremony took place on a cold, rainy day in December 1962 at Newport News Shipbuilding in Newport News, Virginia. At the Vice President's signal, yard workers moved a fifty-two ton ring section into place on the keel blocks. Johnson hammered the authenticating seal into the brass plate on the keel. After the ceremony, Johnson shook hands with the men who handled the ring section, speaking with every one of them.

When SAM RAYBURN was launched in December 1963, Lyndon Johnson, now President following the assassination of John F. Kennedy, sent a personal message which was read at the ceremony. At the submarine's commissioning in December 1964, President Johnson made a telephone address to the crew and spectators.

Cheering crowds greeted President Johnson when he came to Groton, Connecticut, for the keel laying ceremony for USS PARGO (SSN-650). LBJ was obviously enjoying himself on the warm and sunny day in June 1964. The Electric Boat Company presented him with a scale model of PARGO. He chalked his initials ten inches high into the sub's keel and watched as shipyard worker Herman Doughrity welded the initials into the keel plate. The President then addressed the crowd of fifteen thousand workers and visitors. Afterward he waded into the crowd, shaking hands and speaking with practically everyone within his reach.

Johnson participated in a third keel laying ceremony when he burned his initials into the keel of USS MARIANO G. VALLEJO (SSBN-655). The ceremony took place in July 1964 at Mare Island Naval Shipyard in Vallejo, California. The President, who stayed in the White House, pressed a button, activating a mechanical device in the shipyard which imprinted his initials into VALLEJO's keel. Mr. Johnson also delivered a telephone address to the crowd assembled for the ceremony.

The United States was at war with Germany and Japan when Mrs. Lady Bird Johnson launched USS TENCH (SS-417) at the Portsmouth Naval Shipyard. Her husband was then a member of the U.S. House of Representatives from Texas. U.S. shipyards were building submarines very quickly, and TENCH was one of two subs launched at Portsmouth on April 11, 1944. The other was USS THORNBACK (SS-418).

Accompanying Mrs. Johnson to Portsmouth was Mrs. Tom Clark, Matron of Honor. The two ladies posed by TENCH's bow for photographs, Mrs. Johnson holding the metal-wrapped launch bottle and a bouquet of roses. Looking trim and businesslike in a suit and straw hat, Lady Bird smashed the champagne bottle against TENCH's bow, beginning the submarine's twenty-six year career.

Richard Nixon

Richard Nixon never visited a submarine during his presidency. His only known trip to a submarine came in November 1980, six years after he left the White House. During a conversation with Admiral Hyman Rickover, the former president expressed an interest in visiting a submarine. The Navy subsequently organized a familiarization tour for him.

Nixon flew to Groton on a Friday afternoon and went aboard USS CINCINNATI (SSN-693), with Admiral Rickover. CINCINNATI got underway and steamed into the operating areas south of Groton. Mr. Nixon remained on board overnight, spending much time discussing world affairs and national policy with the officers and crew. CINCINNATI returned to port Saturday morning and Mr. Nixon departed. CINCINNATI presented him with a blue jacket bearing his name and the ship's patch.

Gerald Ford

Gerald Ford made his only visit to a submarine when he was a congressman from Michigan. He joined eight other congressmen and Rear Admiral Hyman Rickover for an overnight cruise onboard USS NAUTILUS (SSN-571), commanded by CDR Eugene Wilkinson. The group boarded NAUTILUS in Groton the morning of February 24, 1956, and spent twenty hours underway, most of it submerged in the waters south of Long Island. Mr. Ford toured the submarine, took a turn at the helm, and looked through the periscope. NAUTILUS returned to port the next morning. After posing for a group picture on the brow, the congressmen toured the Naval Submarine Base.

Mrs. Betty Ford, sponsor for USS DACE (SSN-607), launched the submarine at ceremonies at Ingalls Shipbuilding in Pascagoula, Mississippi, in August 1962. She returned to Pascagoula in April 1964 to participate in DACE's commissioning.

Jimmy Carter

Jimmy Carter had the strongest connection of all the presidents with submarines. A 1946 graduate of the Naval Academy, he attended Submarine School in Groton from July through December 1948.

After sub school LTJG Carter reported to USS POMFRET (SS-391), a diesel submarine homeported in Hawaii. The ship deployed immediately to the Far East. During the crossing POMFRET encountered a violent storm. Carter was standing watch on the bridge one night when a wave washed him thirty feet aft and left him clinging to POMFRET's five inch gun. He held on till he recovered his strength, then returned to the bridge. As he later recalled, had the wave taken him anywhere other than dead aft, he would have been washed overboard and undoubtedly lost at sea. As it was, the storm knocked out all POMFRET's radio transmitters, and after she missed several scheduled transmission periods, the Navy reported her as missing and possibly sunk.

In April 1949 POMFRET returned from deployment. Rosalynn Carter and their son Jack, then almost two years old, moved from Plains, Georgia, to Oahu to join LTJG Carter. POMFRET operated in the Pacific for the rest of 1949 and 1950. In the summer of 1950 she changed homeports to San Diego.

In the fall of 1950 LT Carter received orders as senior officer to the pre-commissioning crew of USS K-1, (later called BARRACUDA), then under construction at Electric Boat in Groton, Connecticut. K-1 was an experimental submarine -small, quiet, and designed for anti-submarine warfare. Carter enjoyed his engineering work and his role in establishing the ship's operating procedures.

After USS K-1's commissioning on November 10, 1951, LT Carter served as Operations and Gunnery Officer. The sub operated off the New England coast and made occasional trips to the Caribbean. Carter later described his service on K-1 as "tough, dangerous, and demanding." He earned his coveted command qualifications while onboard. Following an interview with then-Captain Hyman Rickover in 1951, LT Carter was accepted into the Navy's nuclear power program. He was assigned to the pre-commissioning crew of USS SEAWOLF (SSN-575), the nation's second nuclear submarine. SEAWOLF was under construction at Groton, but the crew was in Schenectady to be close to Knolls Atomic Power Laboratory where General Electric was building a prototype of SEAWOLF's reactor.

At the time of his assignment, Carter was the senior officer on the pre-com crew. His work involved observing the reactor's construction, teaching advanced mathematics to SEAWOLF's enlisted crewmembers, and traveling to different sites involved in reactor planning and construction. One of these trips, with his wife Rosalynn, was to Groton to witness the keel laying ceremony for NAUTILUS in June 1952. He served with the SEAWOLF crew from 1951 until 1953.

Mr. Carter's father died in 1953. Although LT Carter considered his work in submarines and nuclear power to be the best job in the Navy, he resigned from the service and returned to Plains, Georgia, to go into business.

Jimmy Carter's next visit to a submarine was as Commanderin-Chief, when he visited USS LOS ANGELES (SSN-688), in May 1977. Accompanied by his wife Rosalynn and Admiral Rickover, he went aboard LOS ANGELES, commanded by CDR John E. Christensen Jr., at Cape Canaveral. The President spent nine hours onboard, three and a half hours submerged, as LOS ANGELES operated off the Florida coast. The President and Mrs. Carter steered LOS ANGELES, driving the submarine at top speed, and they participated in a mock attack on USS ARTHUR W. RADFORD (DD-968), their surface escort.

Afterwards President Carter praised LOS ANGELES and her crew: "With absolute certainty, I can say there is no finer ship in the world. I'm very proud of what I see."

On April 7, 1979, Mrs. Carter went to Groton for a double event at the Electric Boat shipyard. First she witnessed the launch of USS OHIO (SSBN-726), the nation's first Trident submarine. Immediately after the launch, the First Lady marked her initials in the keel of USS GEORGIA (SSBN-729) at the keel laying ceremony for the fourth Trident submarine. Mrs. Carter wore a special apron commemorating the event. Welder Kimberly Shriver burned RSC into the keel and Mrs. Carter cleaned up the work with a wire brush. She also made a short speech about the importance of submarine-based strategic weapons.

Ronald Reagan

President Reagan's experience with submarines was confined to his career in the movie business. He did not visit a submarine during his eight years in office.

In the 1930s Ronald Reagan, under contract to Warner Brothers, had a role in the movie <u>Submarine D-1</u>, starring Pat O'Brien, George Brent, and Wayne Morris. The story involved two sailors trying to win the same girl. Much of the action centered on sunken submarines with crew trapped onboard and the use of the McCann diving chamber to rescue them. The movie used much film shot on location and contains excellent pictures of submarines and facilities at the Naval Submarine Base in Groton and the Naval Base in San Diego.

Warner filmed two endings to the movie - one in which Wayne Morris gets the girl, another in which Reagan, playing a naval aviator, enters as her fiance at the end of the film and claims her. The studio chose the Wayne Morris ending and all of Mr. Reagan's scenes were cut from the movie. Mr. Reagan spent an enjoyable week in Coronado working on the film, but it is not clear if his portion of the filming involved going close to or on a submarine.

Ronald Reagan's last film was <u>Hellcats of the Navy</u>, made in 1957 for Columbia Pictures. Based on a book by Vice Admiral Charles Lockwood, the movie loosely interpreted the daring penetration of the Sea of Japan by U.S. submarines in World War II. Mr. Reagan played the Commanding Officer of one of the subs sent on this dangerous mission. Much of the film was shot on a U.S. submarine, and the future president spent many hours on the bridge and inside the conning tower, wardroom, and other spaces onboard. Between scenes Mr. Reagan relieved an inclination to claustrophobia by looking through the ship's periscope.

Co-starring in the film were Arthur Franz, Harry Lauter, and Nancy Davis, who played a nurse and the romantic interest. It was the only film Mr. Reagan made with his wife Nancy Davis.

George Bush

George Bush was grateful for his first trip on a submarine because it probably saved his life. During World War Two, then LTJG Bush served as a naval aviator and flew torpedo bombers from the carrier USS SAN JACINTO.

On September 2, 1944, Bush was flying his fiftieth mission, a bombing run on a Japanese radio station on ChiChi Jima, when heavy anti-aircraft fire struck his plane. He continued to his target, dropped four 500 pound bombs, and then headed out to sea. With the plane ablaze and one crewmember dead, LTJG Bush and the other crewmember bailed out at 1,500 feet. The other man's parachute failed to open, but the future president landed safely in the ocean close to ChiChi Jima.

U.S. fighter aircraft drove away a Japanese boat that tried to capture the downed pilot. They also radioed Bush's position to the USS FINBACK (SS-230), commanded by LCDR R. R. Williams, which was operating fifteen to twenty miles from the island.

Two hours later FINBACK had the life raft and pilot in sight through the periscope. They saw him before he saw them. Mr. Bush remembered the occasion years afterward: "I saw this thing coming out of the water and I said to myself 'Jeez, I hope it's one of ours'." FINBACK got him aboard quickly.

FINBACK, however, was not running a taxi service, and LTJG Bush stayed with the sub for the remaining thirty days of its war patrol. During this time FINBACK picked up five downed fliers, sank two enemy freighters, and was both depth charged and bombed by enemy ships and planes. Mr. Bush recounted the experience: "I thought I was scared at times flying into combat, but in a submarine you couldn't do anything except sit there. When we were getting depth charged, the submariners did not seem overly concerned, but the other pilots and I didn't like it a bit. There was a certain helpless feeling when the depth charges went off that I didn't experience when flying my plane."

George Bush's next three visits to submarines, all as Vice President, were more relaxed. He was the main speaker and Mrs. Bush the sponsor at the launching of the fast attack submarine USS HOUSTON (SSN-713) in Newport News, Virginia, in March 1981. He visited USS INDIANAPOLIS (SSN-697) in Pearl Harbor in July 1981. The Vice President was the principal speaker at commissioning ceremonies for the nation's first Trident submarine, USS OHIO (SSBN-726), in Groton in November 1981.

FIFTEEN MINUTES ...

by Rear Admiral David Oliver

This is a leadership story involving submarines. First: a little background. As you may know, over the past several decades as our country built our nuclear submarine force, we have sold or given existing diesel-electric submarines (as well as other ships) to allies and friends of the United States. As a result, today many of the ships comprising the naval backbone of several South American countries are vessels which were originally commissioned in the U.S. Navy.

For the nations that comprised the post-World War II free world, it has been in our best interests to provide naval advice and assistance to go with those ships. This is especially true if that assistance is not seen as intrusive or an infringement on national independence, and was particularly expensive and unnecessarily duplicative. For example, we maintain, located on U.S. soil, but quickly transportable worldwide, several different methods of assisting countries in the event that one of their submarines accidentally sinks.

One way to escape from a submarine is with a diving bell or an escape chamber. This is exactly what you think. A bell-like chamber is lowered down to the submarine (usually guided by a cable which is attached to the submarine on the bottom end and suspended from a orange-colored buoy on the surface). The men enter the bell directly from the submarine, and are slowly winched to the surface. Since trained underwater doctors and divers can be sent down with the bell and oxygen supplied in the quantity needed, injured men can be retrieved and there is a great deal more flexibility in any rescue effort.

We maintain an escape chamber capability for the use of our friends and allies worldwide. The equipment, as well as the trained doctors and divers, have been located in San Diego for some years, and, in the event of an emergency, we fly whatever is needed anywhere in the world.

Another one of those methods to rescue submarine accident survivors is with a mini-submarine. This is an electric-battery powered submarine (with about a day's use endurance) designed to shuttle transport survivors from their submarine on the bottom to another submarine or to a surface ship. If you saw the film <u>Hunt for Red October</u>, you watched the actors (and several regular Navy men who were recruited for the film) be transported underwater in a mini-submarine between the United States submarine DALLAS and the Soviet RED OCTOBER. A mini-rescue-submarine can go down to several thousand feet and bring back survivors without anyone even getting his or her feet wet, much less nibbled by a shark.

Once upon a time a diesel submarine belonging to one of our South American friends accidently sank. It was later determined the submarine had been inadvertently run over by a surface ship.) The people in San Diego responsible for submarine rescues heard about the accident and immediately started preparing for the rescue. Well ... sort of immediately started preparing, and this is one of the important aspects of this story.

In the military units with which I am familiar, since the United States does not have a nearly constant call for warfare (or submarine rescue, in our current example) to be conducted somewhere, we try to invent a job to occupy the people. We want the men and women to keep their skills sharp so that they are continuously ready, so we think of some useful work closely related to whatever they would actually do in combat. This is fairly easy with most naval jobs, for the danger of simply working on the sea is usually enough to keep people tuned. Understandingly, the better we do at devising their peacetime job, the more the people doing the work may think that this is their real reason for existence! In the case of interest, during the 99.999 percent of the time that submarines are not inadvertently sinking, we have the rescue people work at helping underwater research. We take scientists down to work near the underwater volcanic fissures, and pick up (very expensive or irreplaceable) things which have ended up on the bottom, lay cables for government agencies, etc. All of this is work that requires people to work underwater at great depths, and to adapt to all types of challenges and environments. It is ideal work for people whose purpose is to rescue submariners.

Unfortunately, since their day-to-day work was so interesting and challenging, the group tended to forget its reason for existence. Therefore, when the South American diesel submarine went down, we could think of all sorts of reasons why this problem didn't particularly apply to us.

"It is too far away, we could never get there in time."

"I'm not sure we have an agreement with that country to provide rescue services."

"If we do anything, it will cost money. Who will pay for it?" "What if they really don't have a problem and ...(insert any of the above questions)?"

"We have a schedule to maintain."

"They're in pretty shallow water, they can get out on their own."

Much later we realized "the schedule" was really the origin of the initial reluctance. Gearing up a major rescue operation would completely disrupt all the operations large numbers of people had spent weeks carefully, carefully planning. The *make work* had taken on a life of it's own! It was an interesting lesson: people do not readily discard work in which they have personally invested. As a result, they may not even recognize a once-in-a-lifetime opportunity!

Fortunately, one officer in the organization was a tiger, and, as soon as he was notified of the problem, he recognized the challenge and took over. Our airplanes with our escape chamber (bell), the support equipment, and the trained divers and doctors were in the air -- nearly over the South American country -- when the last of their trapped submariners made good their own free ascent escapes.

A I recall, only one sailor died, and he died helping save some of his injured shipmates.

Our American unit got a lot of praise for their aggressiveness in getting out ahead of the problem. Some of the troops got an interesting trip to an exotic city they would otherwise never have seen. Everyone in the organization was proud. We gave out a couple of medals. We promoted the tiger in front of his peers. Everyone in the organization had a renewed understanding of their purpose. There wasn't any press coverage, and we didn't promote any. The country with the problem had handled it on their own and the party in power in that country was not particularly interested in advertising <u>any</u> relationships with the North American brother. Wonder how the press would have treated the event if we had started our rescue preparations only after the submarine's own rescue attempts had failed?

We did completely destroy the schedule. No planned paper event was completed on time for at least a couple of weeks. Too bad.
We also uncovered some problems in the way the unit was organized and trained, so we were better prepared for the next time, whenever it comes.

A good couple of days. An opportunity for fifteen minutes of glory avoided.

An organization is lost without one, but a single tiger is usually enough. If you have one, ensure he or she is fed and protected.

Let's permit a couple of months on the calendar to leaf by and we'll return to that unit and see what other lessons they can teach us.

Remember I mentioned earlier that some of the people who drive a mini-submarine in the rescue unit once got the role of acting that same job in a movie? Well, several months after the movie came out, some of these sailor-actors were at sea in their mini-submarine practicing putting in an underwater cable (the submarine can be outfitted with different mechanical devices, or "hands", making underwater work easier -- today they had a cable reel installed).

They were working about a mile underwater, where the pressure is sufficient to crush a tank. It's dark down there. Light from the surface doesn't go much below a hundred feet, so there is nearly no vegetation this deep. There are only a couple of portholes in the submarine to see from anyway. Can't see anything approaching from directly astern. It's also cold. And lonely. The only contact with humanity is an occasional underwater telephone message from the support ship on the surface. Underwater telephones are hard to understand and each message uses precious power, so there aren't many. The occasional fish that swims into your working beam is a welcome fellow swimmer.

The mini-submersible's crew was working at replacing one of the anchors for a suspended hydroacoustic device. It was slow work. The previous crew had worked the anchor into place. This day's job was to connect a nylon cable to the anchor, then slowly back away using the small multiple propellers installed on the very maneuverable submarine, paying out the cable for fifty feet or so, and then slowly ascend, leading that cable up to the support ship. Once the cable was connected, the hydroacoustic device would be firmly anchored, no matter what the sea conditions -- the cable was nearly unbreakable. The previous day's crew had warned of seeing an old nylon cable in the vicinity of the anchor. This crew had seen nothing - maybe some long fronds, but nothing else. Now, the anchor's hooked! Only have to carefully back away. Five feet, ten feet, fifteen. Out of the corner of his eye, the pilot saw some long shadows waving in the turbulence created by the mini-submarine's motion. Then the maneuvering propeller suddenly stopped.

Yes. They had backed into another virtually unbreakable nylon line and wound it around their main propulsion propeller. In their initial efforts to break free, their own cable reel came loose and assisted in the entanglement. The mini-submarine was now tied securely to the bottom, nearly a mile below the surface, with less than eighteen hours of oxygen remaining.

The first major obstacle the leader must overcome in these circumstances is that people tend not to believe in the possibility of death to them or their friends. Everyone under the age of thirty believes they are immortal. They also believe their friends are immortal. In this case, with only eighteen hours before everyone was truly dead, there wasn't a great deal of time to talk about whether the problem was real or not.

The second obstacle is that people are reluctant to take steps which might later prove to have been unnecessary. I don't know why. I believe it is related to the first problem - people are very slow to recognize a deathly serious situation. In the case at hand, we were going to have to get people out of a casualty situation (which initially is seldom or never clearly understood) without losing more people in the same deadly snare. And we did not have much time. So we obviously should plan on using every tool we could find.

Fortunately, a leader stepped forward and organized:

- A robot camera which could be lowered down to observe the mini-submarine to determine the true situation and monitor those aspects the men on board could not see (their stern for example). The camera would be there in four hours.
- A remotely operated vehicle with a mechanical arm which could cut away some types of obstacles. It would be on scene in twelve hours.
- Another mini-submarine which could be transported to the accident area aboard a submarine. Unfortunately, both of the submarines which could serve as transport vehicles were themselves in drydock undergoing repairs.

Therefore we called 10,000 people into work (it was about midnight) and began making emergency preparations to put both submarines back together and get them to sea. We started cutting corners in order to get the submarines and their important passenger married up within fifteen hours.

 A crane with a mile long cable aboard a large barge (we hoped to grab the mini-submarine and the offending cable, and wrench them all to the surface). We knew an appropriate crane was somewhere on the coast and began making frantic telephone calls.

It turned out that when the robot camera was lowered down the second time (the first time it failed and had to be repaired on scene), the individual in the support ship was able to coach the mini-submarine into maneuvers that unwound the nylon cable. With a little help, and a lot of luck, the people on scene were able to save themselves.

What did we take away from the experience?

Again, without at least one tiger in the organization (and he or she does not have to be very senior to save the day in an emergency) nothing would have happened in time to be helpful. The average person simply does not accept that someone is going to die if some extraordinary action is not taken. Of course it did not help that the emergency started at night. Tired people don't react as aggressively as people who are already awake -- unless they are people who have trained themselves to compensate at night and mentally force their bodies into action.

Once everyone starts rolling, the people quickly will separate themselves into those who will take their part of the problem and start running with the ball, giving you adequate and timely status reports of their progress and problems, and the other group. The other group will still begrudge any extra effort and will make progress agonizingly slow. In a fast moving situation, you probably don't have time to replace the latter with someone who has enough specialized knowledge to keep that unit going. Therefore, concentrate all the supervisory talent you have available on keeping this latter group moving.

After the problem is over don't waste any pity on the latter group. Shoot them in the head.

Whenever you have a fast moving problem, you can keep unwanted requests for status off your back, while still keeping the door open for good or new ideas, if someone in the unit is assigned to keep the rest of the organization up to speed. Don't waste the leaders time screening the output for something as unimportant as *spin*. If it truly is a life and death situation, no one can waste their time worrying about external impressions. We tasked a small group to hourly report what was going on to <u>everyone</u> external to the unit. The reporting group did such a good job that no one external wasted our time with distracting questions.

If you have a life and death situation, ensure you take whatever measures that will enable you to live with yourself during future rainy nights when the wind moves the trees outside your windows. Also remember that the rest of the organization is watching. They will gauge what the organization would do for them if they were in trouble by what you actually did that night. No number of public affairs programs, or speeches, or company memos will overcome what you did when the rubber actually met the road. One good save is priceless for your organization.

In this particular situation, several young people had done exceptional work, and there were no secrecy problems. The men involved in saving the mini-submarine got their fifteen minutes. It was the right kind of time.



DOLPHIN SCHOLARSHIP FOUNDATION

Dolphin Scholarship Foundation is excited to announce the publication of <u>Thirty Years of Submarine Humor</u>, a commemorative collection of Dolphin Calendar cartoons and submittals from the last thirty years. This ninety-six page, 8½ x 11 hardcover book is due out this fall and will sell for \$15, plus \$3.50 shipping. All proceeds from the sale of this book will go to the Dolphin Scholarship Fund.

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PROLIFERATION OF MID-RANGE MISSILES AND OF NUCLEAR WEAPONS IS DEVELOPING AS A KEY ARMS TREND OF THE 1990s, THIS TREND WILL CHANGE THE NATURE OF REGIONAL WARFARE, ENHANCING THE ROLE OF U.S. SUBMARINES.

Looking ahead, the nuclear submarine is the only U.S. platform that has no meaningful opposition. Cruise-missile-equipped U.S. attack submarines now control not only the deep seas and shallow water, but they can also attack land areas hundreds of miles inland. In the next decade, as more and more nations gain nuclear weapons, U.S. nuclear submarines will remain unchallenged. In any scenario, they remain far less vulnerable than any other kind of air, land, or sea platform. Construction of submarines is thus the wisest choice today because no potential opponent, with any known weapon system, will be able to counter them.

Let's prepare for the next conflict, not the last one.



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ON PATROL FIFTY YEARS AGO

by Dr. Gary Weir

Lieutenant Commander Roy S. Benson took command of USS TRIGGER on August 1942 upon the boat's return from its first war patrol. He had graduated with the class of '29 and went to Submarine School in 1934. He was Executive Officer of NAUTILUS from February '41 to August 4th of '42. He became the PCO Instructor in New London in July of '43 and in June of '44 he took command of RAZORBACK. Rear Admiral Benson retired in 1969.

This patrol was chosen to illustrate the state of the submarine war in the fall of 1942 as the U.S. Navy took the battle to the Japanese home waters.

USS TRIGGER -- Report of Second War Patrol

NARRATIVE:

September 23, 1942

0900 VW Departed Pearl Harbor.

October 5, 1942

- 0420 K Lat 31-40N, Long 142-06E. Sighted smoke on starboard bow. It was grey dawn, overcast sky, two hours before sunrise. Closed and then noticed that vessel was heading for us. He looked small so manned 20 MM. Manned 3" gun as greater size became apparent.
- 0439 K Opened fire, range about 1500 yards. The enemy returned fire with gun of about 3" calibre and machine guns.
- 0445 K Ceased gunfire and changed course to bring bow tubes to bear. Target, a freighter of about 4,000 tons, turned away and started zigging. Gun crews sent below. Commenced chase.
- 0450 K Angle on the bow 180.
- 0453 K No it isn't. AOB is zero and relative speed is very fast. Too close to torpedo. He is attempting to ram. Maneuvering to avoid.
- 0455 K Target passed abeam to port about 50 feet on opposite and parallel course. Target swinging left rapidly and so did we to keep him from striking our stern.
- 0500 K Fired torpedo tubes #7 and #8. One torpedo wake

went under the target. After Torpedo Room heard a rumble and a roar 1 minute after #8 was fired. Word got out that we made one hit.

- 0505 K Sound reported high speed screws. Thought gun of larger calibre was heard. Assumed some support for the enemy had arrived, but could see none, visibility not good. Submerged. No screws heard except our surface target. He was damaged but was getting away.
- 0530 K Surfaced and chased him on four engines. Enemy opened up again with gunfire.
- 0551 K Fired #4 torpedo tube. Saw wake go under the target. Reports from Forward Room of a hit. By now planes could have reached the area as result of radio report, target was smoking tremendously, SD radar had been out of commission repeatedly in the past few days, and the dawn was very light. Therefore, submerged with the enemy at a range of about 500 yards swinging toward us. He passed our stern at about 200 yards and dropped one depth charge.
- 0610 K Fired one stern tube in desperation. Did not see torpedo wake.
- 0750 K Target's smoke did not seem to be drawing away fast enough so came to course 125 to close him again. Then there were several large puffs of smoke; then nothing.
- 1100 K Abandoned the search.
- 1418 K Surfaced. The target was a three island freighter of about 4000 tons. The appearance was not unlike that of the Q-ship at which USS GUDGEON fired five torpedoes on her second patrol without sinking her. The target had been definitely damaged at least, and possibly sunk.

October 8, 1942

0135 K Lat 30-42N, Long 133-03E. Sighted two objects, one large and one small, on the horizon dead astern, hull down. Change of bearing indicated they were heading south. Commenced tracking at full speed on all main engines attempting to take position ahead. Tracking indicated course 160, speed 15. Chart indicated that they came from Bungo Suido and were headed for the Mandates. Visibility such that an undetected night surface attack was not possible, yet not light enough for night periscope attack. Decided to make periscope attack at dawn.

- 0600 K Target not in sight. Slowed to allow target to close. Finally found him broad on port quarter, AOB 45 starboard. Came to normal approach course at full speed. Could now see two ships.
- 0622 K Too light to continue on the surface. Submerged.
- 0637 K Target zigged again. Unable to close, passed at four miles; no escort. It was a huge tanker, fully loaded, estimated 10,000 tons.
- 0745 K Surfaced when target finally out of sight. Ahead full on all main engines to circle target and make another attempt. Conned the ship from the A-frames with his masts just in sight.
- 1050 K Lat 28-44N, Long 134-18E. Plane sighted astern cutting in and out of clouds. Continued the chase. Target now bearing normal to base course.
- 1054 K Plane previously sighted headed for us. It was a small, high speed plane. Submerged; Abandoned the chase. Set course toward Bungo Suido to return over the 200 miles covered in the chase.

October 16, 1942

No ships are being sighted off Ashizuri Saki. On surfacing, headed for coast line south of Bungo Suido entrance.

October 17, 1942

- 0541 K Lat 32-21N, Long 132-04E. Sighted smoke inshore. Made simple, night surface, undetected attack.
- 0600 K Fired two bow tubes. Both hit. Target went down by the bow and opened fire with a gun of about 3" calibre. Turned away to spoil the accuracy of his gunfire but keeping him well in sight.
- 0615 K Not sinking. He has turned away and his screws are still turning over. Took position and fired one torpedo. Missed aft. Fired again. Torpedo went under middle of target; no explosion. Perhaps the range was too close to arm in time.
- 0620 K Target took a decided list to starboard, bow going down, stern coming up. Saw one, perhaps two lifeboats in the water.

- 0623 K Target sank bow first. Another explosion. Soundmen becoming familiar with noise of sinking ship. Target had been a three island freighter of about 5,000 tons. This approach had been made by Lieutenant E. L. Beach, Jr., USN, with the Commanding Officer unnecessarily coaching, Lieutenant S. S. Mann, Jr., USN, on the TDC.
- 1335 K Lat 32-38N, Long 131-48E. Sighted freighter on southerly course. Commenced approach, AOB 90 port. Just holding our own on normal approach course at full speed, 140 port track for zero angles.
- 1446 K Fired 3 torpedoes. All ran hot. No explosions. No maneuvering by the target. Track was 110 port, range 1800 yards. Longitudinal spread. Could not have gotten into better position. At firing we were in 30 fathoms of water, coast steep to. Surfacing so close to coast out of the question. Resumed patrol up the coast.
- 1933 K Surfaced on course 045 to cross the entrance of Bungo Suido with hope of sighting target coming out in the afterglow.
- 2010 K Lat 32-33N, Long 131-55E. Our hopes of sighting a target were fulfilled to overflowing, for at this time sighted a destroyer bearing 330 relative, distance about three miles, AOB zero with a tremendous bow wave. Submerged to periscope depth. Destroyer commenced firing. He passed over our stern uncomfortably close and dropped a string of depth charges so close that there were no clicks. He started several more runs but turned away on about one-half of them as we outmaneuvered him. Strings of depth charges were being dropped quite regularly but none very far away, none wasted. It was exceedingly difficult to see through the periscope. He turned toward us again. We turned toward him. Zero AOBs meeting. When did not dare hold fire longer, considering the possibility of a complete miss, fired three torpedoes down his throat, range about 2500 vards. When the first torpedo had run about a minute there was a terrific explosion which CO saw in the exact direction of the oncoming destroyer. When the smoke cleared, the destroyer was still

there but no longer bows on. The first torpedo must have exploded prematurely and the others detonated when they passed through the turbulence. Finally when he was at a range of about 1500 yards, AOB 90 port, fired one stern shot at his bow with intent to fire another at his stern. Could not see him due to poor visibility. Sound reported screws on some other bearing. Could not see a ship anywhere. After a few minutes of screws on various bearings and nothing seen, screws speeding up and getting closer, went to deep submergence thereby losing the initiative but probably saving the ship. Commenced evasion tactics. Our courses were limited to between 090 and 180 for we were boxed in on the 100 fathom curve. Our battery was nearly exhausted for we had over an hour at full speed this afternoon. We were continually getting heavy for we have had leaks into forward trim tank for days and in auxiliaries and after trim occasionally. Water is flowing in by the stern tubes. Numerous other leaks at 250 feet are embarrassing us. Started bucket brigade to shift water from full bilges to reasonably dry ones. Evasion tactics are being successful. Had to speed up now and then and had to pump. The destroyer started a number of runs but, when we evaded, he turned away and then came in again. Finally he had us boresighted. Each one was closer. He must have run out of depth charges. About two more and he would have been on us. He had dropped a total of 26, not one at sufficient range to give the initial click.

2300 K Destroyer not being heard now. Negative tank flood and quick closing vent will not close, vent stops are therefore closed. We have to pump regularly to hold depth even at two-thirds. Pressure in the boat is 2½ inches. The battery is exhausted.

October 18, 1942

- 0020 K Surfaced, expecting the destroyer to be waiting in the distance. Sound reported pinging. Bright light on starboard beam.
- 0022 K Submerged to 200 feet. Nothing heard.

0100 K Surfaced and cleared the area at high speed. The destroyer Commanding Officer may well claim our destruction for obviously he never heard us after his last run and he stayed around for some time. Headed for the 160 course line from Bungo Suido in order to intercept ships on that track. At dawn, commenced submerged patrol. Leaving negative tank flooded completely, flood valve will not shut.

October 20, 1942

- 1815 K Lat 32-00N, Long 132-35E. Sighted smoke bearing west. Started submerged approach until it was obvious that we could not close. Course was southerly.
- 1915 K Surfaced and started the chase at full speed. Tracked the target to be zigzagging at 15 knots with base course 160.
- Attained position ahead. Moon too bright for 2310 K surfaced attack. Sighted target; 10,000-ton loaded tanker. Eight torpedoes remain on board, four in each end. All are ready. AOB impossible to estimate, but closing on a constant bearing. Large zig to the left. Came to 90 starboard track with stern tubes. Pinged a range, 1400 yards. A large zig to the right, still starboard track. Pinged a range, 900 yards. 2350 K Fired a wide spread of four torpedoes, two to hit. Came left to bring bow tubes to bear. Two hits. Target heading for us to ram. Went to 100 feet. Target went over our stern and dropped one depth charge at a range of about 500 yards. About one minute later there was a violent explosion, absolutely not a depth charge. It must have been his aviation gasoline, magazines or boilers. Started for periscope depth. Sound reported high speed screws near the target. Search during approach had not revealed an escort but visibility had not been sufficient to be certain. Not having a negative tank did not dare to come to periscope depth until we knew more about the high speed screws. Turned our quarter toward them. High speed screws dying out. Sound reported tanker's screws had stopped. Started for periscope depth. Sound reported crackling sounds like those

when the ship we attacked on 17th finally sank. Periscope depth. Nothing in sight. Surfaced in order to see better. Nothing in sight. Visibility excellent in bright moonlight. Searched thoroughly with binoculars. Nothing in sight.

October 24, 1942

- 1031 K Lat 32-06N, Long 132-34E. Sighted large tanker zigzagging, base course about 340. He is about 10,000 tons and empty, very high in the water. We do not have any stern torpedoes left. Unable to get a ping range.
- 1054 K Fired longitudinal spread of three torpedoes. Three hits, one seen right at his stern. Target turned away going deep by the stern. Screws stopped. Heavy white smoke out of his after parts. Target opened up with gunfire from a forward gun. Range to target increasing. Afraid he may be able to get away.
- 1102 K Fired our only remaining torpedo which had been saved for the Coup de grace. The true bearing of the target was perfectly steady. No explosion at the proper time. Various small explosions being heard. Might be internal in addition to the quite regular sound of his shells landing. Withdrew to range about 6000 yards to keep him in sight. Still well down by the stern and still afire aft; not sinking. His angle up by the bow had now increased to nearly ten degrees.
- 1405 K Two light bombing planes are now circling the target and searching the area for us. Went to 150 feet for the time being as we can do no good and will be able to look again later.
- 1450 K Two depth charges or bombs at a considerable range. No screws. Probably from planes. Perhaps we have an air or oil leak; else they are being dropped to get us away. The latter is probably correct. We can do no more good here. Am sure that this empty tanker will not sink; too much reserve buoyancy. No use in inviting attack so remained at 150 feet clearing the area. During evening twilight surfaced and started home at high speed expecting to be ambushed as we are close to Bungo Suido.

2045 K Left the area.

LETTERS

ON BEING A SUBMARINER

9 June 1992

To: Commander Kirk Donald, USN Commanding Officer USS KEY WEST (SSN-722) FPO New York 09576-2402

Dear Captain

It was a rare privilege to be allowed to visit your magnificent ship during such an important event as Top Torp. Never having been on a submarine before, I found it an almost overwhelming experience which will take me quite some time to assimilate properly. I will share some of my initial impressions with you.

First, it had never dawned on me the extent to which your entire war fighting mission is so totally controlled by one individual -- the captain, i.e., you. All the inputs from the operators go directly to you, and you make all the decisions. I don't believe there is anything like it in any other war fighting team and/or machine we put together anywhere in the armed services. A corollary that also never had dawned on me was how crowded and busy your command center is. People kept milling about, and you yourself had to jostle people aside to get your job done. That's unlike anything I have seen or could have imagined. But this allowed me to stand over your shoulder and see how you pursued your task -- fascinating, to say the least. Of course, it helped to have the crib sheet from CAPT Dave Miller too, so I could see what you could not, i.e., where the opposition was.

Second, another strong impression is how crowded a submarine is. It's hard for anyone to be deprived of solitude, and you have to be kept very busy to bear it. No wonder you work your people hard - I imagine that is essential in order to keep them functioning during long deployments. I found it very gratifying to see how alert, calm, and generally content your crew appeared. Clearly, you pick and train them well; nevertheless, after months at sea under the conditions forced upon them in a submarine, I would have expected a greater impatience in their demeanor, especially with the prospect of shore leave so close at hand. I was very favorably impressed with your crew, and only wish I had had more time to chat with the enlisted men. I toyed with the idea of asking to come along on the trip to Norfolk to get a better feel for what life on a submarine is like when it is not engaged in an important exercise, but desisted partly because I was not prepared to impose on you any more than I already had, partly because I would not have had much to do on board for a few days -- and having nothing to do on a submarine is, as I said above, not a very attractive prospect for anyone.

Third, I had never thought about the unbelievable extent to which the physics of the undersea environment and the technology of your vessel determine everything that you do. When CAPT Mike Feeley walked us about the ship, it was impossible not to marvel at how every nook and cranny is crammed with various functions. Space is at such an enormous premium, obviously, and all systems are limited by that. But the war fighting aspects of it are even more fascinating. I never knew how difficult it is to read and interpret sonar displays, and the extent to which you have to use the statistical applications to make your decisions. You never really know anything for sure about the enemy, do you? You never see him, and you can't be totally sure that you hear him, and you can never be certain that he really is where you guess he is. And then, when you send him a fish, you have only limited control in steering it to where you think he is. That is a very hard environment to fight a battle in.

And, finally, when you give away your position by firing something, you get incoming immediately. That means that you may stalk your enemy for hours or days, get one shot in, and then you have to bolt. The slow speed at which the battle is fought and the single opportunity you get when you do decide to strike are so unlike anything else in war. Yours is clearly one tough battle to fight in a very imposing environment where any technological edge becomes an enormous force multiplier. I don't think I shall ever forget the feeling when the ship went from cruising speed to flank speed so quickly at that depth – that was very, very impressive indeed.

Pardon the silly pun, but it was a deep experience, all of it, very deep indeed. It will be long before I forget any of it.

I wish you the very best in the Top Torp competition, and I will ask to be kept up with how KEY WEST does. Please convey my gratitude and kindest regards to all your crew.

I look forward to meeting you again some day soon.

Sincerely yours, Carl J. Dahlman Deputy Assistant Secretary of Defense (Requirements & Resources)

RIGHTING AN EDITORIAL WRONG

This letter is in regard to your miscellaneous news story on the decommissioning of the USS GUITARRO (SSN-665) on page 118 of the April edition (of the SUBMARINE REVIEW).

It is a sad state when even submariners cannot look past the downfalls of a submarine's history. The article did at least attribute a "distinguished career" to the GUITARRO. The rest of the paragraph mentions "an embarrassing moment" and points out that it was the target of an Admiral Rickover joke.

As a former officer of the GUITARRO, I had to deal with this stigma 20 years after the accident. It would have been prudent that even one of the real distinguished firsts be mentioned by your staff. Some of these include the first submarine launch of the Tomahawk cruise missile, the first to forward deploy ADCAP torpedoes and some highly classified firsts on an overseas deployment which earned the ship a Navy Unit Commendation (NUC) under CDR M. R. Kevan. The GUITARRO also earned two Meritorious Unit Commendations (MUC).

The pervasive attitude that GUITARRO was a jinxed boat was always a topic the wardroom's throughout its history had to overcome. Electricians always blamed unidentifiable intermittent grounds on the sinking and that the water had deteriorated the ship's cabling and connections a generation later. I once overheard an EM1 talking to a prospective prototype student say, "Don't come to GUITARRO. It's been an electrician's nightmare since day one." Other casualties just seemed to reinforce the GUITARRO's accident-prone existence such as the infamous battery fire in the mid '80s with a PCO class on board.

The cursed boat atmosphere did not help morale. Personnel incidents were woven into the legend of GUITARRO. The crew seemed to expect the worst to happen.

These problems existed even on the boat's last deployment where the ship suffered a propulsion plant casualty while deployed. I was the OOD on that fateful mid-watch. That sequence of events had more impact on my outlook toward submarine life and its personnel than anything else in my 3½ years on board. The crew buckled down in sweltering heat to return the ship to operation and complete the mission. There were no complaints, just professionalism, teamwork and sense of duty. The Engineer was awarded the Navy Commendation Medal (NCM) for his efforts. I was proud to be a member of that crew. I am sorry that the <u>SUBMARINE REVIEW</u> could not see it appropriate to acknowledge the positive aspects of the GUITARRO's 20-year career. Unfortunately, from launching to decommissioning, the GUITARRO was simply known as the *Mare Island Mud Puppy*.

LT Rick E. Dansey, USN

A CALL FOR THE BALANCED VIEW

If ever one wanted a case study of the manic/depressive approach to defense policy that runs amok in the Bedlam of the Beltway, he has only to look at submarines.

As recently as three or four years ago a large body of uninformed opinion advanced the proposition that SSNs would sweep the surface navy from the seas. SSNs were the new capital ships and when would the crusty old U.S. Navy wake up to the fact and stop building those carriers, amphibs, and other assorted targets for torpedoes? A skillful writer of strong opinions, John Keegan, illustrates. In <u>The Price of Admiralty</u>, Keegan concludes with a chapter titled "The Empty Ocean," which explains to the lambs that only warships that submerge will survive in future wars. I don't suppose that OP-02 and other submarine officers thought they were living in a bed of fiscal roses even then, but the garden was lush with expressions of the inevitable future dominance of submarines.

Now the U.S. undersea fleet is fighting for its very existence. The new amateur opinion is that submarines are quite useless and what is needed is Marines on amphibious ships and minesweepers, and not very many of them. It is a paradigm shift that never was, for both extremes view submarines through the narrowest of lenses, heedless of the future, of the adaptability of submarines and other naval forces, and of the need for balance in technological development, the industrial base and operational skills.

I can only wish for all submariners that sanity may prevail over the feast or famine, live-for-the-day, off-with-their-heads madness that is rampant, else Lockwood's "Sink 'em all" be replaced with "Scrap 'em all."

> Wayne P. Hughes, Jr. Captain, USN(Ret.) Naval Postgraduate School Monterey, California

SUBMARINE MEMORIAL IN FORTALEZA, BRAZIL

About two weeks ago an impressive memorial was unveiled in the port area of Fortaleza, Brazil. It consists of a submarine sail mounted in a pool of water to represent a submarine surfacing. The sail came from the Brazilian submarine CEARA, the name of a Brazilian state of which Fortaleza is the capitol. So the memorial has much local interest. A museum is planned alongside the memorial and is intended to provide a history of the boat from its launching to its scrapping (five years ago).

The CEARA was the ex-USS AMBERJACK and was sold to Brazil in late 1973, arriving here on 30 January 1974. It would seem to be a wonderful gesture to provide the museum with material relevant to the years when USS AMBERJACK (SS-522) operated with the U.S. Navy. I know from talking to local people that they would greatly appreciate anything we might be able to get them.

Therefore, I wonder if I might ask the NSL to see what you might be able to obtain. It would seem that what might be of particular interest are things like:

- Pictures of the launching of AMBERJACK and at various times during her service.
- History of the ship.
- Listing of Commanding Officers.
- A plaque (probably unobtainable) or a copy of the logo.
- Pictures of the decommissioning and transfer of ownership to Brazil.
- Letters from any former crew members who might have special anecdotes to relate.

I might also mention that we have an excellent glossy picture of the memorial at its dedication which we will give to the NSL. The dedication was attended by five Brazilian admirals, active duty and retired, and they included the former Minister of Marine (Secretary of the Navy).

I should also mention that the memorial and museum are being underwritten by private sources, primarily by the Sociedade dos Amigos da Merinba (Society of the Friends of the Navy) which is comparable to the Navy League in the United States.

> Sincerely Chuck Pollack

[Editor's Note: Contributions of memorabilia can be sent to: CAPT Charles Pollack, USN(Ret.), Yacht REVERIE, NATO, P.O. Bax 1418, Sarasota, FL 34230, USA

REQUEST FOR HELP BY RECRUITING COMMAND

News reports concerning the downsizing of the armed forces have fostered misconceptions about the viability of the Navy as a good job and career opportunity. These misconceptions have begun to hinder our recruiting efforts.

Despite some uncertainty regarding the future size and role of the Navy, it is certain that our Navy-Marine Corps team will be central to any national defense strategy. Thus, our Navy of the future will continue to require intelligent, highly motivated young men and women who desire the opportunities that the Navy provides. Unfortunately, force restructuring, downsizing, mandatory force-outs of career people by the other services, and early retirements have led many to believe incorrectly that the Navy is no longer a good choice. Some people, in fact, believe that the Navy has stropped recruiting!

I need your help in dispelling these myths. Career opportunities are still available -- the downsizing has not changed that. This year, we are accessing 58,000 men and women, more than 30,000 of whom will move directly into technical fields such as aviation, nuclear propulsion and electronics. Next year, we plan to access more than 60,000. We continue to provide excellent scholarship opportunities. All new Navy men and women can receive \$10,800 (\$9,000 for a three year or less enlistment) and some will receive up to \$25,000 in educational assistance through the Navy College Fund.

Through the Naval Submarine League, thousands of people across the country can be informed about Navy career opportunities. Whether your members can provide assistance to their local Navy recruiter or simply spread the word about Navy opportunities, the assistance to recruiting would be invaluable.

Each Navy Recruiting District across the country is supported by a Recruiting District Assistance Council (RDAC) which helps coordinate efforts to assist our recruiters in bringing the message of Navy opportunity to local communities. I encourage your local chapters to coordinate their activities with the RDACs.

I greatly appreciate whatever you and the members of the Naval Submarine League are able to do to assist Navy recruiting. Sincerely

> Rear Admiral J. M. Barr, USN Commander, Navy Recruiting Command

[Editor's Note: The enclosure to RADM Barr's letter, a list of Recruiting District Assistance Council chairmen, has been provided to the Presidents of the NSL Chapters, and is also available from NSL Headquarters. (703) 256-0891.

REQUEST FOR INFORMATION RE: USN SUBS IN 1944

I am in the process of doing research for a book. This will be a biography on Major Harold J. Mann, U.S.A.A.F. Although he flew as a bombardier in a B-29, the silent service is very important in his life's story.

On August 20, 1944, his B-29 was damaged while bombing the coke plants in Yawata, Kyushu, Japan. They headed for the East China Sea hoping to link-up with the submarines on lifeguard duty there. The radioman was in voice contact with two boats using the code names "Clever Clarey" and "Larapin(g) Lulu." Before they could reach safety, they were forced to bail out due to the fires in the bomb bay gas tanks. The radioman was killed. Two others were strafed in their parachutes and killed. Maj. Mann escaped this fate by dumping the air out of his chute and free-falling to a safer altitude. He landed on Iki Island and was captured and beaten. Later he was tortured. He and his pilot, Col. Richard H. Carmichael, were kept in solitary confinement for eight months under a death sentence for the war crime of bombing Japan. They eventually ended up in the P.O.W. camp at Omori. They, along with about 34 others, were listed as Special Prisoners for being air-crew personnel. These men were all together in one barracks and were not allowed to mingle with the other prisoners.

Maj. Mann received war and camp news from a man in a red beard who spoke softly outside his window while he pretended to be otherwise occupied. This man turned out to be CDR Richard H. O'Kane for the TANG. He and his few surviving shipmates were also kept here. Another captive was Gregory *Pappy* Boyington. Maj. Mann survived the war. Motivated by his war experiences he became a doctor.

With the assistance of Admiral O'Kane, "Clever Clarey" and "Larapin(g) Lulu" have been tentatively identified as Bernard A. "Chick" Clarey and John E. Lee. I have received confirmation from Admiral Clarey and Admiral Lee and the National Archives that their boats, PINTADO and CROAKER were in the East China Sea on lifeguard duty that day. Unfortunately none of these sources can confirm the use of "Clever Clarey" and "Larapin(g) Lulu" as an identifier that day.

In order to add the human touch to this story, I am trying to contact anyone who may recall the use of these code names. I would imagine that my best results would come from the former radiomen, chiefs and officers of PINTADO and CROAKER. Their comments and recollections would be very helpful. I've been in touch with Cal Wentzel, a radioman from CROAKER, who believes he recalls the "Larpain" from somewhere but is not sure if it is only the power of suggestion.

In the letters from both Admiral Clarey and Admiral Lee, they have no recollection of these names being used. Do you feel these names may have been used by a crewman on a spur of the moment decision? Do you think perhaps "Clever Clarey" was used in a less than flattering light? Would it be possible for you to run an add in your magazine requesting assistance from crew members of both PINTADO and CROAKER?

Thank you for your help and cooperation in this matter. Please feel free to write or call me collect with any comments or suggestions.

> Respectfully yours John Chapman 116 Penny Pack Circle Hatboro, PA 19040 (215) 675-6542

BOOK REVIEWS

THE DEVIL'S DEVICE Robert Whitehead and the History of the Torpedo by Edwin Gray ISBN 0-87021-245-1

Reviewed by Rear Admiral Peter Chabot, USN(Ret.)

[Ed. Note: Rear Admiral Chabot is the former Manager of the MK 48 Torpedo Program in the Naval Sea Systems Command.]

How did Whitehead come to build torpedoes in Italy and Marconi make them in England? This bit of trivia may have occurred to individuals familiar with naval weapons and war at sea. This is an updated and expanded biography of the 19th century Englishman whose work had more influence on the course of naval warfare than most of the admirals of his time combined.

Robert Whitehead is an interesting study; an engineering genius, an eminently successful businessman, and a gentle family patriarch who sincerely believed the value of his invention was in its deterrence to war, a weapon so devastating that it would tend to prevent war rather than facilitate it. His unique talent was in applied mechanics that led first to the invention in the 1860's of the automobile torpedo itself (as differentiated from towed or spar torpedoes), and then to each major improvement in the weapon until his death in 1905. Whitehead was additionally an entrepreneur who promoted and sold the product of the family-operated enterprise to some fourteen separate nations while amassing a considerable fortune.

But a lack of financial discipline and the excesses of his English estate, Paddockhurst, cost him a considerable portion of that wealth. And while his engineering achievements were recognized by awards and titles from many of the nations of Europe, he never received, in his lifetime, a single honor from the government of his native England.

The Devil's Device, while first a biography of Whitehead, is also a history of the weapon from its crude inception to today's underwater guided missile. But it is the story of personalities and events surrounding the weapon rather than a technical and engineering treatise. And as such it makes for good reading for a broad based audience.

Whitehead, born in 1823 in Lancashire, began professional life as an engineering apprentice and then moved to formal study of drafting, engineering, and mechanics. Like many English engineers of that period, he followed opportunity to the European continent and with the good offices of an uncle, became involved in marine engineering in shipyards of France and Italy. He progressed rapidly and by the late 1850's, Whitehead was directing both design and construction at the Stabilimento Tecnico Fiumano (STF) engineering works at Fiume, near Trieste.

The Battle of Lissa in 1866 brought initial international recognition to Whitehead. Employing ramming tactics, the outnumbered and outgunned Austrian fleet mauled the Italians, sinking three and severely damaging three additional ships of the line. Whitehead had designed and built the propulsion plant of the FERDINAND MAX, the key Austrian participant. While Tegethoff, the Austrian commander, became a national hero and naval observers concluded the underwater ram was THE weapon of the future, Tegethoff wired Whitehead, "Thanks to (the reliability and performance of) your first class engines, I was able to win the Battle of Lissa."

But in 1864. Whitehead had commenced the work that led to the self propelled, underwater torpedo that would render untenable the close quarters required for ramming tactics. Beginning with a proposal by an Austrian officer for a small, unmanned, surface device carrying an explosive charge, the effort evolved to an underwater vehicle that could deliver an attack beneath the surface, unobserved and below the armor belt where ironclads were most vulnerable. The initial torpedo emerged from the STF shops in 1866 and was offered for trials with the Austrian navy. Powered by compressed air at 6 knots over a run of 200 yards, it delivered an 18-pound dynamite warhead. And so began the evolution that has led to today's subsurface missiles which employ extensive logic embedded in onboard digital computers to acoustically locate, classify, and attack surface and submarine targets at speeds of 50 knots and higher with warheads containing the equivalent of hundreds of pounds of TNT.

As might be expected, one of the initial problems Whitehead faced was getting his torpedoes to consistently run at a depth which would insure impacting the target's hull. The issue consumed nearly two years of effort, until a middle-of-the-night inspiration resulted in a pressure chamber and pendulum device which Whitehead crafted in 1868. Always called "The Secret" (throughout his life Whitehead refused to patent any of his inventions because he feared industrial piracy), his depth sensor/controller remained virtually unchanged in principle through WWII!

As engines improved and range increased, accurate direction control became increasingly important. Whitehead, in 1895, was probably the first individual to put to work the initial practical gyroscope devised by Ludwig Obry. Again, his system of a high speed gyro wheel to detect deviation in direction and compressed air to control the torpedo's rudder were basic ingredients to torpedo control into the 1950's.

While ably demonstrating Whitehead's engineering achievements, the author weaves in a thoroughly researched and well written description of early engagements involving torpedoes. The focus is on actions before World War I, and the period of naval history many readers will already know. Most significant are such battles as Weshaiwei (Japan/China) in 1895, Port Arthur (Japan/Russia) in 1895, and Tsushima (Japan/Russia) in 1905. While it will come as no surprise, the narrative also clearly demonstrates that the weapon is a stern taskmaster as hardships and casualties were significant among those employing torpedoes.

Included are many of the unusual events of torpedo warfare which provide human interest and color – such as the WWI British submarine commander who surfaced his craft to recover a torpedo that missed its target, made it ready again on board, and fired it for a hit (and a confirmed sinking) on a subsequent target. One of the initial aerial torpedo attacks was executed by a British aviator who was forced by engine problems to land his float plane on the water and subsequently taxied into firing position. After achieving a hit and a sinking (a tug), and unburdened of the torpedo weight, he was able to coax his aircraft into the air and make good his escape.

While most people will recognize that Captain Georg von Trapp was a naval officer (the Trapp Family Singers of The Sound of Music), many will not know that he was the World War I U-boat commander credited with sinking the French armored cruiser LEON GAMBETTA. Von Trapp's first wife was Robert Whitehead's granddaughter, Agathe, and after her untimely death of diphtheria in 1922, Georg hired Maria as governess for his five children – and the world is familiar with the story from there. Again, this is a book of torpedo events and people.

Published originally in 1975, this 1991 updated and revised edition reflects author Gray's continued research of his subject and newly available information in Whitehead family letters and Royal Navy documents. Added is a full chapter dealing with torpedo problems encountered by German and American submariners in WWII. While readers will be familiar with our own MK 14 issues, similar difficulties in German torpedoes are given equal treatment. The contrast in finding solutions is remarkable!

For the serious student, eleven appendices provide comprehensive information on the characteristics of torpedoes built by the Whitehead works and the principal naval powers from the beginning up to the present. A final appendix documents principal factors in torpedo engagements through 1895 including date, location, warring parties, attacker and target, and results. A thorough bibliography of primary and secondary sources supports the entire text.

Mr. Gray has written extensively on undersea warfare, both in historical form and in novels. In <u>The Devil's Device</u>, he has achieved a most enjoyable work that will have a significant appeal to both the naval professionals and to others having a more casual interest in war at sea.



THE U-BOAT OFFENSIVE 1914-1945 by V. E. Tarrant Annapolis, MD: Naval Institute Press, 1989. 190pp. and

THE U-BOAT WAR IN THE ATLANTIC, 1939-1945 Ministry of Defence (Navy) London: Her Majesty's Stationery Office, 1989. 396pp.

\$49.95

Reviewed by Marc Milner University of New Brunswick

[Reprinted with permission from Naval War College Review]

ohn Keegan once observed that the vast amount of raw data in logs, signals, orders, charts, and the like burden naval history with such a density and volume of facts that the prospect of writing it might "crush the spirit and blind the imagination of all but the most inspired and dedicated scholar." Compared to the more visceral problems confronting those who wrestle with land battles, modern naval "battle" history does present unique challenges. One of them is that the historiographical concept of naval battle has been extended in this century to include episodes that were, in essence, protracted campaigns of attrition waged by submarines against shipping. Far more than the distinct and discrete "battle piece" - like Jutland or Midway -throughout that Keegan had in mind, these campaigns were shaped and driven by hard data; such as loss and tonnage rates, wastage, rates of new construction, volumes of cargoes delivered, and serviceability and strength returns. The submarine campaigns of this century were battles writ large, with all the detail of particular actions overburdened by the mountains of data compiled by shore staffs.

That essential truth is amply demonstrated in these two excellent books. However, they do more than simply recount the relentlessly accumulated data in plus and minus columns. They fill large gaps in the English language literature on the U-Boat campaigns. Tarrant's <u>The U-Boat Offensive 1914-1945</u> covers the whole sweep of two world wars and provides a remarkably concise yet thorough account of the German U-boat campaigns in both. His discussion of operations is set in a solid strategic context and within the broader context of the evolution of naval warfare itself. His account of the wedding of timehonoured blockade strategy with the new possibilities -- and limitations -- of submarines in the First World War is tightly focused and marvelously balanced. The same can be said of his handling of World War II in which the complex pressures of strategy, the intelligence war, and the contest between Allied tonnage losses and new construction are clearly set forth, he displays a fine sense for the limits of Dönitz's fleet and for the imperatives of the war of attrition. <u>The U-Boat Offensive</u> also provides enough technical detail on U-boat development to carry the story.

Tarrant's text is itself a major contribution to the field, but it is also particularly useful for the enormous volume of essential data that it provides on aspects of the U-boat war. U-boat losses are recorded in detail at the end of each chapter; merchant shipping losses (in various arrangements), new U-boat construction, monthly U-boat strength returns, U-boat specifications, and other tables are provided in appendices. Much of this information is already available in British official and naval staff histories and in out-of-print monographs, and the text is based largely on Admiralty in-house publications available at the public Records Office in Kew. But it would be impudent to suggest that Tarrant has simply repackaged a familiar tale. Rather, he has produced for the first time a truly comprehensive and scholarly account of the German U-boat arm in the world wars. The worst that can be said is that his standard of documentation is less than the scholarly norm.

<u>The U-Boat Offensive</u> will serve as an essential reference on the U-boat campaigns. However, its significance is surpassed by that of the publication of <u>The U-Boat War in the Atlantic 1939-1945</u>, one of the confidential Admiralty in-house sources upon which Tarrant and many others before him have drawn. Long revered by specialists in the field as the Grail for U-boat operations in the Second World War, <u>The U-Boat War</u> was compiled after the war under British and American direction by Fregattenkapitan Gunter Hessler, Staff Officer (Operations) to BdU from 1941 onwards and Admiral Dönitz's son-in-law. Among Hessler's able research assistants was a young German naval officer named Jürgen Rohwer, now the foremost authority on the Battle of the Atlantic. Hessler's credentials for writing this account were impeccable and so too were his sources, which included the surviving U-boat logs, the War Diary of BdU, and other captured German records.

Her Majesty's Stationery Office has published a facsimile edition of the original three-volume "BR 305." Its 400-plus pages of text cover deployments, operations, analysis of U-boat activities, equipment, tactical developments, and evaluations of the significance of Allied countermeasures. The comings and goings of individual submarines and "wolfpacks" are described in detail, as are contemporary German assessments of convoy battles. The text is buttressed periodically with maps, diagrams, and charts illustrating strategic and tactical deployments and concepts, and with no less than thirty-two diagrams, published in a separate wallet, from the original BR 305. The diagrams contain a goldmine of data: flow charts of pack composition, strength returns, tonnages sunk, deployments by theatre, and the like. To this facsimile edition the reviser has appended brief notes correcting errors and explaining incidents in the text along with reflections on the latest intelligence revelations, and a brief index.

It is difficult not to indulge superlatives when assessing the importance of Hessler's work and its publication for wide distribution. Nothing like it has ever been available; <u>The U-Boat War</u> is without a doubt the most important book ever published on the Battle of the Atlantic.

Amid the welter of books which clutter the field of twentieth century naval history, Hessler's and Tarrant's stand out as essential additions to modern naval libraries. They also demonstrate that naval historians have been neither crushed or blinded by the challenges of their field.

REGISTER OF SHIPS OF THE U.S. NAVY, 1775-1990

by K. Jack Bauer and Stephen S. Roberts Westport, Conn. Greenwood Publishing, 1991 ISBN 0-313-262-02-0 \$75.00

Reviewed by Norman Polmar

T his is a remarkable book, listing every U.S. major combatant acquired by the Navy from 1775-1990 in 350 pages of text and photos. Forty pages of text are devoted to detailing each U.S. submarine, from Holland's PLUNGER, the submarine built for the Navy -- but never accepted -- and HOLLAND (SS-1) through the LOS ANGELES (SSN-688) and OHIO (SSBN-726) classes.

For each submarine the authors provide the craft's number, name, builder, building dates, disposition (if stricken or sunk), basic characteristics, and a paragraph of information on authorization, design, reclassifications, and other details. There are also some unusual facts given, such as the TECUMSEH (SSBN-628), originally to have been named WILLLAM PENN, although there is no mention of the PLUNGER (SSN-595) having been named PLUNGER when ordered as an SSGN and the BARB (SSN-596) having been the PLUNGER as an SSGN. As noted in the book, four submarines of this series were reordered as THRESHER-class attack submarines when the Regulus II missile program was canceled.

Unfortunately, the guided and ballistic missile submarines, radar pickets, hunter-killers, and research submarines are listed separately from the *standard* submarines (SS/SSN), and thus the specialized submarines are not listed in chronological or numerical order. But this is a minor limitation as there is a name index and limited hull number index in the book.

There are ten photos in the submarine section. These are the normal shots of the craft and could have easily been deleted, if only in an effort to reduce production costs. And cost is a big factor – but the book is a *must* to those interested in the history of U.S. warships or the Navy. Beyond submarines, the book similarly lists the Navy's sailing ships, beginning with the 74-gun ship-of-the-line AMERICA launched in 1782; armed merchantmen, ironclads, and other warships of the 1800s; monitors; battleships; cruisers; destroyers; escort ships; frigates; and aircraft carriers.

U.S. SUBMARINE FLAG OFFICERS ON ACTIVE DUTY

ADMIRALS (LINE)

Kelso, Frank B., II Chief of Naval Operations DeMars, Bruce Director, Naval Nuclear Propulsion Program

Larson, Charles R. Commander in Chief, U.S. Pacific Command Smith, William D. U.S. Representative to the NATO Military Command

VICE ADMIRALS (LINE)

Bacon, Roger F. Assistant Chief of Naval Operations, (Undersea Warfare) (OP-02) Chiles, Henry G. Commander, Submarine Force, U.S. Atlantic Fleet

Owens, William A. Deputy Chief of Naval Operations, (Resources, Warfare Requirements & Assessments) (N-87)

Colley, Michael C. Deputy CinC U.S. Strategic Command

REAR ADMIRALS (LINE)

Consey, James D. Assistant Deputy Chief of Naval Operations (Plans, Policy and Operations (N-5B)

West, Ralph W., Jr. Superintendent, Naval Postgraduate School

McKinney, Henry C. Commander, Submarine Force U.S. Pacific Fleet

Oliver, David R., Jr. Director, General Planning and Programming Division (N-80)

Jones, Raymond G., Jr. Chief of Naval Technical Training

Barr, Jon M. Commander, Naval Recruiting Command Hill, Virgil L., Jr. Commander, Operational Test and Evaluation Force

Vogt, Larry G. Director for Plans and Policy USCINCPAC

Davis, George W., VI Inspector General Department of the Navy

Campbell, Arlington F. Vice Director, Defense Communications Agency

Houley, William P. Director, Test and Evaluation and Technology Requirements (OP-091B)

Ryan, Thomas D. Director, Submarine Warfare (N-87) Tindal, Ralph L. Director J-3/J-4 U.S. Strategic Command

Goebel, David M. Commander Submarine Group TWO

Marsh, Larry R. Director Office of Program Appraisal

Riddell, Richard A. Commander Submarine Group NINE

Jones, Dennis A. Commander Submarine Group EIGHT

Clemins, Archie R. Fleet CinC Representative for N-8 (N-83)

Watkins, Edison L. Commanding Officer U.S. Military Entrance Processing Command

Bowman, Frank L. Deputy Director Politico-Military Affairs J-5, JCS

Mies, Richard W. Deputy Director, J-5 U.S. Strategic Command

Pelaez, Marc Y. E. Executive Assistant to Assistant Secretary of the Navy for Research, Development & Acquisition

Buchanan, Richard A. Director, Strategic Submarine Division (N-871) Kaup, Karl L. Commander, Naval Base Charleston

Sterner, George R. Vice Commander, Naval Sea Systems Command

Emery, George W. Commander Submarine Group FIVE

Robertson, Thomas J. Commander Submarine Groups SIX & TEN

Shipway, John F. Program Manager SEAWOLF SSN-21 Class Submarine (PMS-350)

Ellis, Winford G. Deputy Assistant Secretary for Military Applications DOE

Gustavson, Fred P. Director, Attack Submarine Division (N-872)

Sears, Scott L. Commander, Naval Undersea Warfare Center

LaCroix, Francis W. Deputy Director, Operations Division, Office of Budget Reports

Herrera, Henry F. Director, J-6 U.S. Strategic Command

REAR ADMIRALS (ENGINEERING DUTY)

Cantrell, Walter H. Commander, Space and Naval Systems Command Claman, John S. Deputy Commander for Industrial and Facility Management

> Deputy Commander for Submarines, Naval Sea

Systems Command

Coyle, Michael T.

Firebaugh, Millard S. Deputy Commander for Ship Design and Engineering

Felton, Lewis A. Commander, Portsmouth Naval Shipyard

REAR ADMIRALS (SUPPLY CORPS)

Filiplak, Francis L Commanding Officer Navy Ships Parts Control Center Moore, Robert M. Assistant Commander Inventory and Systems Integrity

Weatherson, Harvey D. Commander, Navy Resale and Service Support Office Morgart, James A. Assistant Chief of Staff Logistics/Fleet Supply Officer

REAR ADMIRALS (RESERVE-RECALL)

Guthrie, Wallace, N., Jr. Deputy Chief of Naval Reserve (OP-095B)

FORCE MASTER CHIEFS

SUBLANT: EMCM(SS) T. J. Determan SUBPAC: MMCM(SS) J.A. Sirles

SUBMARINE FLAG OFFICER RETIREMENTS (Since 1991 NSL Fact Book)

VADM James D. Williams RADM Theodore E. Lewin RADM Thomas W. Evans RADM Thomas A. Meinicke RADM Howard W. Habermeyer VADM J. Guy Reynolds RADM Stanley E. Bump RADM Douglas Volgenau RADM James R. Lang



REUNIONS

USS CLAMAGORE (SS-343) 22-25 October, 1992 - New London, CT Contact:

> Jim Storms 3029 Thrush Drive Melbourne, FL 32935 (407) 254-9223



USS ANDREW JACKSON (SSBN-619) 15-18 April, 1993 - Charleston, SC Contact:

FTCM(SS) Richard Wehle, USN(Ret.) P.O. Box 26 Goosecreek, SC 29445



USS GUDGEON (SS-567) and USS TECUMSEH (SSBN-628) 16-19 September, 1993 To be held in conjunction with U.S. Sub Veta Inc. National Convention in Vallejo, CA.

For USS GUDGEON, contact: Clifford A. Smith 407 Roleen Drive Vallejo, CA 94589 For USS TECUMSEII, contact: John J. Flynn 2155 Lousiana Blvd NE, Suite 4000 Albuquerque, NM 87110 1-800-428-1036

USS ROBERT E. LEE (SSBN-601) 22-23 October, 1993 - Orlando, FL. Contact:

> Ronald C. Kimmel 7019 Tracyton Boulevard NW Bremerton, WA 98310-8909 (206) 692-9487



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BENEFACTORS FOR FIVE OR MORE YEARS

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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.

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