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EDITOR'S COMMENTS

There are several issues of importance to the U.S. Submarine Force and the supporting community that are addressed in this issue. The lead article is a reprint from a Massachusetts Institute of Technology publication that uses the BATON ROUGE collision off Murmansk to raise the stability issue. In a Counterpoint article our Ambassador Linton Brooks takes on that charge in specific terms. Ambassador Brooks also puts the challenge before all of us to be ready to counter the type of thinking that puts very sophisticated issues into a dangerously simplistic manner when he charges that "...submariners must be in the forefront of thinking through the difficult problems of escalation and stability."

In a pair of landmark articles, two active duty officers also address issues of vital concern to all of us. LCDR Vernon Hutton writes about the real elements of reconstitution, as it now stands as a fundamental principle of the National Security Strategy, and how it applies to the Submarine Force. The point is sound and the argument is well stated. There is more to say on this issue and it does appear that the **survival** of the nuclear submarine as a viable instrument of American security policy may well depend on the submarine community being "...in the forefront of thinking through..." this difficult problem. LT Brent Ditzler discusses the utility of submarines in a **presence and diplomacy** role, using as an example the British application during the Falklands War in 1982. As all modern submarine advocates have heard from various commentators, analysts and even non-submarine naval officers, conventional wisdom seems to hold that a naval force has to be physically visible to be viable in a **presence** role. Here again, the cure to non-appreciation and mis-understanding of submarine potential has to lie in the objective treatment of those issues in easily understandable language by people who know what they are talking about.

The articles by Jim Patton, Richard Ackley and George Kraus each touch on an aspect of the changing world with which the submarine community has to deal. Again, more needs to be said and published about each of those subjects. And lest we forget that we, more than any other maritime group, are dependent on our mastery of technology to let us coexist with, and fight within, the endlessly powerful sea, there is

a menu of suggestions from Ted Gaillard to adapt the lessons of the aerospace world to submarine naval architecture and engineering.

There are two features from the Royal Navy presented in this issue. In the first Rear Admiral Abbott, the Assistant Chief of the U.K. Naval Staff, describes the current status and goals of the British submarine program. A certain amount of editorial license has been taken in order to emphasize for our readers key points of commonality and difference between the U.K. and U.S. submarine practices and structures. In the second British feature we are fortunate to have an expansion by Admiral Woodward on some of the points made in the October 1992 of **THE SUBMARINE REVIEW** by Ken Cox and Tom Maloney in their discussion of Admiral Woodward's book.

Besides the British submarine information there are several other pieces about foreign submarine services. Russian submarines are discussed along two different paths but both start at the same place. George Newton reports on a recent visit to the design bureau which originated the DELTA class SSBNs of the former Soviet Navy, and Norman Polmar's latest subguide article treats the KILO diesel-electric submarine, by the same design bureau, which is now appearing in several of the Third World navies. There is also a translation of a newspaper account of a French submarine escaping from the death throes of a great fleet in Toulon in November of 1942. In addition, John Alden outlines the operations of the Dutch submarines in the Pacific during the 1941-45 war.

From the U.S.N. experience in World War II there are three pieces of interest, two of which are closely related. The war patrol report of fifty years ago is the one of Mush Morton and WAHOO in his raid on Wewak and the convoy battle which followed. There is also a letter which relates a recent visit to Japan as a footnote to WAHOO's last patrol. Bill Ruhe gives modern submariners something to think about as they consider operations in shallow littoral waters with his note on wartime use of grapnels in anti-submarine warfare.

As a final note, because books are an important avenue to achieving the more general awareness of submarines which we strive for, your attention is invited to both the review of Jim George's new book and to the Submarine Bibliography, which is in its second installment. For those of you who have not yet

seen your favorite submarine books mentioned, please send them in and we'll include them.

Jim Hay

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FROM THE PRESIDENT

This spring, Congress will review the first Clinton Administration defense budget. One element of the heated debate that will certainly ensue is the preservation of the U.S. nuclear submarine industrial base vis a vis a sharply reduced global threat.

The complexity and difficulty of resolution of this issue has been acknowledged by both Secretary of Defense Les Aspin and his predecessor, Dick Cheney. Each has characterized the need to maintain our ability to design and build nuclear submarines in the current budget environment as among the most confounding problems facing the nation. Fortunately, there is agreement between Defense and Congress that the United States must sustain its hard won technological lead in undersea warfare: the issue is how to preserve the very unique industry that provided that lead.

Last year, Congress recognized and validated the importance of the industrial base when it voted to fund the second of the SEAWOLF class submarines, and to set aside an additional $540 million to sustain current design and construction capabilities.

More recently, a study by the Joint Chiefs of Staff and two high-level Navy studies have recommended that a minimum production level be established to retain the base. Increasingly, other Pentagon officials are voicing assent. Last year, as Chairman of the House Armed Services Committee, Les Aspin, in a speech to an industrial association, stated that with regard to the submarine industrial base, "We have to ensure that the suppliers remain viable. That may mean a sustaining rate of procurement, even if it exceeds our short term needs."

Within the public at large, there is little understanding of this issue. That is about to change as arguments over the allocation of fewer defense dollars become more intense. The submarine force and the industry from which it springs should welcome the increased scrutiny attendant to the debate, for here is a story worth telling about an invaluable and irreplaceable national asset. Over a period of 40 years, hundreds of industrial

activities, from small business suppliers of precision parts, to major contractors and the shipbuilders themselves, have teamed together with the Navy to produce the most technologically advanced machines made by man, unarguably the finest submarines in the world.

The industrial base is diverse and complex, both the products and the processes needed to build them. The craftsmen are skilled and highly trained. The ships are wondrous models of applied technology. In a Trident ballistic missile submarine, for example, there are some 265 subsystems, 25,000 components, and 350,000 parts supplied by a dedicated and specialized network of businesses. Built into each of these submarines over a six-year, 12 million-manhour construction period is an array of systems that spans the technological spectrum -- from advanced computers to life support systems, from fresh water distilling plants to space age food stowage and preparation facilities -- all that is needed to operate completely submerged for 90 days or more, without a supporting logistics train, an undetectable whisper in the vast sea.

Propulsion is supplied by compact, safe, and reliable nuclear power plants. There is, however, no more stark example of the fragility of the industrial base than this very special niche in which the Navy must now rely on one remaining supplier of nuclear fuel, and one manufacturer of major nuclear components.

If the nation's submarine design and construction capability were permitted to expire, reconstitution -- even if it were possible -- would be technically risky and prohibitively expensive. Restarting the industry would require a lead time of at least seven years. Furthermore, it is not certain that our nation would have the will to absorb the cost of its rebuilding.

The debate surrounding the preservation of the submarine industrial base is not a force level issue, nor is it a jobs issue. Rather, it is a matter of national security, centered on whether the U.S. has a need to retain these key technological and manufacturing capabilities.

Preservation of the industrial base can be achieved most cost-effectively by completing the already authorized third SEAWOLF class submarine. This would require the allocation of about $1.2 billion and the application of the $540 million set aside last year for just this purpose. That additional investment

would bridge the gap prior to the startup of the New Attack Submarine in 1998, and would provide the Navy with one more copy of the most capable submarine in the world.

Submarines, unlike many other military products such as aircraft, have no companion commercial industry. The only way to maintain the nation's submarine industrial base is to build the ships. Proceeding with the third SEAWOLF represents the most cost-effective option to achieve that goal.

See you in June.

Bud Kauderer

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SUBMARINE COLLISION OFF MURMANSK: A LOOK FROM AFAR

[Reprinted with permission of Breakthroughs, a publication of the Defense and Arms Control Studies Program of the Massachusetts Institute of Technology]

by Eugene Miasnikov

[A recent visitor at the MIT DACS program, oceanographer Eugene Miasnikov is a Doctor of Physics and member of the Moscow Institute of Physics and Technology's Center for Arms Control, Energy and Environmental Studies.]

On February 11, 1992, while operating in or near Russian territorial waters off the port of Murmansk, the U.S. attack submarine USS BATON ROUGE was struck from behind by a Russian SIERRA class submarine. Although such collisions have occurred in the past, this one has generated more attention. Contradictory press accounts of the collision, published in both the U.S. and Russia, raise two questions: What was the U.S. submarine doing so close to the Murmansk naval facilities? And how could such a collision have occurred?

These two seemingly simple questions, however, raise a third question that points to issues of prime importance for security planning in both Russia and the U.S: Does this collision tell us anything important about the capabilities of U.S. submarines to conduct anti-submarine operations against the newest generation Russian submarines? If so, could this incident indicate that current and future generations of Russian ballistic missile submarines could be held at risk by U.S. Navy undersea forces? Here I examine these questions using both Russian and American sources as well as a technical review of the capabilities and limitations of submarine sensors in shallow coastal waters. In particular, our analysis indicates that in the shallow northern seas, even under the best environmental conditions, the technical capabilities of modern covertly operating submarines do not allow the detection of other modern covert submarines at distances of more than a couple of hundred meters.

What Do We Know About the Incident?

The USS BATON ROUGE, a LOS ANGELES class nuclear

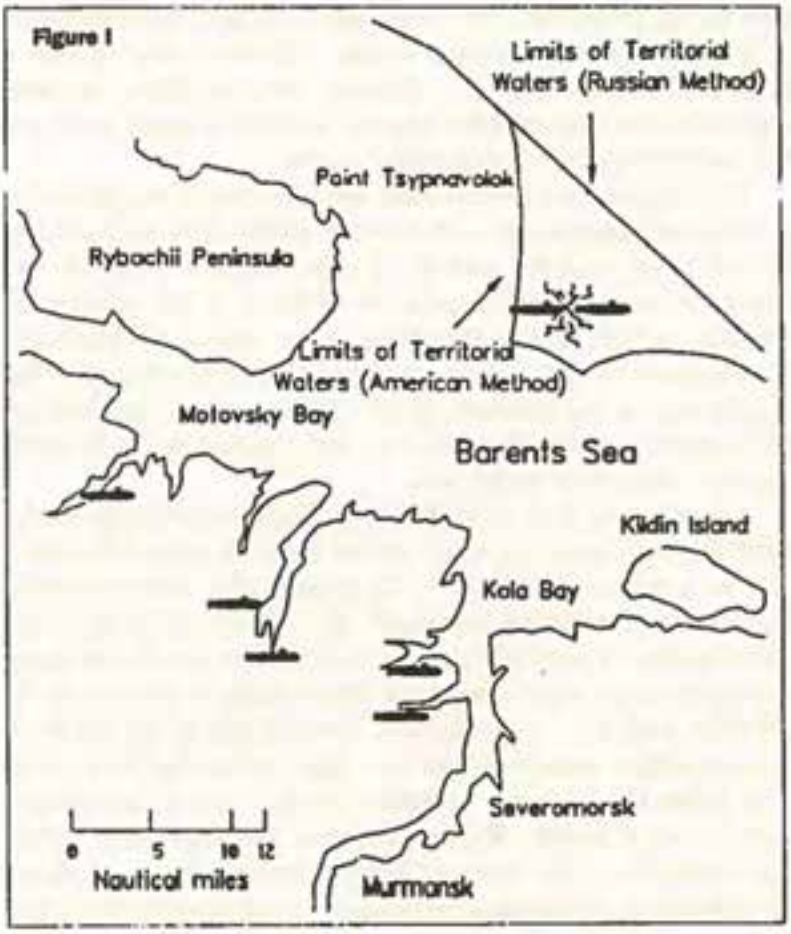
attack submarine and the Russian SIERRA class submarine collided at 20:16 Moscow time, at 69°38.7' North and 33°46.9' East, roughly 4.7 miles from the line connecting Tsypnavolok Cape and Kildin Island (see Figure 1.) The U.S. Navy stated that the collision occurred more than 12 miles from the shore, at a location in international waters. However, Russia uses a different set of rules for defining the boundary between territorial and international waters,[1] and the Russian rules put the collision site inside territorial waters.

The dispute over exactly what areas of coastal ocean can be considered international waters is important since international coastal waters can be used for a wide range of activities and many questions of rights and *rules of the road* are effected by whether or not naval operations occur within territorial or international waters. In the particular case of Murmansk -- the largest base of the Northern Fleet -- there are obvious additional concerns about the security and operation of Russian warships near their home port.

According to U.S. officials, the collision occurred when the SIERRA was surfacing beneath the BATON ROUGE, which was at a periscope depth of 22 yards. U.S. reconnaissance photos of the SIERRA reportedly showed a large dent in the front section of her sail structure and indicate that the Russian submarine's sail may have hit the underneath aft section of the BATON ROUGE. According to Soviet reports, the SIERRA incurred slight damage to her sail, where substantial bits of the U.S. submarine's skin -- ceramics, plastics, and other components -- were found. Reportedly, after the BATON ROUGE had returned to her base in Norfolk two weeks later, divers conducting an underwater inspection found scrapes, dents and

1. The U.S. and Russia recognize a 12-nautical mile territorial limit, but the two countries have different methods of applying this limit. According to the Russian method, points are marked 12 nautical miles beyond the line between two pieces of land that extends farthest into the sea on either side of a bay or a gulf: in this case, Tsypnavolok Cape, on the Rybachii Peninsula; and the northern shore of Kildin Island. The U.S. method draws a line 12 nautical miles offshore that follows the general contour of the coastline. The U.S. and former Soviet governments have held bilateral discussions, most recently in 1990, aimed at resolving this and other nautical boundary disputes. These talks have so far not met with success.

two minor gashes to her port ballast (one of two on the submarine). Fortunately, the accident did not cause any injuries or deaths.



Why was the BATON ROUGE there?

The U.S. Navy has not released an explanation of why the BATON ROUGE was operating so close to the Russian coast. However, sources within the Pentagon reportedly have said that the BATON ROUGE was on an intelligence gathering mission at the time of the collision. This explanation has been offered in other press accounts of the collision as well.

There are several kinds of intelligence missions that could, at least in principle, have brought the LOS ANGELES class submarine so close to the Russian coast. One is simply aimed at gaining experience operating in shallow waters as close as possible to the Russian coast. Although one press account stated that "there is little if any tactical reason these days for American submarines to operate so close to Russian shores," the U.S. Navy may not yet have reached the same conclusion. The gathering of intelligence with submarines may also be able to provide information on aspects of Russian naval operations that could be useful in helping to predict the movements of the Northern Fleet. According to knowledgeable sources in the Russian Navy: "Intelligence gathering is a routine activity of American subs near our coast. Typically, there are one to two American or British submarines operating close to the coast off Murmansk, one to three off the Kamchatka peninsula and one off the coast of Vladivostok. During naval exercises this number can increase by a factor of two."

Gathering intelligence either inside or just outside Soviet territorial waters has been a long-term program of the U.S. Navy, and has been given names such as Holystone, Pinnacle, Bollard, and Barnacle.[2] These activities apparently include close-up photography of the undersides of Soviet ships and submarines; plugging into Soviet underwater communication cables to intercept high-level military and other communications considered too important to be sent by radio or other less secure means; observation of Soviet submarine-launched ballistic missile (SLBM) tests including monitoring of the various computer checks and other signals that precede test launchings; and the recording of *voice signatures* -- the noises made by operating Soviet submarines. One possibility, consistent with reports that her mission was intelligence gathering, is that the BATON ROUGE was on the mission to install (or recover) intelligence gathering devices from the seabed near the shore.

Press speculation that the "American submarine, which... was sitting at 'periscope depth', may have been using secret interception equipment to monitor communications at nearby

2. Desmond Ball "Nuclear War at Sea," *International Security*, Winter 1985-86, v.10, No 3, pp. 3-31.

military bases" is implausible for two reasons; First, continuous radio interception of military communications can be accomplished without the use of a submarine. Communications intercepts can be accomplished with surface ships operating from international waters, and intermittent interceptions can be accomplished with satellites orbiting in space. Second, a submarine periscope or antenna sticking out of the water can be observed by a variety of relatively long-range sensor systems -- in particular by modern radars. As a result, unless there is a compelling reason to argue otherwise, it is unlikely that a submarine commander would be willing to keep a periscope mast deployed for a substantial period of time in such close proximity to a potential enemy's surveillance systems and forces.

Could the BATON ROUGE have been trailing the SIERRA?

According to one Soviet press report, the collision was the result of a cat-and-mouse game between the two submarines. This possibility deserves detailed study, since it could indicate that the U.S. may still possess substantial capabilities to trail Russian ballistic missile submarines.[3]

Since the BATON ROUGE was operating covertly close to major Russian Naval facilities, it is highly unlikely that she would have used her active sonar as it would greatly increase the likelihood that her presence would be detected. It is also unlikely that she would have been using her long towed array. The length of such an array with towing cable is more than 1 km., many times the water depth at the place of collision. In addition, it is difficult to control an array's orientation in the water without severely constraining the motion of a submarine. Such constraints are highly undesirable when operating in close proximity to potentially hostile forces. Thus, although using her towed array would substantially improve her detection capabilities, it is unlikely that the BATON ROUGE would have this type of sensor system deployed in shallow waters. Hence, she was almost certainly using only her fixed passive sonar systems.

3. This question is very important for survivability of Russian strategic forces at sea. If quieter American attack submarines could covertly trail them, this could cause an unstable situation in a conflict between these two countries.

This conclusion allows us to estimate her detection and counter-detection capabilities against the SIERRA submarine that she was allegedly tracking.

There are three reasons why the submarine passive acoustic detection ranges would have been short in the place of collision. First, in shallow waters, the ambient noise levels from wind-generated breaking waves are typically 10-100 times higher than those in deep water. This noise generates background signals that can mask the presence of a signal from even a nearby submarine. This mechanism results in markedly higher wind-generated sound power densities relative to those in deep water. In technical terms, the coherence of sound in shallow water is considerably lower than in deep water. This means that it is not possible to achieve shallow water array gains as great as those in deep water. Second, in shallow water, the acoustic signals from a target submarine will arrive at the acoustic detectors of a hunting submarine from many different directions and at different intervals. This is because sound waves generated by a submarine will be reflected from the constantly shifting ocean surface and from numerous locations on the ocean bottom many times before they arrive at the face of an acoustic detector. Since the signals from a target and from breaking waves both unpredictably come from many directions, there is no way to enhance the signal from a target submarine relative to that from interfering wind-noise by increasing the number of receivers and the size of array. Third, there are no sound focussing effects in shallow waters, as there are in deep water, that can make it easier to detect the submarine against the background of ocean noise. Such deep water effects can strongly focus the sound from a localized sound source like a submarine at well defined distant ranges in the ocean. At the same time these effects only weakly focus the diffusely generated sounds from wind-generated noise.

Quantitative analysis shows that the shallow water detection range of the fixed sonar of the BATON ROUGE against a SIERRA class submarine would only be a couple hundred meters -- even if the acoustic conditions for detection were nearly ideal and the submarine was oriented so that its sensors could achieve maximum sensitivity. Near ideal acoustic condi-

tions could occur only in extremely calm seas. For environmental conditions that are much more typical of the waters off Murmansk, like those associated with a 10 knot surface wind, noise levels would be great enough to result in the same short detection range even if the BATON ROUGE were using a long towed array. Making matters worse, it is likely that the SIERRA may have encountered the American submarine from behind. In this circumstance, the BATON ROUGE would have had no ability to detect the approaching SIERRA, as the fixed sonar on the submarine cannot detect the signals within a cone 60 degrees to the rear of the submarine.

Even if some unexpected combination of events led to the detection of the SIERRA, the fixed sonars on the BATON ROUGE could provide very little useful information about the direction and range of the SIERRA. These detection and tracking limitations are a consequence of the relatively small size of fixed hull arrays and the highly unpredictable and variable transmission efficiency of underwater sound.

The arguments above do not support the speculation that the BATON ROUGE was trailing the Russian submarine. It would have been very hard for the BATON ROUGE to do so in this particular situation.

Could the SIERRA Have Known That the BATON ROUGE Was There?

Clearly, the conditions for the SIERRA to detect the BATON ROUGE by passive acoustic means were no better. As we have learned from informed Russian sources, there are specific rules for the safety of submarine operations in such a complex environment. The area of a submarine's operations is closed to any shipping. The submarine is supposed to "look" around by using her sonar every hour and every time when her depth of operation is changed. In order to do this a submarine has to move along a loop shaped trajectory, because her sonar is deaf in the aft direction.

It is possible also that Russian submarines may use their sonars in an active mode as a standard operational procedure, when they do not need to be covert in their home waters. The use of an active sonar could allow the SIERRA to increase her

detection range to a couple of kilometers and to obtain much more detailed target location information. It appears, however, that she was not using her active sonar, since the American submarine would have heard the approach of the SIERRA and determined the bearing of the Russian submarine at a distance of at least several kilometers, which is enough to take care to avoid a collision. In fact, in this situation, the BATON ROUGE would have detected the Russian submarine long before she was detected by the SIERRA.

It is also interesting to consider two related questions: What were the potential capabilities of the Russian anti-submarine warfare (ASW) forces to detect the BATON ROUGE? Would it have been possible to avoid the accident if the Northern Fleet ASW forces acted properly?

Most likely, the American sub had to pass a Russian seabed passive (or active) sonar system near the approaches to the Russian shore. The detection range against a quiet LOS ANGELES class submarine of such a passive system might be about 1-5 kilometers in the best conditions of a calm sea. According to the Russian Chief Navigator Valery Alexin, several fishing ships were present, the screws of which generated noise similar to that of the American submarine. These fishing ships might substantially mask the BATON ROUGE, although it seems improbable that such ships were actually present, since the Russian Navy is typically very cautious about permitting civil ships in the operating areas. Using a passive seabed system the location of the submarine could be determined more accurately than by using a towed array, but probably not better than 1-2 km. If stationary active sonar techniques were employed, the detection range would be restricted by surface and bottom reverberations and might not exceed 5 km.

The BATON ROUGE could also have been tracked either by a ship's active sonar at a range of no more than 1 or 2 km, or by sonobuoys which could be deployed by aircraft. The detection range of active sonobuoys most probably was not more than 1 km for this particular case. A possible means of locating a submarine more precisely could be airborne magnetic anomaly detection (MAD) and lidar (lasers) sensors.

As a result, it appears unlikely that the Russian ASW Forces

detected the American submarine before the collision. As the estimates above indicate, substantial capabilities would be required to keep even a relatively small area safe from invasions by foreign submarines. Most probably, on routine duties, less capable forces are deployed, and this might be the reason why the American submarine was not detected.

Conclusions

Despite the claims of some press reports, it appears likely that neither submarine heard the other before the collision and that the collision was an accident. Playing an extended cat-and-mouse game would have been impossible in that area because both subs possessed only very short-range detection capabilities. Moreover, there are no reliable means available to submarines that would allow them to operate both covertly and safely in such a complex environment as the shallow waters of the Barents Sea.

The circumstances of this collision suggest that, at least in some environmental conditions, if carefully operated, modern Russian submarines are almost impossible to detect by passive acoustic methods, even by the highly capable ASW forces of the United States. If true, this has important implications for the options available to Russian policy-makers as they decide how to implement the nuclear reductions called for by the START Treaty and the follow-on Bush-Yeltsin agreement as well as possible future deep reductions in strategic nuclear forces.

The great emphasis that has recently been placed on assuring the safety of the nuclear weapons of the former Soviet Union stands in sharp contrast to the circumstances of this incident. The collision illustrates that covert operations of foreign submarines close to Russian Naval bases can create dangerous situations that may result in undesirable outcomes. More than half of the 54 Russian strategic submarines, each with 16-20 submarine launched ballistic missiles, are still based near Murmansk. The benefits accrued by U.S. attack submarines operating so close to Russian port facilities may be offset by the risk that a nuclear weapons related accident might eventually result.

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FORWARD SUBMARINE OPERATIONS AND STRATEGIC STABILITY

by Ambassador Linton F. Brooks

[Ed. Note: Ambassador Brooks is a member of the Naval Submarine League and commanded USS WHALE while on active duty.]

In a recent edition of Breathroughs, the journal of MIT's Defense and Arms Control Studies Program, Russian oceanographer and arms control analyst Eugene Miasnikov analyzes the February 1982 Barents Sea collision between USS BATON ROUGE and a Russian SIERRA class SSN. Miasnikov was drawn to conduct his analysis (which is reprinted as the preceding article) because of his belief that the collision "raises issues of prime importance for security planning", namely whether the United States "may still possess substantial capabilities to trail Russian ballistic missile submarines". In a footnote, Miasnikov asserts that "if quieter American Submarines could covertly trail [Russian strategic forces at sea], this could cause **an unstable situation** in a conflict" (emphasis added).

Miasnikov is not alone in his concern that superior U.S. ASW capabilities might threaten strategic stability. In a February 1993 interview with a Japanese publication, Marshal of Aviation Yevgeniy Shaposhnikov, Commander in Chief of the joint military forces of the Commonwealth of Independent States, and thus (nominally at least) of the strategic forces of the former Soviet Union, renewed an old Soviet call for negotiation of an agreement for ASW free zones as a means to enhance stability. While the Russians did not raise this issue during the START II negotiations, and while, as of this writing, the Russian government has made no formal proposal for such negotiations, it is probable that we have not heard the last of the idea.

Why this concern with "stability"? And why this implication that ASW excellence -- long a source of pride to submariners -- somehow needs to be restrained as a danger to peace? Like so much of the arcane theory of nuclear stability, the answer lies ashore, in the ICBM force.

Stability in a crisis has long been a goal of the U.S. strategic planning. The United States has sought a situation in which neither side could gain an advantage by striking first in a crisis. This concern for stability was at the heart of the long, and ultimately unsuccessful, search for a survivable basing mode for

U.S. ICBMs.

The reason for the concern is clear. If Russia and the United States each were to deploy a strategic force dominated by ICBMs in vulnerable silos, especially ICBMs with multiple warheads, strategic planners on both sides could face a terrible choice. Whichever side launched its forces first could destroy the strategic forces of the other side. In contrast, restraint could lead to one's own forces being obliterated, with no capacity for retaliation. In time of great crisis, such a situation would present immense incentives to shoot first at the slightest indication that the other side was preparing to launch or even considering such a step.

Avoiding or reducing this potential instability in a crisis has been a major goal of U.S. arms control policy. Arms control has been seen as a method of encouraging a shift to a more stabilizing force structure. Most recently, the United States sought and obtained a ban on ICBMs with multiple warheads in the January 1993 START II Treaty in order to enhance stability in a crisis. If the United States and Russia return to an era of confrontation -- which cannot be ruled out -- this ban will prove far more important than START II's deep reductions in strategic arsenals, although the latter has been given more publicity.

The importance of enhancing the stability of land-based forces is unquestioned. Advocates of restrictions on ASW operations in SSBN patrol areas take this valid analysis of crisis stability and apply it at sea. They reason that effective ASW against SSBNs will lead to the same type of "use or lose" situation as does ICBM vulnerability. As a result, they call for such arms control measures as limiting the numbers of attack submarines or banning their operation in so-called SSBN bastions. At the height of the Maritime Strategy debate in the 1980s, opponents of the strategy, especially those in the academic community, focused on its anti-SSBN aspects, claiming the mere prospect of such a campaign was dangerously escalatory.

Prior to the conclusion of the START II Treaty in January of this year, these theoretical arguments had limited practical relevance. Despite Soviet public rhetoric, Soviet negotiators made no serious attempt to negotiate restrictions on ASW during the nine years of the initial START negotiations. There was an excellent reason for this: the strategic nuclear forces and strategic doctrine of the former Soviet Union were dominated by ICBMs, with SSBNs very much an afterthought. Thus, in the real world, it mattered little whether attacks on SSBNs

were or were not destabilizing.

Recent developments, however, have fundamentally altered the situation. Economics and arms control are combining to end the dominance of the ICBM in Russian strategic forces. Doctor Miasnikov suggests that the question of submarine vulnerability has important implications for Russian policy-makers as they decide how to implement START and START II. But the collapse of the Russian economy will dramatically limit Russian flexibility. A shift of Russian strategic forces to sea seems inevitable.

START II obligates the United States and Russia to reduce to no more than 3500 strategic warheads apiece by January 1, 2003. Half of these warheads (1750) can be on submarines. While nothing in START II **requires** Russia to deploy its full allowance of submarine warheads, it is difficult to see how Russia can maintain even the dramatically reduced levels of START II without reliance on sea-based forces, given the hugh cost either of deploying hundreds of single-warhead ICBMs or of expanding the Russian bomber force. Thus the question of whether the enhanced stability of START II is threatened by American ASW prowess takes on a new urgency.

While the question has new relevance, the answer remains the same: forward ASW operations do <u>not</u> threaten strategic stability. The ICBM analogy is false. Despite Doctor Miasnikov's implications and Marshal Shaposhnikov's renewed interest in ASW-free zones, limits on forward submarine operations -- either negotiated or unilateral – are not required and will not increase stability.

There are three reasons why this is true. First, the ability to threaten SSBNs is inherently limited. One need not accept Miasnikov's conclusion that "modern Russian submarines are almost impossible to detect by passive acoustic methods" to recognize that no prudent military planner could assume that the entire SSBN force -- or even a large fraction of it -- could be successfully engaged. The situation at sea is thus fundamentally different from the ICBM case in which the entire force could be held at risk simultaneously.

Second, even if a large fraction of the Russian SSBN force were subject to attack in time of war, the "use or lose" situation would not obtain. Such attacks could, at most, lead to erosion, not catastrophe. In contrast, the risk to stability from ICBM vulnerability is that the entire force could be destroyed quickly. Thus, a decision maker may believe he cannot take the risk of waiting to make the fateful decision to launch his strategic forces. In contrast, the loss to conventional attack of one SSBN

at a time over a period of days or weeks provides no single event of sufficient importance to warrant the irrevocable and catastrophic decision to execute a strategic nuclear strike. Gradual SSBN attrition allows extensive decision time and a variety of options, the exact opposite of a "use or lose" situation.

Finally, regardless of what one believes about stability in wartime, peacetime operations of the type BATON ROUGE was conducting are no threat to stability. Indeed, the opposite is true. By increasing U.S. understanding of Russian operations, forward deployments reduce the risk of misinterpreting events during times of tension.

The collapse of communism and the end of the Cold War give discussions of nuclear stability an anachronistic flavor. But while political attitudes have changed, the forces remain. The reductions of START II were unthinkable when the first START Treaty was signed in 1991; by 1993, they seemed routine. Even after those reductions, however, Russia will retain the ability to devastate the United States.

If the Russian experiment in democracy succeeds, a decade hence theories of nuclear deterrence may well have been relegated to historical footnotes. Democracy's success, however, is far from assured. It is sobering to recall another state with a long authoritarian tradition that tried to turn to democracy while burdened with hyperinflation and a large and demoralized military. The Weimar Republic failed, and the German people voluntarily turned to authoritarianism and extreme nationalism, with catastrophic results for humanity. The parallels with modern Russia are both frightening and difficult to overlook.

President Yeltsin and the Russian democrats dodged one bullet in the March Congress of People's Deputies. But the assaults on reform will continue. The United States is taking a number of steps to help Russian democracy survive and flourish. There is good reason to hope that democracy and reform will prevail. But those of us whose profession is national security need to contemplate the possibility that we may once again be forced to think through the consequences of facing an adversary armed with a powerful nuclear arsenal.

If that day comes, submariners must be in the forefront of thinking through the difficult questions of escalation and stability. To be ready for that responsibility, we must continue to challenge fallacious assertions in articles such as Doctor Miasnikov's that forward operations by attack submarines are dangerous and destabilizing. **It's just not true.**

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THE ROYAL NAVY SUBMARINE FORCE -- TODAY and TOMORROW

by Rear Admiral P. C. Abbott
Assistant Chief of the UK Naval Staff

[Rear Admiral Abbott was educated at Queens College, Cambridge, and joined the Navy in 1964. He served in a wide variety of surface ships and commanded CHAWTON, AMBUSCADE and AIAX. He has been in his current assignment since February 1991.]

As we look into the rest of the nineties and the turn of the century, the Royal Navy in common with the USN is facing change. It may be of interest to USN readers to learn something of how that change is effecting the Royal Navy, and particularly the Submarine Force, while at the same time taking a moment to cast an eye more generally across some submarine matters in the UK.

UNITED KINGDOM DEFENCE STRATEGY

The new United Kingdom Defence Strategy has been generated in the face of the changing world scene. The pace and direction of that change keeps varying, but some regions of instability remain clearly marked; the Middle East; the former Soviet republics; South Africa and of course Yugoslavia. Others are less conspicuously flagged, a few column inches in yesterday's newspaper waiting to grab the headlines in tomorrow's. The proliferation of sophisticated weapons threatens to provide the means by which local feuds, mostly ethnic in origin, could grow into major conflicts. Despite these dangers, the optimism brought about by the collapse of the former Soviet Union is very much alive. The spirit of cooperation in the United Nations and their willingness and determination to bring pressure to bear to achieve peace are noteworthy examples. The Royal Navy has an important part to play in the face of this change, and in the three overlapping defence roles defined in the new UK Defence Strategy which are, in summary:

- to ensure the protection and security of the United Kingdom and her dependent territories, even where there is no external threat.
- To insure against any major external threat to the UK and her allies.

- to contribute to promoting the United Kingdom's wider security interests through the maintenance of international peace and stability.

RATIONALE FOR MARITIME FORCES

Utility. Over a forty year period, while being primarily shaped to respond to the massive threat posed by the Soviet Union, Royal Navy forces have been called upon to tackle a wide range of very different security problems, and these will continue to pose challenges to the UK and her allies. Many of the naval tasks of the future are likely to be familiar ones. The rationale for maritime forces in the new strategic environment can be based largely on recent history which, in addition to UK commitments to NATO and routine operations in support of defence policy, over the last few years has seen a number of operations of specific interest across the whole spectrum of conflict, including Operation GRANBY involving conflict with Iraq in 1990/91 (DESERT SHIELD/DESERT STORM in the USA); clearance of Iranian mines in the Gulf in 1988; evacuation operations off Aden in 1986 and Liberia in 1988; humanitarian operations by Royal Marines and helicopters to assist Kurdish refugees in Northern Iraq; disaster relief in Bangladesh and in the wake of Hurricane Andrew in the Caribbean; and assistance in anti-drug smuggling operations both in UK waters and further afield (including in the Caribbean). Submarines were among the Naval forces involved in some of these operations, although the prime example of their utility had been demonstrated earlier, in the Falklands War of 1982.

There are some common features of all these operations that we expect to continue into the future, notably that Naval forces designed primarily for sophisticated tasks in high intensity conflicts close to home have proved suitable for employment in a diverse range of lower intensity tasks around the world. [Ed. Note: Emphasis added.] The Royal Navy can maintain this general purpose utility provided that we can keep a balance of capabilities within the Fleet, including submarines, and the amphibious forces needed to exploit the enduring attributes of flexibility, mobility, availability, endurance, reach, autonomy and their overall contribution to deterrence both strategic and conventional.

STRATEGIC REALITIES

The bedrock of a rationale for our maritime forces is a clear demonstration of the value of these attributes to the strategic interests of the nation.

Europe. Although the United Kingdom is now less threatened directly than during the Cold War, our islands remain strategically significant. They lie on an axis between North America and Europe, between oceanic and coastal trade routes and astride the sea lanes that will be used by most of NATO's maritime crisis response forces, strategic lift reinforcement and resupply and economic shipping in peace, crisis, or war. It is for this reason that the UK makes such a substantial contribution of both deep and shallow water forces to NATO. More recently the Western European Union (WEU) has been of increasing importance in developing the European Pillar which together with the Transatlantic pillar provide two crucial elements of NATO. Ships and submarines could be made available to the WEU for WEU tasks when not required in their NATO roles. There are also opportunities for the development of WEU operational planning, command and control arrangements, mutual exercises and common training.

The Wider World. Crises continue to occur in spite of international attempts to prevent them -- nearly all outside the NATO area. Our recent and continuing operations in the Gulf have emphasized several strategic lessons. This region has been, and will continue to be, a source of instability where our Naval forces remain ready to deter or help deter any potential aggressor and to protect our interests in peace, crisis, and war as the Gulf patrol has done for the last eleven years. The Kuwait campaign demonstrated the importance of international cooperation and multinational employment and also our dependence on strategic sealift. Over 80% of the logistic support to British forces in the Gulf went by sea.

Indeed the UK depends on the sea not only for military access -- to deploy and support forces to areas of crisis -- but also for our trade of which over 90% by weight moves by sea. 30% of Europe's oil comes in tankers from the Gulf.

Our interests are increasingly threatened by the worldwide proliferation of arms in spite of attempts at international control. For instance, 60% of the world's current total of 376 conventional submarines are owned by Third World nations, and

some 3,000 Exocet air and sea launched anti-ship missiles have been sold abroad. [Ed. Note: Emphasis added.] RN warships of all types have the qualitative edge to face this proliferation of sophisticated weapons. This must be retained.

TASKS

Against this backdrop we can define the maritime tasks of the future. The requirement for the UK to provide credible strategic nuclear forces continues in an uncertain environment in which huge stockpiles of nuclear weapons, although reducing, are still maintained and the proliferation of nuclear weapons is a major concern. [Ed. Note: Emphasis added.] The RN will continue to give priority to this task.

Conventional forces will face a wide range of tasks from peace through crisis prevention and response to general hostilities. Tasks that demand a balance of forces, of which submarines are a part. Like other elements, they are able to operate on the high seas without the constraint of national boundaries or arms control limitations and are suited to early deployment to an area of tension. Their reach, autonomy, endurance and ability to poise or withdraw covertly can make them useful instruments of foreign policy at the early stages of a crisis. They can help to demonstrate resolve to dissuade any potential aggressor and can contribute to the covert collection of intelligence and surveillance. Credible deterrence depends on good training, and exercising with Allied naval forces demonstrates solidarity and interoperability.

THE SUBMARINE FORCE

Size. The size of the RN submarine force by 1995 was announced by the Government's "Options for Change" of the Armed Forces in 1990. In summary, this allows a force of about twenty submarines which includes four SSBNs, four SSKs and about twelve SSNs. [Ed. Note: Emphasis added.]We have almost reached those numbers, an overall reduction of about 35% in hulls. The four SSBNs will be the new 16,000 tonne TRIDENT submarines of the VANGUARD class. All four have been ordered from the sole submarine building yard of VSEL (Vickers Shipbuilding and Engineering Limited), and HMS VANGUARD has recently completed her first of class trials at sea. The first of the previous RESOLUTION class of SSBNs has now paid off. The SSNs will be the five remaining

SWIFTSURE class and the seven TRAFALGAR class submarines, of which HMS TRIUMPH was the last joining the Fleet in 1991. Three of the four new diesel-electric UPHOLDER class SSKs are in commission, with the fourth, HMS UNICORN, to join them very soon. These submarines offer an entire weapon system that equates to that fitted in an SSN, as well as a specialized special forces capability, at about 40% of the cost.

This mix of modern submarines of all types provides for a balanced force, and reemphasizes a commitment to retaining the best possible quality of vessels, available to meet future requirements and especially capable of operations in all maritime theatres. In the longer term, an updated TRAFALGAR class submarine, known as "Batch 2 TRAFALGAR class", or B2TC, is being considered as a replacement for the SWIFTSURE class.

Weapons and capabilities. Torpedoes, anti-ship missiles, mines and special forces can all be delivered by conventionally armed RN submarines, and the Trident D5 missile in the VANGUARD class supersedes the Chevaline missiles which updated the original Polaris weapon of the RESOLUTION class. The Mk24 "Tigerfish" remains the most stealthy ASW torpedo in the world, but it will be replaced shortly by "Spearfish," a more capable and flexible weapon designed to counter any modern submarine threat. RN Sub Harpoon is similar to the U.S. version of the Harpoon anti-ship missile, but with some tactical differences. Continuing development of sensors and data handling systems, and a policy of backfitting and updating submarines will continue to ensure their maximum capability through life. [Ed. Note: Emphasis added.]

Manning. There are abut 6,500 officers and ratings in the submarine service, which reflects a gradual shrinkage commensurate with the reduction in hull numbers. The system of officer manning is different to that used by the USN; Royal Navy officers are trained as specialists in their own professional fields, so that any ship will contain Executive (or Seaman) Branch, Marine Engineer, Weapon Engineer and Supply Officers. [Ed. Note: Emphasis added.] Only Executive Branch officers can attain sea-going command. This system dates back to 1956 when a major review was last conducted. In line with changing times, another all embracing review of the officer structure of the Royal Navy is under way.

The existing system leads to a SSN or SSBN under the

command of a Seaman Commander or Lieutenant Commander is some SSNs, supported by three Heads of Department: a "Perisher" (command qualified) Seaman Lieutenant Commander as XO (second in command, and head of the Seaman Department); a Lieutenant Commander Marine Engineer Officer as head of the Marine Engineering Department; and a Lieutenant Commander Weapon Engineer Officer as head of the Weapon Engineering Department. The Supply Officer works for the XO, and heads his own small department.

In the past, the division between the Seaman and Weapon Engineering departments has been straightforward, with seaman personnel operating the equipment provided and maintained by the Weapon Engineers -- sensor systems, tactical data handling, communications, and navigation equipment. This division allowed each to be specialists in their own field, providing the command with expert advice and support from each area. However that division of responsibility has gradually become blurred with the increase in modern technology, and the service is moving towards more of a user/maintainer concept. Seaman officers conduct the submarine from the Control Room, supported in their tactical handling of the vessel by junior seaman officers and rating operators, while Marine Engineer officers provide propulsion and mechanical engineering support from their watchkeeping position in the Manoeuvering Room.

Submarine Command. *Perisher* -- the Submarine Command Course -- is still the benchmark by which all submarine Seaman Officers are judged. As rigorous as ever in its pre-selection process and in its nature, it reflects the needs of nuclear submarine command and has long since left its diesel submarine based format. The process of selecting an officer for Perisher begins early in an officer's submarine career, which allows the outstanding candidate to be detected by his successive COs as early as possible commensurate with his experience. If selected for the course a typical officer will be about 32 years old and either about to be, or just recently promoted to Lieutenant Commander having filled each junior Seaman Officer duty in his submarine career thus far. Under the eye of "Teacher", each Perisher student develops his proven command abilities both at sea in a SSN and in simulators ashore, so that safety, tactical and weapon firing situations may be applied to each student under escalating command pressure. It is a pass or fail course,

and the successful Perisher will move on to become a nuclear submarine XO before eventual command. SSK COs are extracted from the same system, typically commanding SSKs as Lieutenant Commanders following their appointment as nuclear submarine XOs.

Command and control. All RN submarines are controlled from Northwood, Middlesex, near London, the home of Fleet Headquarters. The precise control arrangements vary depending on tasking, but in general Flag Officer Submarines operates all except the deterrent force on behalf of the Commander-in-Chief, Fleet (CINCFLEET). Flag Officer Submarines commands the submarine force through four submarine squadrons which will shortly reduce to two. The First Submarine Squadron in Gosport, near Portsmouth, is home to the UPHOLDER class and is co-located with the Submarine School and HMS DOLPHIN, the submarine shore base that is the historical *alma mater* of the submarine command. The Gosport-based submarines will move and be subsumed into the Second Submarine Squadron in Plymouth, Devon, home of the TRAFALGAR class SSNs. The Third and Tenth Submarine Squadrons are at Faslane on the west coast of Scotland; the former supports the SWIFTSURE class, the latter the SSBNs. They will shortly be combined to form a new First Submarine Squadron. The submarine service is further supported by two dockyards, at Plymouth on the south coast of England and at Rosyth on the east coast of Scotland, both government owned but privately managed and able to conduct nuclear submarine refits.

CONCLUSION

RN submarines have played a vital part in the Cold War, but with its ending, the Submarine Force, as well as providing and ensuring the security of the strategic deterrent, has to refocus on traditional roles. As a part of the balanced Naval force necessary for upholding the National Defence Strategy, it is modern, well equipped and manned to do that. It is having to respond to the need for streamlining, and has to bear its share of reductions in defence expenditure -- but not at the expense of quality and effectiveness. While numbers may change, there is no intention of allowing the RN Submarine Force to be anything other than one of the best in the world. [Ed. Note: Emphasis added.]

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MORE ON THE "ONE HUNDRED DAYS"

by Admiral Sir John Woodward GCE, KCB

It was with considerable pleasure and some concern that I discovered my book One Hundred Days was thought to warrant a full article in your October issue of the **SUBMARINE REVIEW**. In the light of what was said there, some explanations are plainly due.

Firstly, as the reviewers recognized, the book is a personal memoir rather than a definitive historical work. I'd go further than that -- it is definitely NOT an historical work, it is a personal memoir, with about half the memories deliberately left out for good reasons of taste, security, and legality. It is impossible to write history so close in time and place to the event. The laws of libel forbid it, for a start. But also as I learn more about what went on around me from year to year, I begin to realize how wrong I was even to have claimed in the preface that "I probably knew less than half of it." That, I discover without surprise, was a major exaggeration.

Critics of what I have left out, put in, said the wrong thing about, not said the right thing about, should try to remember that the book was only intended "to reveal what went on in my mind throughout those weeks..." As a consequence, things that went reasonably satisfactorily often get only scant mention simply because they had no need to exercise my mind at the time. And things I didn't know about, weren't going to get thought about. The book itself just might be worth looking at to see what it did leave out, what it is that the offshore commander didn't have to worry about in that situation, what should be taken *as read*, what was done for him by others as well as what was delegated and how that was done. There are several obvious areas.

For submariners, the glaring omission was the effectiveness of the submarine force. But it did no more and no less than I expected. They sent the Argentinean fleet home on Day Two. There wasn't very much more to say after that without risking bathos. My worries and irritations about the control of SSN's in open ocean operations with very little ASW opposition pale into insignificance by comparison -- though there were clear lessons to be learned, albeit no new ones.

For aviators by contrast, I failed to sing the praises of the

Sea Harrier anything like enough -- and that aircraft greatly exceeded our expectations in every area of its use, versatility, reliability, and effectiveness. Whereas the SSN's just did what any right-thinking submariner knew they would all along, cleared the sea and then helped at the edges, "reaching the parts that others do not" as the advertisement says -- hardly any need for *hot debate* about that, I'd have thought.

For the *Blackshoes*, I perhaps failed to underline with sufficient clarity the sacrifices surface forces are likely to have to make in this kind of operation. *Vulnerable* is an adjective air forces and armies like to use for ships, entirely forgetting that without them there'd be little need for an army or an air force other than for home defence. The Falklands War demonstrated again the kind of price that has to be paid in ships and people when amphibious operations are undertaken in the face of significant opposition.

So none of these interests received their due -- no apologies, it's not what the book was about.

I do have to agree that the paucity of maps and chartlets, data tables and the like is fair criticism on behalf of the serious student -- they will be found, with variable accuracy, in the many books which have tried to write the history. There is incidentally, an official naval history in process, which will provide a very much better chronology of events -- but even this will lack the sort of data required for those unfamiliar with British naval capabilities.

On the larger canvas, I am clear that Operation Corporate can stand as one useful example of what seapower can be about today. And it represents just about the limit of what Britain can do on her own. Sir John Nott, the British Secretary of State for Defence at the time, still dismisses it as an anomaly of history. But it is worth remembering that it was he that was dismissed shortly afterwards. The glaring omission in capability at this level was, of course, the lack of a large aircraft carrier. It was undoubtedly this lack which caused the U.S. Navy to be less than sanguine about the prospects, and understandably so. But again there is a lesson; if you don't have a sledgehammer, (to coin a phrase) use your head!

On another tack, the operation told us quite a lot about how to limit the extent and level of conflict. The British government was very careful to avoid taking the battle to the continent, and

despite the many temptations, refrained from aggressive acts inside the twelve mile limit from the shores of Argentina.

And again though less usefully, it told us something about what nuclear weapons are NOT for. Yes, a nuclear bomb on BA would have settled the matter -- no, it wasn't even the remotest possibility at any time, whatsoever. I am left wondering just what degree of *force majeure* is allowable to democracies these days; perhaps *minimum force* has already taken its place?

But these matters verge on the *What-if's* -- not very helpful, I find. Add a NIMITZ to my Battle Group and the balance shifts enormously. Put four Exocets into her, and it could well change back. Provide the Argentineans with one SSN at sea no better armed than CONQUEROR, and again the whole balance shifts. No, you have to take the scenario as it actually happened and beware of extrapolating to suit the argument of the week. The fact is that if you want to project power overseas for whatever purpose, you are going to need sufficient forces to give a reasonable chance of victory. **To provide that across a range of scenarios, you are going to need a wide range of naval capability, lack of any one part of which can ruin your day -- but what is new, we have known this for centuries.**

And anyway as the reviewers so rightly judged, it is the people who provide the skills and determination without which technology is useless. On *The Day War Breaks Out* things will not be exactly what you expected -- nor what you planned into your hardware. The tools provided by technology will need rapid adjustment to suit; only the people on the spot can effect this. And even they can only do that for you if you have brought them up the right way -- if they are, as you say, *The Right Stuff*.

It's worth my adding, on the non-professional net, that the wives have found the book a good read -- so I suspect that whatever it is to us, the professionals, it is something else for those with no particular interest in naval affairs.

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THE RISE AND FALL OF THE SUBMARINE FORCE - AGAIN

by CAPT James H. Patton, Jr., USN(Ret.)

In the late 40s, when making plowshares from swords was a growth industry, virtually the entire Submarine Force was on the chopping block. All historical evidence at that time was that the submarine's single meaningful mission was seaborne commerce raiding, and although it was recognized by some that these units had literally brought Japan to its knees, the new potential adversary -- the Soviet Union -- had interior lines of communication, no significant merchant marine, and its expansionism could be inhibited by the threat of air-delivered nuclear weapons. The common wisdom of the time all too often took the following form:

> The threat no longer exists, and even though the Submarine Force played a major role in its demise, an evaluation of existing military needs indicates that there remains no compelling requirement for anything more than a token force level, since no real warfighting role remains for submarines. Submariners arguing for continued strong support of these weapon systems are accused of engaging in parochial *invent-a-threat* tactics, and even many in the rest of the Navy remain unconvinced of any future for these *single-mission* platforms.

A brief historical note about the war then just ended is appropriate here. The incredible successes of the Submarine Force in the Pacific during WWII are somewhat general knowledge -- 55 percent of all Japanese merchant ships and 38 percent of all their naval vessels destroyed were sunk by submariners, who never exceeded 1.6 percent of U.S. naval personnel. Not quite as well known is that the intended employment of the Submarine Force on the eve of Pearl Harbor was **not** interdiction of merchant shipping and independent operations in enemy waters (the skippers had been taught, in fact, that to operate a submarine within 500 miles of an enemy airbase was virtually suicide!). The primary mission (identical to that of Japanese submarines, incidentally), with attendant tactics and doctrine, was to be operations with the

Fleet as Fleet Scouts -- a tasking made somewhat academic by mid-morning of 7 December 1941. Submarines were then turned loose in "unrestricted submarine warfare" because it was the **only** naval option available at the time -- having been deliberately ignored during the air strike as *non-threats*. Tactics and doctrine largely had to be invented in real time, and as Clay Blair, Jr. described so well in Silent Victory, shaking the Submarine Force loose of deeply imbedded conservative training and cautious assumptions did not come easy. Many skippers were relieved in the first year of the war for having "failed to engage the enemy."

After WWII, submariners made note of the large Soviet Submarine Force that threatened trans-Atlantic Sea Lines of Communications (SLOCs) in support of any future European war, and constructed a case that U.S. submarines could conduct anti-submarine warfare (ASW). As might be expected, this concept was not universally embraced by the Navy. By about 1948, the case had been built marginally enough to grudgingly justify the establishment of Submarine Development Group Two (now Submarine Development Squadron Twelve) in New London, Connecticut, to develop the concepts and tactics of submarine ASW. Even before the quantum leap in capability provided by NAUTILUS and her subsequent sisters starting in the mid-50s, DEVGRUTWO had put together viable and effective guidance which enabled the U.S. submarine to assume a vital role in protection of SLOCs against a Soviet submarine threat.

The history of the U.S. Submarine Force development between 1950 and 1990 and its superior military capability relative to that of the Soviets has been previously told so often and so well that to repeat it again here would be redundant. Let it suffice to say that on the eve of the physical collapse of the Berlin Wall, *their* critically important sea-based nuclear strategic reserve had been driven out of the deep oceans and was **still** held at great risk even while backed into heavily defended *bastions* close to Soviet shores. Our fleet ballistic missile submarines (SSBNs) were, for all practical purposes, immune from any credible offensive action, and operated wherever and however national strategy deemed most useful. As for *tactical* units, U.S. nuclear attack submarines (SSNs) could operate virtually anywhere at will, were the irresistible

force which had driven Soviet SSBNs into (target rich!) bastions, and had presented the Soviets with the planning problem of almost assured destruction of **any** significant naval units out of port at the beginning of a NATO/Warsaw pact conflict. Not only were the Soviet SSNs largely relegated to a defensive role in support of the bastioned SSBNs and therefore mostly neutralized as a threat to the SLOCs, but when they **did** venture out of *home waters*, they had to have felt the eyes and ears of an integrated, combined arms systems designed to deny them stealth and covertness, and therefore, military effectiveness. It should be no surprise that our thoughtful, chess-playing ex-adversaries, with this arrangement of *men* on the board, chose to *resign* rather than playing out the match. Whether the ASW mission was *thrust upon* or *invented by* submariners in the late 40s, there is little disagreement that the role was adapted to and played to an award-worthy excellence – just as between 1941 to 1945.

There no longer exists any credible doubt that the SSN has any competitor for the effective engagement of targets on or under the oceans surface. That fact should not imply, however that the submarine is a single-mission platform. The point is that there is often a **single** most important mission that no other platform can undertake in a meaningful way; therefore priority of employment often detracts from secondary missions. That was the case with the escalating U.S. submarine attacks against the Japanese SLOCs to their newly-acquired conquests. The critical nature of this mission and the success with which it was executed, as it was again to be with the anti-Soviet ASW mission from 1960-1990, resulted in a near-total commitment of all submarine assets. Looking beyond the two diverse missions themselves, however, the common *enabling characteristic* in both cases which permitted adapting to, then executing the superbly *unexpected* tasking was **stealth** – ability to selectively deny an opponent knowledge of their presence.

In a *Deja vu all over again* manner, the common wisdom of the late 40s cited earlier has again become popular. Again, submariners are striving to articulate the fact that their platform's basic *enabling characteristic* of **stealth** provides just that capability required to dramatically contribute towards those **new** requirements of a multi-polar and regional-conflict-prone post-cold war world. In a published policy statement titled Subma-

rine Roles in the 1990s and Beyond, of 31 January 1992, VADM Roger Bacon, the Assistant Chief of Naval Operations, Undersea Warfare, describes how **intrinsic capabilities of the U.S. SSN such as stealth, agility and endurance** provide options to the National Command Authority that are at once unique to the platform, but at the same time are complementary and synergistic with other key components of a reduced but balanced U.S. military force structure.

A major change in the U.S. military is felt by most to be necessary because the overriding strategic requirement is no longer to **deter global war on a regional basis** (i.e. the periphery of the Soviet Union), but rather to **deter regional war on a global basis.** This is by no means a *lesser included* requirement of what submarines and the rest of the U.S. armed forces have been doing for the last 40 plus years. Another significant change of the past few years is the redefinition of the very word *strategic* which, since 1945, has really meant *nuclear.* There will be no participation in regional conflict by U.S. forces if there are not vital interests involved, as clear a definition of *strategic* as is possible, but it is extremely unlikely that the use of nuclear weapons will be considered. **Nuclear weaponry remains a critical factor in the *strategic algorithm***, however, and they will remain in the back row of the chessboard.

The ability of an SSN to quickly proceed, without need for a *critical mass* of supporting and logistic forces, to any point on the globe and to remain as a ubiquitous but **not necessarily provocative** force for periods measured in months is a valuable and unique asset for the transitionary and unstable period of world history now unfolding. For the third time in this century, the enabling characteristic which permits this *new* employment is the **intrinsic stealth** of the platform. As demonstrated in Desert Storm, because of weapons such as Tomahawk, the SSN in a strike role is no longer limited to naval or maritime targets.

Those that would point out that there is no longer a credible *threat* to defend against are probably correct in the strictest semantic sense of the word *defend.* For two generations we truly did have to defend against the announced intention of Soviet communism to expand globally. **The issue is now deterrence**, and though defense can be accomplished from a position of parity, deterrence cannot. Deterrence could be thought of as the clear and unambiguous capability for imple-

menting *armed litigation of international law* (when so mandated both domestically and internationally). **Although it may appear a contradiction in terms, the future roles of the Department of Defense are really based on a clearly credible offensive capability which is rapid, mobile, survivable and free of dependence upon foreign bases. This credence can proceed from massive quantities of *normal* military equipment, or it can be generated from reasonable numbers of systems which exploit the *unfair* technological advantages intrinsic to such as a modern, ubiquitous, U.S. SSN.**

In Submarine Roles in the 1990s and Beyond, it is noted that an existence of what could be called *the great black fleet*, a *constellation* of 14-16 SSNs deployed and moving somewhat homogeneously throughout the world's oceans, would result in a high probability that a unit would always be within two days (reportedly the degree of clear warning available concerning the invasion of Kuwait) steaming of any shoreline, where it could **survivably** observe or engage. Others, of course, including units in U.S. ports not currently deployed, could arrive on station in a serial fashion with time.

In response to the argument that one SSN is not going to stop an armored column, it must be noted that with the assumption of the role of a strategic platform comes all the *strategic* logic developed in support of nuclear weapons. *Counterforce* and *countervalue* do have real meaning in a non-nuclear sense. A survivable platform is not obliged to employ its weaponry in a *tactical*, unit-versus-unit sense against an adversary's *force*, but can credibly threaten targets of **economic value** to him, such things as economic, communications, transportation or power nodes. There are few countries in the world that could be cavalier about losing twelve carefully selected targets in these categories to Tomahawks a couple of days into some aggressive adventurism. In fact, the largely aviation term *sortie generation* begins to have some meaning for submarine strike operations in regional conflict, since as subsequent units *roll in* to their launch points, previous units are enroute to some location for rearming. An objective analysis would concern what sortie generation rate could be expected from what force level for how long, while other types of assets (Carrier Battle Groups, USAF TACAIR, Amphibious Forces, heavy Army Divisions, etc) are forming and enroute.

Submarine Roles in the 1990s and Beyond goes on to describe other credible post-cold war roles and missions for the SSN, but in the final analysis, there is no difference between submarine employment in 1943, 1973, or 1993. In each case, the platform assumes those tasks that its stealth and mobility make it better suited to perform (often uniquely so) and appropriate concepts, tactics, doctrine and C^3 are developed and implemented. As a logical extrapolation of the old *more bang for the buck* theology, and as has been demonstrated repeatedly this century, there is little that can compete with the cost effectiveness of a submarine in the traditional maritime role of Sea Denial, and now with the advent of advanced conventional munitions (ACMs), precise and Selective Strike ashore. Just as is taught regarding furniture, the long-term cost of ownership for a credible deterrent force does not have to be prohibitive if one doesn't scrimp on the initial investment. To paraphrase Mark Twain, the reports of the demise of the Submarine Force are greatly exaggerated.

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Researcher seeks information and contact with former crew members of the USS REQUIN (SS-481) and anyone with information on the Radar Picket Program, specifically the MIGRAINE conversions for possible book. Contact: James Mandelblatt
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SUBMARINE (INDUSTRY) SURVIVAL

by LCDR Vernon Hutton, USN
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The National Security Strategy states that the defense agenda remains as security through strength and consists of four fundamental elements: Strategic Deterrence and Defense, Forward Presence, Crisis Response and Reconstitution. The first three elements appear to be for defense roles which are executed with peacetime force levels. The usefulness of submarines to meet those requirements can be addressed in rigorous and convincing terms. What is not well understood is how submarines fit within the reconstitution strategy. Reconstitution means more than generalized activation of industry. There must be a potential within industry to respond to defense demand. The potential of the submarine industrial base defines the capability to support a future submarine force. Without continuing production the nuclear submarine industrial base is in danger of evaporation, thus removing credible potential for reconstitution.

Simplifying greatly, the lead time for a new submarine is 12 to 14 years (from design start to completion of the first unit). The lead time for manufacturing the major structural and large subsystems is 6 to 7 years. These times assume an operating industry. To be ready for an unknown threat, either we must have great foresight or we must maintain continued production even at a low rate. Force levels tend to show that there is no pressing military need to spend any money to continue construction and that depending on the final resolution of the force level question new submarines are not required until about 2010. Because most of the manufacturing of subsystems is now complete for the remaining OHIO, Improved LOS ANGELES and SEAWOLF (even if three are built) classes, unique suppliers of submarine equipment now face a gap in production for 10-12 years.

What should the Submarine Force do to support the reconstitution strategy of our military force? How is defense industry capability related to reconstitution? The time to face these questions is now. Because of the various legal and administrative hurdles built into our current system of executive recommendation and legislative approval, any delay may well

defer the problem beyond recovery. **The submarine industry will disappear.**

Throughout the defense industry, the dissolution of the Soviet Union as the primary threat and the nation's economic strictures are causing a significant restructuring. This consolidation is in addition to significant downsizing that occurred during the 1980s. In spite of rising procurement budgets, the number of defense contractors in 1982 was 118,489 versus a number of 38,007 in 1987.[1] For the ten years from 1987 to 1997 there is expected to be almost a 50% decrease in the procurement budget which means a further consolidation of the defense industry.[2] This estimate is last year's budget and future year's defense plan. There will be more.

Additionally many studies by industry, think tanks and DoD have concluded that there are several areas ripe for acquisition reform. These areas apply to generic procurement and have varying applications to specific industrial sectors. Four areas commonly identified are: Accounting Requirements and Audits, Military Specifications and Standards, Technical Data Rights, and Unique Contract Requirements.[3] Improvements in these areas definitely need application to defense acquisition as a whole **but acquisition system reform will not by itself enable the submarine building industry to survive.** It is unique. There are several aspects and demands in submarine construction (quieting, shock resiliency and nuclear propulsion) that have no counterpart in other industries. The question becomes one of ensuring that the capability to build submarines in the future is maintained.

As a candidate, President Clinton said "Where I disagree with President Bush is on retroactively canceling two of the three SEAWOLFs on which work has already begun. Any savings are negated by the adverse impact on the submarine

1. Procurement budget in 1982 was $43.3 Billion ($54.9 B constant 89$) and in 1987 $80.7 Billion ($87.0 B constant 89$). *Deterrence in Decay: The Future of the U.S. Defense Industrial Base*, CSIS Defense Industrial Base Project, May 1989.
2. Budget of the United States Government, FY 93 Supplement, February 1992.
3. *Integrating Commercial and Military Technologies for National Strength, An Agenda for Change*, Report of the Committee on Security and Technology, CSIS, March 1991, and *Adjusting to the Drawdown*, Report of the Defense Conversion Commission, 31 December 1992.

industrial base... I would wind down production in a way that will preserve our crucial submarine construction capability... The end of the Cold War means that we can save money by building fewer submarines. But we remain a maritime nation and the world is not yet so safe that we can prudently sacrifice our ability to build submarines at all."[4] **President Clinton seems to understand that if submarine construction is terminated, the U.S. will sacrifice an important component of our national military strategy to support our status as a leader and a maritime nation. That component is reconstitution. The future loss is submarines.**

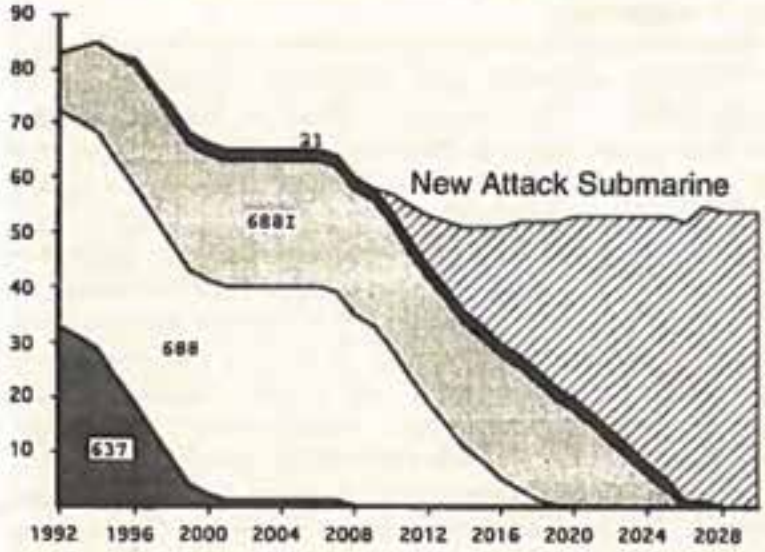
Reconstitution is preserving a credible capability to forestall any potential adversary from competing militarily with the United States. The President's National Security Strategy amplifies reconstitution as "forming, training, and fielding new fighting units from cadres; mobilizing previously trained or new manpower; and activating the industrial base on a large scale."[5] Although these words are from President Bush, the essence of reconstitution is still valid. But it is more than redirecting or activating industry. In peacetime, the defense industry must support cost-efficient production. In a crisis it must surge as required for immediate needs. In a major conflict, it must convert and create as necessary to greatly expand manufacturing. Reconstitution is industry's whole potential (whether producing or not) to support the needs of the military when required. The decision to reconstitute is difficult. For complex weapons and systems it requires the ability to forecast several (6-10) years ahead that a threat to the United States requires a larger military force. Because the time frame is so long and because the threat must take some drastic actions before America actually mobilizes, the decision will not be simple, easy or unique. For complex production and long-life items, reconstitution can mean little more than expansion of current production.

The military requirements-driven production rate for submarines is numerically dependent on the force level. By comparing with current levels one can estimate when new

4. *Defense Week* 7/13/92.
5. *National Security Strategy of the United States*, The White House; GPO, Washington, DC, Jan 93.

submarines will be required to maintain the appropriate level. If the industry (and budgetary & political considerations) were not a concern and if the force level goal was about 55, then scheduling a delivery rate of about 3 per year beginning in 2010 is a simple numerical answer. That means design starts about 1998 and actual manufacturing of the long lead items would be about 2004. Congressional authorization for the first submarine would be FY 02. See Chart 1.

Chart 1. - Submarine Force Levels[6]



Beginning 2008 the rate of decline is about 3.5 submarines per year. One could then make the argument to begin delivering the New Attack Submarine and maintain force levels near that level. This numerical solution exists. But is it a realistic solution or just a simple one? Can the industry survive the 10-12 year gap in production?

It is commonly believed that submarine new construction could not survive the 10-12 year gap and therefore the push for CENTURION is proceeding. If the commitment to initially

6. Assumptions: 30 year life span for all 688s, 2 SEAWOLFs, New Attack Submarine delivery starts at 3 per year in 2010. Different alternatives such as retiring 688s early and lower force levels create different numbers, but the concept is still valid.

fund the CENTURION in FY 98 holds, the gap is not that long. The long lead items would be appropriated in FY 96. This argument (probably being debated today in hearings) is complemented with completing the third and perhaps the fourth SEAWOLF to bridge that gap. Yet the solution is more than just waiting for the CENTURION.

There is a question of affordability. If money were the only consideration then the simple numerical solution might work. A disadvantage/advantage of submarines is that they require large initial investments and then small operating costs. Most major defense programs also call for large initial investments, but on a relative basis, there is more put into the submarine initially and less cost over its life. There are critical components with little commercial counterpart that are the major reasons for this large initial cost. The reactors are now expected to last the life of the ship. Other major systems and hardware installations (pumps, valves, etc.) are expected to last much longer than their predecessors. The high quality and investment in manufacturing over the last 30+ years have significantly improved ship performance. Most future expenses are tiny compared to the initial investment. There is little prospect for the industry to sustain itself with repair and maintenance work. Future expenses and life cycle costs (and savings) are hard to express in annual budgeting, but from interviews with Senate and House defense committee staffs, they understand these implications. Yet the pressure for near term savings is immense.

Some of the major structural work include hull fabrication and the reactor and propulsion plant structural manufacturing processes. This is the work that is essentially complete for all submarines on order today. To meet the simple numerical solution, this work for the New Attack Submarine would start in 2004. Just for the nuclear components, Admiral Watkins, as Secretary of Energy, concluded that "it would take at least ten years to restart the naval nuclear capability in this country -- assuming it could be done at all."[7] The reasoning for this time period comes from the extensive quality control methods, high manufacturing standards, unique trade skills, and specific methodology and performance standards in addition to the basic machinery. Part of the consideration also are the federal regulatory requirements that would have to be reestablished.

Technically it could be done. Financially it could probably be shown to be more cost effective to continue an extremely low rate of production rather than commence a restart for a program ten years ahead of time (which would be now anyway). **Politically it would be nearly impossible to restart a similar program today.**

Again as a candidate, President Bill Clinton said "...We must shape and support the industrial base to support these key capabilities. We shall survey our needs at the start and fund the capabilities, such as the armored vehicles, submarines and high performance aircraft, that are crucial to future weapon development. Special attention must be given to critical components that have no civilian counterpart, such as submarine propulsion, tank armor and large caliber gun tubes."[8]

At the prime level there are two new construction yards, General Dynamics/Electric Boat and Newport News Shipbuilding Company. At an extremely low rate of one boat every two years until the CENTURION is built, Electric Boat has said it could barely stay in business. If there were no new boats until CENTURION there is some prospect that one yard could disappear. Newport News does argue that it can sustain submarine new construction capability with the FY 95 carrier new construction, but that remains to be seen. If the numerical solution were taken and there were no new submarine deliveries until 2010, there is some probability that neither prime would be able to construct submarines. **This is not a case for industrial policy but a case for credible potential to build submarines in the future.**

The prospects of the second and third tier suppliers remaining is in greater doubt. The number of suppliers has declined similarly to the whole defense industry. Today there are about 30-35 sole source suppliers for submarine equipment. Table 1 shows some examples. For some, the submarine business is their only source of business. For other companies the pros-

7. *Report on the Preservation of U.S. Nuclear Submarine Capability*, Admiral Bruce DeMars, Director, Naval Nuclear Propulsion, 3 March 1992. Printed in the joint hearing report of the Seapower and Strategic and Critical Materials Subcommittee and Department of Energy Defense Nuclear Facilities Panel Hearing on Naval Nuclear Shipbuilding Program, April 7, 1992 (H.A.S.C. No. 102-48)
8. *Defense News* 10/26/92

pects of covering the losses with other business temporarily is slim. *For the good of national interest* goes only so far before the ownership cuts its losses.

TABLE 1.[1] SUBMARINE SUPPLIERS

Products	1980	1985	1990	2000
Main Propulsion Units	2	2	2	1
Ship Service Turbine Generator Sets	2	2	2	1
Air Conditioning Plants	2	1	1	1
Main Condensers	2	1	1	???
Air Circuit Breakers*	1	1	1	???
Power Distribution Switchboards*	1	1	1	???
High Capacity, Quiet Pumps	5	4	3	???
Quiet Motors	2	2	2	1
Diesel Generators	1	1	1	1
Air Revitalization Equipment	3	3	2	1
Navy Standard Bronze Valves	3	3	2	1
Quiet Hydraulic Control Valves	3	3	2	???
Large HY80/100/130 Steel Castings	5	3	3	2
Hy80/100/130 Steel	4	3	2	2
Main Propulsion Shafts	3	3	2	1
High Pressure Gas Flasks	1	1	1	1
Periscopes	2	2	2	1

* Same vendor for both products

1. Briefing "United States Submarine Industrial Base," Naval Sea Systems Command, Corporate Operations Directorate, October 1991 given to the Congressional Research Service [Ron O'Rourke]. Also note that at the time at least six SEAWOLFs were planned to be constructed.

Thus reconstitution and the defense industrial base mean different things depending on the force and equipment involved. As stated above, it involves initially drawing on cadre-type assets at the same time activating the industrial base on a large scale. For equipment its meaning depends on type, substance and manufacturing complexity. There is a spectrum or time-frame to be considered based on the sophistication of the weapon system or equipment as well as the industry that creates the weapon. An illustrated example follows:

Spectrum of Reconstitution (time-frame)

Near Term	Medium	Long term (>10 yrs)
Consumables Munitions	Armored Combat Vehicles Aviation	Shipbuilding

The division between time-frames is fuzzy and even the confines of a particular sector varies across the spectrum. For example the B-2 time-frame would be a lot longer than the Apache helicopter. Tomahawk missiles are a lot longer than artillery missiles. **What is clear is that shipbuilding is one of the longest time-frames for manufacturing and thus for reconstitution.**

Defense industrial planning for reconstitution includes current manufacturing levels and current surge capacity with the industrial potential to activate in the face of a major crisis. For example, consumables would be a relatively low level of actual production with a large margin for surge production plus an even larger potential for industrial activation. Generally industry would be able to convert and respond to defense needs. Shipbuilding is at the other end of the spectrum. There would be relatively little margin for surge expansion and little potential for industry activation to support shipbuilding.

Because of the tighter margins between actual production, capacity and potential for shipbuilding, the reconstitution solution to shipbuilding revolves around the level of actual production to sustain. There is a basic acquisition strategy that continues technology improvement but no production. Design and technology advancement would occur but no production would start. If there are significant production gaps that might damage the industrial base, the next step would be low-rate

production. This strategy sustains the production forces although not at an economically efficient rate which means unit costs are high. It does sustain the manufacturing processes and skills. Next is the economically efficient rate which means production near capacity and low unit costs.

A study by RAND Corporation describes a decision framework for production restarts. Discussing the potential for these restarts, it outlined similar options for production levels (described in Table 2). Although the study focused on aviation systems, the analysis made a pertinent reference to industrial capacity. "The industrial base for aircraft is sufficiently large so that the feasibility of production restart seems reasonably assured. The industrial base for production of large naval vessels appears subject to greater uncertainty..."[9] The analysis also notes that for very specialized items it could easily be ten years or more to reconstitute (activate) if the production line was completely shut down. The key is that similar options exist across the various sectors of defense industry. The solutions will not be similar as each sector has unique characteristics that must be considered.

TABLE 2. - PRODUCTION OPTIONS

Category	Existing Systems	New Systems
Restart production	Stop production when program need satisfied. Perform "smart" shutdown. Restart production in future if needed.	Develop and test new system, produce only enough to prove production process. Preserve low-rate capability. Restart production, expand rate as needed in future.
Sustained low-rate production	Continue production at low-rate to maintain active production capability, permitting rapid surge to higher rate if needed.	Establish initial production line for efficient operation at low-rate
High-rate production with storage	Extend normal production, store excess items until needed.	After normal production run, produce at efficient (high) rate to cover future requirements, store quantities excess to present requirement until needed.

9. From discussions with John Birkler, RAND Corp, Nov 92, Subject was a study tentatively titled *Reconstituting a Production Capability; Past Experience, Restart Criteria and Suggested Policies.*

What is the solution for the submarine industrial base? As seen above at least ten years could easily be the stretch that the prime(s) and suppliers must endure. But even with the assumption that the new attack submarine (CENTURION) will be funded in 1998 as planned, there would still be an estimated 5-6 year gap in production. Whether it is 5 years or 12, the question to be faced is: what should be done today to enable the next submarine to be constructed without excessive costs or risks? There are three alternatives: 1) Do nothing, 2) Preserve the industry through continued production, 3) Shutdown and Restart of the industry when needed.

(1) Do Nothing. Always an alternative to be considered but rarely the answer. The long lead items by suppliers and hull fabrication manufacturing processes are today completing their tasks for the last submarines on order. They will have no business for at least five years. Granted some of the suppliers will have some business for repair, maintenance and overhaul but the volume of that business is significantly less than new construction. How does one convince a business to maintain people skills, keep manufacturing processes and tooling in working order, and invest in modernization? It is not by promising lots of business in five or more years.

(2) Preservation of industry through continued production. A hard solution in the near term due to budget constraints and political pressures, probably the easiest and best solution for the long term, and **possibly the only practical answer.** Its disadvantage is budgetary. The need for additional submarines now is nonexistent. At a cost of about $1.4 Billion dollars (if SEAWOLF is chosen) every two years when the near term budget priorities are everywhere else, the likelihood of getting it funded is slim. Yet when long term issues are brought forward such as how to provide a feasible solution to future submarine construction, then this solution becomes stronger and more cost effective. **The long term affordability to sustain a submarine capability exists with low rate production.**

(3) Shutdown and Restart. If we deliberately let the industry collapse yet ensure everything feasible is saved for an orderly restart, it may be technically feasible. But could the suppliers, subcontractors and prime(s) be (re)established? There are business and regulatory aspects in addition to incurring significant costs that must be addressed. What are the long term

prospects of success? Can a fair profit be obtained in a reasonable time for the private investment? Can the long term commitment be made by government? Can the regulatory considerations such as environmental and social requirements be reestablished? Can the mere decision of government saying yes to restart overcome all of the legislative requirements (and public questions)? These problems are unanswerable today. **Even so, the question is moot if the numerical example at the beginning is true, because the restart would have to begin now to be ready for authorization and construction to deliver in 2010.** We are now back to the question of how to sustain the industry to support submarine construction.

Even as this article is published, congressional debate is probably considering these tough questions that prevent an obvious solution. A minimal rate of production will sustain the production base but costs a good deal of money in the budget years. (The third SEAWOLF wouldn't cost as much due to previous appropriation and rescission, but the implications are still there.) The deficit issue is forcing further tightening of available funds. The prospects of CENTURION being ready for FY 98 funding must be considered. Defense acquisition programs are notorious for some delays. There is still much to be done. The question remains as to how long this production gap will exist and what will be enough to sustain the industry until CENTURION actually starts. **As shown earlier the reconstitution strategy for submarines depends on the potential of the industry. The answer is low rate production to sustain the production base and especially the suppliers. The result is future availability of submarines.**

■

IN REMEMBRANCE

Captain John E. Dingwell, USN(Ret.)

Commander H. Lee Holthaus, USN(Ret.)

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BRITISH SUBMARINE DIPLOMACY:
The Falklands Crisis

by LT Brent A. Ditzler, USN

A. INTRODUCTION

This is a case study of submarine diplomacy during the 1982 Falklands Conflict. This effort cannot ensure that all facts are known, as those derived were from open sources only. However, enough is known to suggest that British submarines did enjoy some success in the naval diplomatic arena. The case study method is a less rigorous methodology than others; however, it is not intended to prove, by this piece, that submarines are a useful naval diplomacy platform. Case studies allow presentation of pertinent information to support arguments and positions. This implies, of course, that it is possible to construct a case study to support any argument or position. An example of misconstruction is found in what is perhaps the earliest incident of submarine diplomacy. James Cable cited this first case of submarine diplomacy as follows:

> "On 20 October (1927) the British Submarine L-4 sank a Chinese pirate ship in Chinese territorial waters. In the subsequent protest the Chinese Government complained, *inter alia*, that excessive force had been used and that some of the victims of the Pirates had perished together with the latter. This illustrates the relative clumsiness of the submarine as an instrument of naval diplomacy." [Ref. 1]

It is unfortunate that this passage misrepresents the truth. Cable's research source for this information, The China Yearbook 1929-30, reveals that the L-4 was operating on the surface and sank the S.S. IRENE by firing "five or six solid shots and explosive shells into her (with the deck gun) at approximately 300 yards range." [Ref. 2] Cable's indictment of submarines is illogical as the Commanding Officer's *clumsy* decision to fire would have been performed no differently had the L-4 been a destroyer.

The Falklands Conflict is a classic example of submarine diplomacy because the SSNs were the first to arrive on the scene [Ref. 3] and the experience has apparently had effects on Royal Navy planning. A 1986 security breach allowed a Royal Navy planning document, discussing political utility of the submarine, to become public. The Labour Party's defense

spokesman in Parliament, David Owen, (himself a former Foreign Minister) paraphrased:

> "We may never again face limited war at sea with setpiece surface ship battles. Rather, in a period of *political tension*, an undeclared war of stealth could be played out under the sea." (emphasis added) [Ref. 4]

Accepting Owen's view, it appears that the naval diplomatic role for the submarine is now fully acknowledged by the Royal Navy.

Case studies involving the use of submarines in apparent naval-diplomatic circumstances must address the following questions of interest:

- Why were submarines used?
- How was the submarine presence conveyed, if applicable?
- How was submarine force used?
- What were the ramifications and outcome of submarine use?

If these questions can be answered, perhaps a greater understanding of past submarine diplomacy can be applied to its future use.

B. FALKLAND ISLAND CRISIS, 1982

On 2 April, 1982, Argentina invaded the Falkland Islands. The British military response was unexpected by the Argentines and the world public. After the Islands had been retaken, the question was asked in Great Britain whether the Government had acted appropriately prior to the invasion. A Committee of Privy Counsellors was commissioned to investigate and report to Parliament. The product was the Falkland Islands Review, chaired by the Rt. Hon. The Lord Franks, hereafter referred to as the Franks Report [Ref. 5].

The British SSN, HMS SPARTAN, received orders on 29 March to deploy to the South Atlantic to "support" the Royal Navy ice patrol ship HMS ENDURANCE, at South Georgia. SPARTAN departed on 31 March. Another SSN, HMS SPLENDID, received orders for South Atlantic deployment on 30 March, and departed on 1 April. A third SSN, HMS CONQUEROR, was earmarked for deployment, but had final orders withheld pending developments, on 30 March. British intelligence first received positive intelligence on Argentine invasion preparations on 31 March. Three SSNs were given

some type of tasking in direct response to a *diplomatic* situation *prior* to it becoming a *military* situation. This sequence amounts to a clear indication that the Royal Navy and the British Government foresaw a naval diplomatic role for the submarine. HMS CONQUEROR departed for patrol on 4 April. [Ref 5: pp. 61-4]

The Ministry of Defence's first suggestion to Prime Minister Thatcher's office of the diplomatic use of submarines occurred on 26 March in a note that included:

> "...a passage discussing the possibility, at the outset of a period of rising tension with the prospect of Argentine military action against the Falklands, of deploying a nuclear-powered submarine to the region, either covertly or overtly as a deterrent pending the arrival of further naval reinforcements." [Ref 5: p. 59]

This was not a novel event. Nearly five years earlier, in late 1977, indications of possible Argentine hostile intent prompted the British to,

> "...buttress the Government's negotiating position by deploying a force of sufficient strength, available if necessary, to convince the Argentines that military action by them would meet resistance. Such a force would not be able to deal with a determined Argentine attack, but it would be able to respond flexibly to limited acts of aggression. The Committee agreed that secrecy should be maintained about the purpose of the force. One nuclear-powered submarine and two frigates were deployed to the area, the submarine to the immediate vicinity of the Islands with the frigates standing off about a thousand miles away. Rules of engagement were drawn up." [Ref 5: p. 18]

On 5 March 1982, Lord Carrington, then Great Britain's Foreign Minister, was informed of this action by the previous Labour Government. He inquired whether the Argentines had been aware of the 1977 deployment, and when told they had not, did not pursue the matter. No recommendation to investigate a similar response resulted from this discussion. When later interviewed about this discussion, Lord Carrington took the view that the covert nature of the 1977 deployment made any usefulness from a similar deterrent deployment doubtful at that point in the crisis. Also, he revealed that, with hindsight, and while he personally felt he did not have enough

justification to deploy a submarine on 5 March, he wished SSN deployment had occurred earlier than it actually did. [Ref 5: pp. 43, 87-8]

This was a missed opportunity. Arthur Gavshon and Desmond Rice in their book, The Sinking of the Belgrano [Ref. 6], make this point explicitly. They report that in 1977, then Foreign Minister David Owen made arrangements for the covert naval presence. However, James Callaghan, then Prime Minister, contends that the Argentine Government had been informed. Press reports in 1982 indicate that the United States informed the Argentines in 1977 on behalf of British. The Franks Report found no evidence of Argentine knowledge of the 1977 deployment [Ref. 5: p. 91]. Rice and Gavshon's point being that: "Whether or not the Argentines had been warned in 1977, in 1982 Lord Carrington knew of no useful precedent for using a naval presence for purposes of deterrence." [Ref. 6: pp. 9-10]

If the Argentine knowledge of the 1977 deployment could have been verified, based on the positive outcome of the December 1977 negotiations, the deterrent value of the overt SSN deployment might have been utilized much earlier -- possibly deterring the 2 April Argentine invasion. Despite the initial covert nature of the 1977 deployment, the failure to *signal* presence prevented early implementation of a plausible strategy in 1982. After the success of the 1977 negotiations an appropriate signal could have been sent by an SSN visit at Port Stanley.

Another alternative was the early covert, non-provocative deployment of the SSN to be utilized in an overt inter-positioning strategy once positive indication of the Argentine invasion was received, essentially a repeat of the 1977 strategy. This latter diplomatic strategy was attempted when SPARTAN was ordered South on 29 March, but Lord Carrington's three week delay nullified these efforts.

Positive indication of Argentine invasion was received on 31 March. With SSNs already ordered South, but not yet underway, a front page Times headline story reported the nuclear-powered submarine, HMS SUPERB, as having been re-routed South from exercises near Gibraltar "several days ago." The next day, 1 April, the Times, again on the front page, commented:

"The report involving ...[HMS SUPERB] is beginning to look more and more like a controlled leak which need not even be true to have the desired effect. The Royal Navy has refused to confirm that SUPERB was on its way to South Georgia."

Conjecture in the press as to the whereabouts and purpose of SUPERB continued throughout the first three weeks of April, until SUPERB was confirmed in its home port of Faslane on 21 April [Ref. 7]. This could be viewed as an attempt at pre-invasion deterrence and post invasion perception management on the part of the British. Lord Carrington, however, took a negative view, and noted that the Argentines might receive "the impression that the British were seeking a naval rather than diplomatic solution." [Ref. 5: p. 66] Lord Carrington's concerns over the press reports were probably genuine, however, the possibility that a deliberate government attempt at disinformation may have been involved in fact cannot be ruled out. This is especially so in light of the coinciding intelligence discovery of an early morning 2 April invasion time. On 9 April, the New York Times printed a press report that head-lined, "Four Nuclear Subs Will Spearhead British Flotilla," and stated that the 8 April dateline had been "confirmed" by "military sources." There were few reasons to doubt these reports in the British press, considering the build-up of the naval Task Force following the invasion. These *leaks* and statements were all attempts to manage a perception of *presence* for the British SSNs.

HMS SPARTAN achieved visual landfall on the Falklands on 12 April. This coincided with the British declaration of the 200 nm. Maritime Exclusion Zone (MEZ). SPARTAN had arrived in her patrol area the day before. The submarine blockade of Argentine shipping around the Falklands was not perfect, as one confirmed instance of seaborne replenishment occurred undetected and the Argentine airborne supply effort to the islands continued. The dual political/military nature of the submarine blockade was substantiated by the Government's refusing permission to attack a minor Argentine combatant, as described by Martin Middlebrook [Ref. 8]:

"The Argentine naval-landing ship CABO SAN ANTONIO was spotted off Stanley on four consecutive days, apparently laying mines, but SPARTAN was refused permission to attack, partly to conceal the presence of the submarine for

attacks on larger targets but mainly to avoid opening the shooting war too soon and compromising the diplomatic efforts still being pursued." [Ref. 8: pp. 97-8]

On 23 April the British "warned that any approach by Argentine forces which could amount to a threat to interfere with the mission of British forces in the South Atlantic would be dealt with appropriately." [Ref. 9] On 30 April the British established a 200 nm. Total Exclusion Zone (TEZ) around the Falkland Islands [Ref. 10]. This timing roughly coincided with the arrival of the main British Task Force. The Argentine Navy was at sea patrolling just outside the TEZ in four task groupings. The Argentine aircraft carrier, ARA VIENTICINCO De MAYO (25th of May) led one group and the cruiser ARA GENERAL BELGRANO led another. The two other groups were comprised entirely of destroyers and frigates. [Ref. 11: pp. 17-8] The positioning of Argentine forces resembled a classic pincher movement with the BELGRANO group Southwest of the Falklands and the Argentine carrier Northeast on each flank.

A political decision had been made in the British War Cabinet to take action against the Argentine Navy in an effort to reduce the naval risk to the Royal Navy Task Force. This was deemed especially necessary after an aborted attack by the VIENTICINCO De MAYO in the early morning of 2 May. The Argentine carrier had penetrated the TEZ and had been detected by a Harrier patrol just after midnight local time on a course to attack the Task Force. It eventually closed the range to within 180 nm. of the Task Force before light winds prevented the launch of the heavily loaded Argentine attack aircraft. The VIENTICINCO De MAYO escaped undetected. The only available target on the afternoon of 2 May was GENERAL BELGRANO, which was outside the TEZ and was being shadowed by HMS CONQUEROR. The War Cabinet had been contacted about noon (London time) with a request for permission to attack BELGRANO. After a twenty minute discussion, permission was granted and messages were passed to all submarines, "authorizing them to attack any Argentine warships." [Ref. 8: pp. 145-7]

CONQUEROR's attack on BELGRANO was **the first time any SSN had fired a warshot in anger.** Commander Christopher Wreford-Brown, Commanding Officer, revealed that his

first post-attack thoughts were of evasion, rather than remaining to attack the two accompanying destroyers. [Ref. 8: pp. 148-9] The attack established credibility for the SSN and more than confirmed presence.

On 7 May the British announced a warning that "any Argentine warship or military aircraft over 12 miles from the Argentine coast would be treated as hostile." [Ref. 9: p. 5] The Argentine Navy never again ventured beyond this line. The coercive naval diplomatic role of the SSN, after establishing presence and credibility, was now ingrained with a political announcement.

In summary, submarines were originally utilized as a quick reaction platform to provide naval presence in a distant ocean area, until a robust surface task force could arrive. This was to be a covert action to be disclosed at a latter time for diplomatic leverage; however, the Argentine invasion of 2 April circumvented the original deterrent purpose of the submarine deployment.

The presence of the British submarine was conveyed originally through an apparently false leak to the press. It is nearly impossible to determine if this leak was intentional on the part of the Government, but subsequent leaks on the movement of SSNs began to gain the appearance of press releases. With the early 8 April announcement and 12 April enforcement of the MEZ, prior to any visible surface forces being present, the Argentines must have assumed that it was being enforced by submarines. If submarines were not physically present, the press releases and/or leaks provided a credibility that made the MEZ more than a paper blockade. Although there were Argentine violations of the MEZ, the volume of maritime reinforcement of the occupied Falkland Islands was reduced to below detectable levels, suggesting that a submarine-enforced MEZ produced the desired effect.

The submarine presence was a coercive force that allowed enforcement of the MEZ from 12 April until 30 April. The Argentine Navy came out to meet the Royal Navy that announced its presence with the establishment of the TEZ and the initiation of strike operations against the Port Stanley airfield and surrounding areas. On 2 May, the Argentine Navy demonstrated that it presented an unacceptable risk to the British Task Force. The SSN, the political weapon of choice,

provided a violent deterrent demonstration. If CONQUEROR's attack had been carried out by Royal Navy Harriers or Exocet missiles, it would not have had the same deterrent effect. As it was, the Argentine Navy was coerced into believing it lacked the equipment, confidence, and perhaps the competence to meet the SSN threat. As a result the 7 May British warning to the Argentines not to exceed the 12-mile limit went unchallenged by the Argentine Navy.

Unquestionably, the sinking of the BELGRANO created political and moral repercussions for the British. The force of world public opinion that had recently aligned behind Britain was suddenly weakened. This loss was regained two days later, after the successful Argentine attack on the HMS SHEFFIELD with an Exocet missile. These repercussions might have been mitigated, if the subtle and abrupt changes to the rules of engagement had been stated more clearly. The 23 April subtle warning statement was evidently not widely known to both the Argentines and the public. If it was known, it was not clear how it would be interpreted. The 2 May abrupt change to the rules of engagement were justified *post facto* and while being accepted on their own account, were publicly judged not to be congruent with the 23 April warning. Granted, this was the first instance a submarine had been used in exactly this manner, and it is not the type of activity to be submitted to experimentation: but, perception management in international affairs is not a new science. Perception management of submarines in the coercive diplomacy role is a new area of that science that requires greater study and prudence in practice.

C: CONCLUSION

The perception of presence was established by the leaks and statements concerning SSN movement, prior to the invasion during heightened tensions. The attack on BELGRANO confirmed presence for the remainder of the conflict and even through today.

The perception of credibility was perhaps the most difficult to manage prior to the actual attack. The last widely acknowledged torpedo attack occurred during World War II and the SSN was yet to fire a shot in anger. But once established, few would doubt the credibility of the SSN today.

The perception of coercion was weakened considerably prior

to the attack, the warnings given to the Argentines were not explicit and, as stated, the credibility perception was almost non-existent. But after the attack, a simple warning – drawing a line in the ocean – established the SSN as coercive naval diplomatic force.

Utility for any platform in naval diplomacy hinges on its ability to apply proportional violence at a level that will not provoke general warfare. For from this ability, credibility is derived. Credibility, together with presence, facilitates coercion. Coercion is a quality required at every point on the naval diplomacy continuum, from benign support for a friend to the violent fait accompli against an adversary. Submariners must learn to efficiently communicate both credibility and presence, if submarine diplomacy is to become a foundation of forward presence, a pillar of U.S. national strategy.

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SUBMARINES FOR THE 21ST CENTURY?

by Dr. Richard T. Ackley

[Ed Note: Dr. Ackley is a League member, a retired Commander, and is Emeritus Professor of National Security at California State University, San Bernadino.]

Political conditions in the next decade portend serious difficulties for the acquisition of high ticket submarine platforms. Navy Department support, rather than just traditional DoD and congressional constituents, may need to be built to fund platforms we consider necessary for national defense. How can Navy Department-wide consensus be built? The purpose of this article is to suggest some intellectual tools to support the Submarine Force in future decades.

- First, is to staff the submarine billets in STRATCOM with our best people. This is being done and requires no further discussion here.
- Second, is backing for a new and universal Navy-Marine Corps mission statement; and
- Third, is positioning the Submarine Service as the strongest supporter of the new Naval Doctrine Command.

Advocacy of these issues could broaden the Submarine Service's opportunity to exhibit the generally unknown capabilities of our platforms and sensors. Additionally, active participation in the Naval Doctrine Command provides a broad forum for innovative development of new submarine tasks.

A Case for a Mission Statement

If you measure success by the flow of money to a project, the B-2 bomber and SEAWOLF submarine were losers. We know otherwise; nevertheless, it will take creative measures to make a convincing case for future platforms. The shifts in threat, redirection of geopolitical interests, reorganization of CNO's staff and fewer total dollars available suggest a change in the way we do business.

The Air Force jumped out ahead in the *war of words* by focusing attention on a united Air Force dedicated to global awareness, global reach, and global power for any purpose. Air Force Chief of Staff General Merrill A. McPeak suggested that, while he can't prove it, the absence of a clear mission statement

contributed to the Air Force not organizing itself properly. He goes on to say that people built intense loyalties around their commands (SAC, TAC, MAC) rather than loyalties to air and space power. This, according to General McPeak made it difficult for the Air Force to think clearly about its purposes and hence, its organization.

More to our point, General McPeak suggested that the B-2 program may have been lost by arguing at the start that it was needed to penetrate Soviet airspace and deliver nuclear weapons against strategic targets. The B-2 has a wealth of conventional capabilities that simply weren't advertised until it was too late. The Soviet Union disappeared and so did the perceived need for the B-2. If this sounds familiar, it may be because SEAWOLF was touted early on as the follow-on SSN that would provide the technological advantage over the best Soviet submarines, forward deployed in open-ocean scenarios. SEAWOLF's less dramatic multi-mission conventional capabilities seemed lost in the milieu. As with SAC, the Submarine Force may have oversold the bipolar need for SEAWOLF.

General McPeak argued that he doesn't know whether a mission statement would have produced a larger B-2 fleet. However, it would have given the Air Force a better intellectual foundation and a more comprehensive understanding of what they were supposed to be doing. In June 1992, the Air Force got a mission statement. **"To defend the United States through control and exploitation of air and space."** The mission definition applied to the *Z-axis*, (air and space,) and is open to a full range of present and future activities. It is not limited by any career (union) field, type of aircraft (platform) or time. The mission statement was to draw all Air Force people into a single calling, for however long the institution exists.

Today's naval mission (a task together with its purpose) appears to have shifted from Title 10 of the U.S. Code. That is, the Code directs the Navy to "be organized, trained and equipped primarily for prompt and sustained combat incident to operations at sea." The current drift is in a new direction -- From the Sea! The initial reaction to From the Sea suggests a rediscovery of the warfare arts mastered in World War II in the Pacific: Amphibious assaults by the Navy-Marine Corps team, and inshore operations. Both the storming of Pacific islands and the success of U.S. fleet submarines in shallow East and

Southeast Asian waters are well documented.

From the Sea probably defines the most foreseeable of Navy-Marine Corps operations. And, its release was timely considering the recent Somalia deployment. Yet, From the Sea lacks an overall clarity of *task* and *purpose* as does the USAF mission statement. It doesn't bridge the gap between declaratory and employment policy. What is suggested here is that the Navy needs a mission statement that ties ocean space to a wide spectrum of generic maritime tasks. Such a statement could be a useful tool to support and integrate submarine capabilities into general maritime warfare requirements.

Navy Department institutional support is needed since the three navy unions -- aviators, submariners, and surface sailors -- lead by powerful three-star *Platform Barons*, OP-02, -03, and -05, -- were reduced to two-stars and subordinated to a single manager. That is, N8, the new three-star DCNO for Resources, Warfare Requirements and Assessments on the CNO staff. Future platform requirements will be debated and staffed through the N8 organization. This means decisions must survive an in-house *union* debate before being approved by N8, and forwarded to the Vice CNO, N9. An overall open-ended mission statement covering the entire spectrum of anticipated naval actions could be the tool for furthering new submarine rolls and missions, hence requirements.

Support for the Naval Doctrine Command.

It has been said that the new Norfolk based Naval Doctrine Command will be staffed by the Navy and Marine Corps' best and brightest. It will "...be charged with building doctrine for expeditionary warfare and translating the concept of 'operational maneuver from the sea' into naval doctrine." It is likely this new command will play a role for the Navy Department similar to what TRADOC does for the Army's Air-Land Battle. According to Acting Secretary of the Navy Sean O'Keefe's remarks at the National War College on 7 October 1992, the Naval Doctrine Command, among other things, "...will focus our procurement process on equipment systems to support this strategy of littoral, regional warfare." This is an obvious assignment for our best SSN C.O's and staff officers, when rotating from sea, including operational submarine staffs, to shore.

Conclusions.

The Submarine Force should do well in the 21st century if it is able to succeed in the following tasks.

- Support our SSBN force by continuing to staff STRATCOM with our best people.
- Support the Naval Doctrine Command to create innovative changes from open ocean SSN operations to operations in the littoral.
- Support the creation of a naval mission statement that gives the Navy Department a better intellectual foundation of submarine operations, and a more comprehensive understanding of what they can do for overall national defense.

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Call For Sea Stories

SUBMARINE ANECDOTE BOOK

In the summer of 1993, with the cooperation of the Submarine Officers Wives Club, we will publish a book of submarine anecdotes. The book will be the same size and shape as the **Submarine Review** and will contain approximately 100 pages. Any organization or individual submitting a particular anecdote will be given credit for the submission.

Complimentary copies of the collection will be provided to each regular member of the League. The Submarine Officers Wives Club also will sell the book, with the proceeds benefiting the Dolphin Scholarship Program.

We hope to come up with stories covering a broad spectrum which includes anecdotes about submariners, staffs, support organizations and the submarine industrial community.

We are receiving some great inputs now, but are holding the door open until June 1, 1993. Don't miss out!

WORLD SUBMARINE PROLIFERATION AND U.S. CONTINGENCIES

by George F. Kraus, Jr.

[Reprinted with permission from Foreign Systems Research Center Analytical Note by SAIC, Denver, CO.]

[Ed. Note: Mr. Kraus is a member of the Naval Submarine League and is a retired Naval Intelligence officer. He is a frequent contributor to THE SUBMARINE REVIEW.]

Submarine Proliferation
High Technology -- High Leverage

The recent sale of three Russian KILO-class diesel-powered submarines to Iran (with negotiations reportedly underway for the purchase of two more) highlights the expanding Third-World submarine threat. Such submarines offer many countries potential leverage against larger or more sophisticated forces -- even the United States. As the number of countries with submarines grows, and with the added potential offered by nuclear-powered submarines, consideration of the impact these units may have on contingency operations seems an urgent planning priority. This is particularly true in view of the declining numbers of U.S. forward bases, the declining U.S. submarine inventory, and the smaller number of available U.S. surface and air anti-submarine warfare (ASW) assets.

This paper addresses the problems posed by Third-World submarine proliferation and some of the associated issues for United States contingency forces. With the decline of the Soviet (now Russian) Navy, more submarines may become available for sale to Third-World states. For example, *Red Star* on 16 October carried an "advertisement" for a TANGO-class diesel boat. The marketing of TANGOs signals that even submarines originally designed for internal Russian use -- rather than just the previous "export versions" -- are now available for sale. Of course, even more capable German, British, Swedish, and other designs (some involving air-dependent propulsion) are available to those with the wherewithal to buy. The threat is thereby increasing in capability and scope, while U.S. ability to respond is constrained by declining budgets, bases, and assets. Will the next U.S. Third-World crisis response face a significant

submarine threat?

A Stealthy Threat
With Very Potent Weapons

U.S. forces responding to future contingency operations face a potential "stealthy" challenge represented by submarines in Third-World inventories. The inherent stealth of submarines makes them ideal platforms to be used in areas where the operating country is unable to achieve and maintain sea control -- as is the case with almost any country in a dispute with the U.S., whether the U.S. acts alone or under UN auspices. Moreover, the torpedoes and mines (notwithstanding the potential anti-ship and land-attack missiles) which submarines carry are particularly effective anti-ship weapons. As U.S. basing and sustainment are reduced in forward areas, the problem of dealing with a submarine threat becomes more acute, especially as the threat is expanding in size and into more and more countries. With current Russian economic troubles causing a *fire sale* mentality and the rapid reduction of their submarine force making boats available for sale, countries that previously could not begin to entertain the thought of submarine ownership may now be able to. Currently 44 countries operate submarine forces of various sizes. The vast majority of these are composed of conventionally-powered vessels, but India has operated one obsolete Russian CHARLIE-class SSGN under a leasing arrangement, and at least India, Brazil, and Argentina have nuclear submarine programs underway.

Moreover, many nations (e.g., Germany, Sweden, Russia, Italy) are working on air-independent propulsion schemes aimed at making conventional submarines even tougher targets than they are now. Such propulsion systems allow greatly extended submerged operations without the necessity for recharging batteries by snorkeling or surfacing, and higher sustained submerged speeds, overcoming one inherent weakness of traditional diesel boats.

The problem that these disparate forces may represent is graphically illustrated by the British experience in the Falklands War. The Argentine Navy had available two German-designed Type 209 SSs (of four diesel boats); one operated for some time in the British closure area. This extremely small numerical threat forced extended ASW operations by the British that continued for the duration of their campaign and resulted in the expenditure of almost 150 ASW weapons in pursuit of (mostly)

false targets. In view of the normal loads of ASW torpedoes and the lack of alternative U.S. ASW weapons, this may give some idea of the extraordinary expenditure of ASW ordnance that has often characterized these operations. Historically, the ratio of ordnance used to submarines killed is similarly high. Anti-submarine warfare is also a costly enterprise in terms of platforms required and the time necessary to "sanitize an area," i.e., assuring (to some probability) that no submarines are present.

In view of the fact that the British units involved in the Falklands were also the main elements of ASGRUTWO, NATO's North Atlantic ASW group and the ASW subordinate staff for COMSECONDFLT in his NATO role as Commander, Striking Fleet Atlantic, the competence of the ASW units was not a question. The complicated ASW conditions, the difficult logistics of operating so far afield, and the quiet diesel threat in an area where maintaining air ASW coverage was impossible are probably sufficient explanations. These are exactly the sorts of problems that the U.S. may face in Third-World operations in a future contingency, although the threat may greatly exceed that posed by the Argentines.

Several scenarios can be envisioned with more dire submarine threats. A PRC-Taiwan scenario, for example, could involve a potential PRC blockade of Taiwan enforced with submarines (among other forces). The PRC has about a half-dozen marginally capable SSNs, but has almost 100 diesel-electric boats of various designs. Were the U.S. involved, dealing with a threat in which the operating area is about 100 miles from the PRC while it is almost 6,000 miles from the U.S. is likely to be a challenge. In addition, the ability to maintain air superiority might also be a problem, particularly with U.S. forces withdrawn from Philippine bases.

It is likely that in most Third-World cases, effective ASW against a diesel threat will depend to an extent on air superiority. With friendly forces controlling the air, maritime patrol aircraft can provide "area flooding" radar coverage of the operating area, facilitating the detection of diesels when they must snorkel, or forcing them to remain submerged for extended periods, precluding their ability to rapidly change operating areas or respond to U.S. movements with maximum flexibility. Clearly, the locus for many such contingencies may be distant from the remaining U.S. forward bases as well as from CONUS, thereby complicating the attainment of air superiority.

Counter With Air ASW -- or SSNs

A Planning Dilemma in Either Case

In order to assure that ASW aircraft can be employed in support of contingency forces, they must be protected from air threats. This is why air superiority is likely to be an essential requirement of a U.S. response (even in the absence of other requirements for air support). Air ASW platforms are generally invulnerable to submarine weapons and offer rapid response and large area coverage. However, in forward areas where there are no bases, the U.S. is likely to provide air forces primarily from carriers. Carriers are vulnerable to submarines and must be operated with organic and other ASW forces to prevent successful submarine attacks. Therefore, the movement forward by carriers is likely to be delayed until ASW forces can deal with the submarine threat.

A Catch-22 situation prevails: carriers are needed to assure effective ASW, but they cannot move forward until effective ASW has been executed. Land-based air might be able to provide long-range ASW support, but air superiority is required to allow such aircraft to operate; carriers are needed to provide that air superiority in the absence of proximate U.S. bases. The use of SSNs eliminated the need for initial air superiority, but SSNs must be operated very prudently against quiet diesels in shallow water, and quiet diesel targets mean a slower search rate for the SSNs. Thus, such an operation will take time, possibly days or weeks depending on the threat, but certainly more than hours.

The U.S. has used its carriers and other naval platforms since World War II with relative impunity in operations from Korea to Libya. Now the proliferation of submarines means that in many such contingencies there will be a tangible, stealthy, anti-ship threat. A solution to the dilemma sketched above will require careful planning and execution, and the prospect for, and nature of, the risks associated with the operation will have to be explicitly evaluated. The element of time necessary for effective ASW prosecution to take place will have to be taken into account. In any case, the conscious recognition that a problem exists is a prerequisite for planning.

The PRC scenario noted above is by far one of the most stressing, but does not necessarily represent the most technically-capable force. There are a number of countries that have bought or are buying Western-designed submarines that are far more capable, including India, Pakistan, and a number of Asian

and South American countries. There are other contingencies where large, Third-World submarine forces might be involved; the North Koreans, for example, have over 20 such boats in their inventory. The nature of these forces also means that the U.S. may encounter either its own or other Western weapons. The U.S. has sold Mark 46 ASW torpedoes to the PRC and to others. The Germans and French have sold both submarines and submarine weapons (including heavyweight submarine torpedoes) widely in the third world, as have the Italians. Thus, the threat is not just from Russian systems, although as noted above, with the economic circumstances in Russia, "bargain" submarines may be available to a new set of clients that previously was unable to afford such systems.

These aspects of adversary submarine operations in Third-World contingencies are only the tip of the iceberg in evaluating the threat. The U.S. has order of battle data on most of the submarines, but has spent little collection effort on characterizing the doctrine, tactics, weapons employment conventions, training levels, maintenance practices and state of repair of the fleet, deployment patterns, reconnaissance and targeting capabilities, etc. In short, most of the data necessary to characterize the *actual* threat versus the "threat on paper" (Clausewitz's differentiation), and to plan U.S. contingency operations, has not received the level of attention that the current threat warrants.

A Proliferation and Contingency Issue

Ballistic Missiles Not the Only High-Tech Threat

The trends discussed above boil down to the following: the number of potential adversaries is increasing; the proliferation of submarines is increasing, and may accelerate with Russian sales; most contingencies will be distant from the United States; there are fewer (and the numbers are continuing to decline) deployable ASW assets in the U.S. inventory; and, finally, most contingencies require U.S. forces to approach foreign coasts, potentially making those forces more vulnerable to hostile submarines (the new U.S. Navy White Paper, *From the Sea*, indicates renewed emphasis on such littoral operations). In view of the potential impact of submarine proliferation on the success of operations across a range of contingencies, it seems important that this problem be thought through systematically. The inherent stealth of the platform coupled with the lethality of the weapons it carries makes this a tangible threat, one that

could mean the loss of a carrier or an SSN in the worst case. Moreover, U.S. and other Western weapons are clearly a part of the problem.

Several initial steps seem advisable. First, some form of proliferation regime that addresses the weapons and high-technologies that make submarines more threatening is as necessary as the regime currently in place to control the proliferation of ballistic missile systems and technologies. Second, expanding the U.S. data collection strategy seems warranted in order to increase the available intelligence on the many intangibles of operations and logistics in Third-World submarines forces -- in addition to the hard data on numbers, types, and weapons. New sources and methods should be examined, for much information is openly available (although often untranslated) in technical literature, trade publications, indigenous newspapers, and the like. Third, contingency planning should explicitly address the impacts of this threat on potential operations, to include the impact of the *timing* of operations.

Just as the U.S. "learned" a number of lessons in the recent Gulf War, it is likely that others did as well. One of the potential lessons for those who may face an American intervention is that allowing a large U.S. force to be deployed with impunity is a guarantee of failure. Means to interfere with the large-scale logistics associated with such a buildup have existed and been exercised since the First World War -- unrestricted submarine warfare (to include submarine mining). The loss of logistics ships or major combatants may affect the ability and will of the U.S. to pursue contingency operations. In the past, the capture of a small number of aviators or a large, single loss as at the marine barracks in Lebanon have had major political impacts on contingency operations. Ship losses -- especially if they are large, modern ships -- represent potentially substantial losses of personnel and equipment. As submarines and submarine weapons proliferate in the third world, perhaps it is time for an "ounce of prevention."

[Mr. Kraus is a Senior Analyst at the FSRC specializing in naval, space and strategic issues, as well as U.S. national security policy. He invites comments and questions concerning this ongoing research at (303) 773-6900.]

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CONVERSION OF A RUSSIAN DELTA III SUBMARINE FOR ARCTIC RESEARCH ...

(How Times Have Changed)

by CAPT George B. Newton, USN(Ret.)

In the current dynamic environment of peace, all sorts of strange and at times almost unbelievable things are happening. On a regular basis the press reports on items such as a new initiative from Russia that offers their under-utilized resources (military or civilian) or provides unique insight into Soviet actions or reactions to an event that heretofore we in the West had only known from one perspective. The demise of Communism and the new world order, coupled with the Russian reaction to them, have been difficult to comprehend, particularly if you were a participant in the Cold War.

In my 24 years of active duty service (most of it in the Submarine Community) one common thread drove the short- and long-term thinking of the U.S. Navy: the Soviet Union. *It was our objective to be better than the Soviets; be bigger than the Soviets; be faster and more responsive than the Soviets; know the Soviet threat; and, if called upon -- beat the Soviets.* The Cold War was a set of military equations. Perhaps the two sides were somewhat equal, but I do not believe either military establishment ever believed that was the case. And, thus, we always sought more knowledge of one another. Trying to stay abreast of what the other side was doing was the challenge.

Quite naturally, the Navy's thinking was my thinking. Most of us in submarines actually took part in trying to unbalance that equation of power: *Learn more!, Get even! Stay ahead! Knowledge is strength!...etc., etc.*

With the foregoing as my mindset, you can imagine the emotions that ran through me when I was invited to be a member of a U.S. (civilian) delegation to travel to St. Petersburg, Russia. The purpose of the trip was to hold talks with the Russian Navy's Central Design Bureau for Marine Engineering (also known by its acronym RUBIN), concerning the possibility of the U.S. paying for the conversion of, and then leasing a Russian DELTA-III Class ballistic missile submarine. The submarine was to be employed for research under the Arctic Ocean pack ice. For three days in July 1992 our five-man delegation was hosted by RUBIN officials led by its Head, Academician Igor Spassky.

RUBIN is housed in a building that reminded me some of Washington's old Main Navy: grey stone, 4 or 5 stories tall, long, and narrow. RUBIN is the oldest Soviet/Russian Navy design bureau, having been established in 1926, and my estimate is that the building in which it is located is close to that vintage.

At present, RUBIN employs 2,500 people, 300 of them in the Russian Navy. Thirty percent of the work force is presently engaged in Navy projects. During RUBIN's peak effort, 4,000 people were employed there.

We were told that the Bureau has designed 19 classes of submarines and 90 percent of the existing Russian submarine force is of RUBIN design -- a number that I believe is a bit high based upon what we were told. Most of their designs have been missile carriers. They started with the WHISKEY LONG BIN and sequentially designed every missile submarine through the TYPHOON with the single exception of the CHARLIE Class.

RUBIN also designed the KILO Class and the MIKE. In the case of the latter they remain actively involved with the survey and monitoring of the sunken MIKE. In fact, at least one of those with whom we talked concerning the DELTA-III project had participated in surveillance dives on the hulk.

Clearly RUBIN's contribution to the Soviet side of the Cold War was considered significant in the eyes of the Soviet leadership because the Bureau proudly displays three command awards in its lobby. They are two Orders of Lenin and a single award of the Hero of the Soviet Union.

Two things made RUBIN even more interesting and conveyed a linkage to U.S. Navy entities. One is the organization's Museum, and the second is the greenhouses.

The RUBIN Museum is a three-room complex located at one end of the building. It was established in 1976 in recognition of the Bureau's 50th anniversary. The outer room displays portraits of distinguished members (past and present) of the RUBIN organization and describes RUBIN's history and contributions to the Soviet State. The two inner rooms contain models of every submarine class designed by RUBIN -- all in the same scale. The older diesel submarines were in the first room, the overhead of which was constructed to replicate the curvature of the interior of a submarine hull. It included an old Soviet equivalent of the U.S. Navy's Type 2 attack periscope. In the second room are all the nuclear submarine models.

When one sees the progression in size from a 1930's vintage conventional submarine to the TYPHOON, the enormity of the latter can be appreciated.

Director Spassky carefully described each display (through an interpreter) and added at one point that we were the first Americans ever to tour the nuclear submarine model room. We saw models of YANKEE and DELTA Classes together with their sail arrangements. Spassky also described a model showing a rather unique hull joint system the Russians use to "build our submarines and take them apart quickly." In a large table-level display case were models of a DELTA's control room (showing a distinct similarity to the one in the movie Hunt for Red October). The control room had five high consoles arrayed on its perimeter (two on each side and one forward) with places for 16 watchstanders. I suspect the consoles displayed information for the sonar, fire control, ship control, ESM, and navigation systems. In the center of the space was a low console with two watch positions behind it for the CO/OOD/JOOD as appropriate. Located behind them were the periscopes in what I recall was an enclosed area, to limit the darkened area when the DELTA was at periscope depth.

The model of the SSBN recreation module was also on display next to the control room model. It showed a sauna, a swimming pool (8'x 15' was my guess as to its size), a lounge area, and a video game room much like those in our shopping malls. Also in the museum was a model and artifact display of the MIKE Class with numerous pictures of the sinking site and personnel involved in the surveys. Several items recovered from the sunken MIKE were on the apron of the display.

Lastly, in the display case containing the model of the OSCAR Class SSGN were several mementos of the first ship of the class. The one that caught my eye was a clear glass bottle (about the size and shape of a whiskey bottle) filled with water and on which was affixed a label showing an OSCAR submarine. When I inquired as to its significance, I was told that commemorative water samples were always taken when a submarine conducted its first test depth dive.

In a wall-mounted picture case were the portraits of the current Commanding Officers of the Russian SSBN fleet.

The five greenhouses on the roof of RUBIN are the remnants of research conducted to perfect the technique for growing vegetables on board SSBNs. The Soviets tried true hydroponics and other growing methods. An experiment

control room located adjacent to the greenhouses contained a mimic bus panel that enabled variation and control of fertilizer, artificial light (both frequency and duration) and growing media (various type soils or water). They ultimately centered their growing efforts on tomatoes and cucumbers. Shades of the U.S. Navy's early SSBN days!

When I asked if the Russian SSBNs continued to produce vegetables at sea, Spassky replied, "No, because of economic requirements, we had to do away with the billet of gardener."

One postscript on the greenhouses. Production is now so successful at RUBIN, they sell the tomatoes and cucumbers to local St. Petersburg restaurants.

It was some time during these first 2+ hours at RUBIN that a U.S. Navy comparison came to mind. Igor Spassky was a lot like Admiral Rickover. When he came into the room, the Russians quickly quieted. He set the tone -- and total deference to him was clearly the rule. His long tenure as Head of RUBIN, his slight appearance, the sea trial deep dive mementos, and the model room all brought back a recollection of NAVSEA 08.

By mid morning of our first full day we were deep into discussions with Spassky and his staff on the proposed conversion. Arrayed on the walls of the conference room were the general (internal arrangement) plans of the DELTA-III, profile drawings of the five conversion options of the ship the Russians offered, and a plan of action and milestones for the conversion. We were later given copies of these posters with the exception of the general plans.

The specific Russian proposals range from the least expensive conversion (≈ $60M) to the most expensive (≈ $100M). Following the conversion (in a Russian Naval shipyard on the White Sea), DELTA-III would be leased to the organization paying for the conversion for an eleven-year period at a cost of $8-10M per year. The eleven-year period would span a one-year shipyard availability, the cost of which Spassky said had been amortized into the annual lease costs.

What form was the conversion to take? First, the missile compartment has to be gutted in order to comply with the START Treaty requirements. The graphics we were shown indicated that there were three compartments after the conversion. The missile compartment, which is 45 meters long overall, would next be converted into a laboratory of 3,700 cubic meters and would include berthing for 30-50 scientists, depending upon the stateroom arrangement.

The laboratory space would occupy three deck levels and would contain all the electrical conversion equipment to accommodate U.S. laboratory and scientific electronics systems. (The DELTA-III's power generation capability is 3,000 kilowatts, 3 phases and 380 volts at 50 hertz.)

Other elements of the conversion would be the addition of bow and stern athwartship thrusters and various configurations of small submersibles. The most elaborate conversion (in which the U.S. science delegation was not interested) was an ocean bottom coring modification which required addition of a second anchor astern and erection of a huge drill tower on the missile deck just aft of the sail -- almost 30 meters above the keel. The RUBIN designers believed the submarine could collect core samples when within 200 meters of the bottom while submerged. (Can you imagine in a Cold War scenario the reaction of Western intelligence analysts to the first sighting of this submarine with its huge tower -- 2½ times the height of the sail?!)

Lastly you might ask: What about the DELTA-III capabilities and arrangements? About the best thing I could suggest is to read the description of the DELTA-III Class in Jane's All the World's Fighting Ships. The data contained therein is very close to the information we were given.

The submarine, which is double hulled over its full length, has eleven compartments -- five were devoted to engineering spaces and six were forward (the missile compartments were three of the six). There are apparently two reactor and two engineering compartments and a stern room where I guessed the emergency propulsion motors and shaft clutches were located. The two shafts were canted outboard about 5 degrees. In general the engineering spaces appeared (on the plans) to be very crowded. I was told all air regeneration equipment was located aft. This perhaps accounted for some of the tightly packed appearance. The presence of the emergency diesel generator in one of the engine rooms also contributed to the crowding.

The remainder of the first day was devoted to technical presentations from the senior technical staff of RUBIN including the Chief Designer and Chief Engineer.

They first addressed the built-in Arctic under-ice capability possessed by the DELTA-III. That capability included an ahead-looking under-ice sonar, an ice profiling system, and fairwater planes which rotate to the 90° rise (vertical) position.

The platform also carried a "water clarity" detection system and a series of three upward looking TV cameras located in the sail, near the bow and forward of the stern. The presenter said that the DELTA-III had the ability to penetrate 0.8 - 0.9 meters of ice routinely and in an emergency it could penetrate from 1.5 to 1.8 meters. That emergency capability "had been confirmed", he added. (I'll bet that event made a good post-deployment story!)

The second day of meetings was devoted to scientific discussions by both U.S. and Russian delegations which addressed the many advantages of using a nuclear submarine as an under-ice Arctic Ocean research platform. It was clear to me that the Russians were as enthusiastic about the platform's availability as they anticipated the U.S. science community would be.

The third day of discussions were devoted to additional scientific and technical presentations by the Russians which covered submarine survivability when operating under sea ice in the Arctic Ocean and to preparing a meeting summary. The two sides agreed to continue a dialogue in the months ahead. The senior U.S. representative, retired Rear Admiral Dick Pittenger, who is now the Director of Operations at Woods Hole Oceanographic Institution, agreed to work toward arranging an international conference in the United States on the subject.

While it has not been my objective to address either the practical or political merits of the DELTA-III project in this article, I must say in conclusion that the meetings were uniformly cordial and, certainly, the Russians were extremely candid by all standards. Only on one occasion was residue of the Cold War shown. On the first day of our meetings, as we were about to leave the main conference room to tour the RUBIN Submarine Museum, two of us who had brought our cameras asked if we could take them into the Museum. Director Spassky looked at us rather sternly and said, "No, we haven't come that far yet."

Needless to say, I still reflect upon the trip frequently. *Where I was. What I saw and heard. Who I talked to.* For a submariner who devoted almost his entire Naval career working to counter the Soviet submarine threat, to have spent three days across the table from the designer of the TYPHOON (and many other submarine classes) was truly an out-of-body experience. How times have changed! ■


In the defense
of our nation, there can be
no second best.
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DUTCH SUBMARINES IN WORLD WAR II - THE FAR EAST

by CDR John D. Alden, USN(Ret.)

When Hitler invaded the Netherlands on 10 May 1940, the Dutch Navy had 30 submarines afloat or under construction. Following longstanding practice, the boats were divided between home waters and the East Indies. Until 1937, Dutch submarines were designed specifically for service in one area or the other, with the home boats assigned Arabic numbers in the "O" (Onderzeeboot) series and the overseas ones Roman numerals in the "K" (Kolonial) series. The latter were usually somewhat larger and had a longer operating range, better ventilation, and stronger gun armament. In 1937 it was decided that all future submarines would be fitted to serve in either area; consequently, the K-XIX and K-XX then under construction were renumbered O-19 and O-20, which left a gap after the O-16, which had been the highest numbered in that series. In 1940, all of the existing K-boats and three of the newest O-types were based at Surabaya, Java.

Of the 15 boats in the Netherlands itself, six were seized by the Germans, but nine escaped to Great Britain and continued to fight. Their history will be covered in a separate article. The 15 boats in the Far East, except for the four oldest in reserve, were kept in readiness for the conflict that was seen as inevitable. When word was flashed of the Japanese attack on Pearl Harbor, seven Dutch submarines were already on or en route to stations in the Gulf of Siam and South China Sea to intercept the invasion convoys headed for the British and Dutch colonies. Four more boats deployed a few days later, and steps were taken to activate the last four in reserve. The war for these boats had begun in earnest.

The Dutch submarines consisted of several types, the oldest dating back to the early 1920s. They were efficient, well-built boats, as would be expected of a navy that had operated submarines since 1905. Typical of the more modern types were the K-XIV and O-19 classes, which were, respectively, 242 and 265 feet in length with surface displacements of 771 and 998 tons. They had six internal torpedo tubes, four forward and two aft, and a pair of trainable deck tubes in the superstructure. Their deck armament consisted of a 3.4" gun and two 40-mm guns in disappearing mounts. The O-19 and O-20 were also

fitted to carry 40 mines, a feature that made them particularly useful in the East Indies. The O-21 class was slightly smaller and not equipped to lay mines, but these boats were built with experimental air-breathing "schnorchels" that were adopted and improved by the Germans in 1943.

Reflecting Dutch monarchist traditions, many of the submarine officers had aristocratic or upper-class backgrounds and have been described as rather authoritarian in their relations with the enlisted crewmen. The boats in the East Indies also included a number of Indonesian natives in their crews; these were berthed and messed separately from their European shipmates. All in all, the Dutch boats were the equal of their contemporaries in other navies and their crews were experienced and well trained.

By 12 December 1941, as prearranged, seven of the Dutch boats had come under operational control of the British Commander-in-Chief, Eastern Fleet and were patrolling in the South China Sea. (There were then only two British submarines in the Far East.) Three more were stationed off Borneo under Dutch control, while K-XVIII was under refit at Surabaya. In aggressive attacks between 12 and 25 December, four of the Dutch boats drew blood, sinking or damaging 10 or possibly 12 Japanese ships. Unfortunately, two of these submarines and two others were lost: O-16 to a Japanese mine on the 15th, O-20 to gunfire from the destroyer URANAMI on the 19th, K-XVII to a mine or Japanese depth charges some time after the 14th, and K-XVI to the submarine I-66 on Christmas Day. Also, K-XIII suffered a battery explosion at Singapore on the 21st after returning from patrol; although towed to Surabaya for repair, the boat never returned to action.

As the Japanese continued their advance southward, the Allied submarines tried with little success to counter them. Between January and March, 1942, only two or possibly three ships were torpedoed. When Singapore became untenable, the submarines all fell back on Surabaya. Many had suffered damage or material casualties, but conditions at the base went from bad to worse as repair facilities came under incessant Japanese attacks, spare parts and munitions were used up, and crews approached exhaustion. By late January the British had relinquished operational control of all submarines back to the Dutch. K-VIII, K-IX, and K-X were recommissioned by

crewmen from the base and boats under repair and used for local defense, but the obsolete K-VII was sunk by Japanese aircraft while submerged at Surabaya. When Java could no longer be held, the British submarines and four of the remaining Dutch boats withdrew to the British base at Colombo, Ceylon; but K-X, K-XIII, and K-XVIII were inoperative and had to be scuttled on 3 March 1942. K-XII, the last boat to escape from Surabaya, went to Fremantle, Australia, with the Dutch admiral and staff. The obsolescent K-VIII and K-IX had already been sent to Australia, where efforts were made to use them as anti-submarine trainers. However, K-VIII, with a mixed Dutch and Australian crew, was fatally damaged at Fremantle by a battery explosion. K-IX was transferred to the east coast but was torpedoed in Sydney Harbor by a Japanese midget submarine on 31 May 1942. Both boats were scrapped as beyond repair.

The destruction of the Allied defense forces in the Dutch East Indies, along with the other catastrophes suffered by the United States, left the Japanese Navy in almost unchallenged domination of the Western Pacific and Eastern Indian Oceans in 1942. The four Dutch and two British submarines that had escaped to Ceylon were badly in need of major refits. The Dutch boats in particular were handicapped by a shortage of torpedoes and the lack of spare parts for their engines and machinery. K-XV made one patrol, a special intelligence mission to western Sumatra, then left for the U.S. K-XIV was unable to operate until November, when she also was sent to the U.S., pausing briefly off the Cape Verde Islands for guard duty during the Allied invasion of North Africa. Both these submarines were under overhaul at the Philadelphia Navy Yard for more than a year before returning to the Far East. O-19 made two patrols out of Colombo, then went to Grangemouth, Scotland, for a long refit. The elderly K-XI also made two patrols in the Indian Ocean, but was then shifted to Fremantle to serve as an anti-submarine trainer until worn out and paid off in 1944.

Of the two British boats, TRUANT suffered from many machinery defects and soon returned to the United Kingdom for overhaul. TRUSTY remained until April 1943 and was joined during 1942 by the Dutch O-23 and O-24 from Europe. O-21 followed in March 1943, but soon left for Australia. For

most of 1942 and 1943 there were never more than three submarines based at Colombo; often not a single boat was fit for offensive patrol, and for much of the time until October 1943 the only boats present were Dutch. Despite the problems, the three Dutch newcomers accounted for five Japanese ships sunk and two or three damaged, before they too were withdrawn for overhaul. O-23 returned to Great Britain in September, while O-24 went to Philadelphia in December. This essentially ended Dutch operations out of Ceylon, except for a few patrols by boats returning from overhaul and making the passage to Fremantle. However, British submarines operated from there in increasing numbers from late 1943 until the end of the war.

The final phase of the Dutch submarine war in the Far East was conducted from Australia, mainly under operational control of the U.S. Commander, Submarines, Southwest Pacific. Old K-XII had been there since 1942, making five intelligence runs for the Netherlands Forces Intelligence Service (NEFIS) between extended upkeep periods. For a time, several U.S. submariners were attached to her crew until she was retired in early 1944. O-21 moved over from Ceylon and made one patrol out of Fremantle in 1943 before returning to the United Kingdom for refit. K-XIV, K-XV, and O-19 were based there after returning in 1944 from their long overhauls. These boats were joined by ZWAARDVISCH, the former HMS TALENT, that came down from Europe in August 1944 after making three Atlantic patrols. O-21 and O-24 returned from overhaul in 1945 but were able to make only a few patrols before the end of the war. O-23 completed her overhaul too late to participate further in the hostilities.

In addition to completing 13 hazardous special missions for NEFIS, in which agents were landed on or picked up from various enemy-occupied islands, the Fremantle boats sank or damaged the German submarine U-168, a Japanese cruiser, three minelayers, two or three naval auxiliaries, three or four small merchant ships and 19 or 20 junks or coasters. Many daring attacks were made on the surface in extremely restricted locations. O-19's eighth patrol was particularly harrowing. After laying 40 mines off Batavia, Java, and sinking the naval auxiliary SHINKO MARU #1, the sub hit bottom in very shallow water and was heavily depth charged by a Japanese sub

chaser. Carbon dioxide from the ruptured air conditioning plant seeped through the boat, forcing the crew to evacuate several compartments and don emergency breathing masks, while the engine room flooded up to the deck plates. After two hours of this, the boat was brought to the surface long enough to see that the Japanese were still in sight, then bottomed again while preparations were made to destroy all secret books and papers. In a final desperate effort, the engine crewmen succeeded in getting back into the engine room and preparing to surface in order to make a run for safety. Although sickened or temporarily overcome, they got the engines running again and managed to repair the worst damage as the boat made its way back to base.

After two months under repair, O-19 made another successful patrol, but was then declared unfit for further combat. Loaded with spare equipment and stores for the new base being established in the Philippines, the worn-out boat left Fremantle on 25 June 1945 for Subic Bay. On 8 July, however, she ran hard aground on Ladd Reef in the South China Sea. The U.S. submarine COD (SS-224) was sent to the rescue but failed to budge the Dutch boat, so took off the crew and demolished the wreck. This was the last Allied submarine to be lost in the Far East during the war.

A bizarre footnote was provided by the British submarine HMS TACITURN. Patrolling off Surabaya on 16 June 1945 in water too shallow for diving, she encountered a strange collection of craft consisting of an armed trawler and a sub chaser towing two hulks, the smaller of which was clearly that of an old and rusty submarine. The larger hulk was torpedoed, the trawler driven off, and the sub chaser and submarine hulk sent to the bottom by gunfire. Dutch sources later identified the hulk as the former K-XVIII which had been scuttled in 1942 but raised by the Japanese and used as an air warning picket platform in Madoera Strait!

All told, 19 Dutch submarines participated in the war in the Far East. Nine were lost by enemy action, scuttling, or grounding and four others were paid off before the end of the war because of damage or excessive wear. At least 136 crewmen were killed, plus more who were lost when transports returning them to Europe were torpedoed and sunk. The boats made 84 patrols: 28 in the early fighting before evacuation of the Dutch

East Indies, 29 from Ceylon, and 27 from Australia. Included in these patrols were 50 special missions, in two of which 80 mines were laid by O-19. Confirmed or possible sinkings included 19 ships and 18 small craft totaling approximately 51,900 tons; another 16 ships and two small craft of about 113,200 tons were damaged to various degrees. The small but valiant Dutch submarine force had avenged its early losses and made a significant contribution to Allied victory in the Pacific.

DUTCH SUBMARINE SUCCESSES IN THE FAR EAST

Date	Sub	Patrol	Target	Type	Tons	Results
12 Dec 41	K-XII	1	Toro Maru	Cargo	1932	S
12 Dec 41	O-16	1	Tozan Maru	Cargo	8666	D (Note 1)
12 Dec 41	O-16	1	Kinka Maru	Trans	9306	D "
12 Dec 41	O-16	1	Asosan Maru	Cargo	8811	D "
12 Dec 41	O-16	1	Sakura Maru	Trans	7170	D
12 Dec 41	O-16	1	Ayatosan Maru	Trans	9788	D
13 Dec 41	K-XII	1	Taizan Maru	Cargo	3525	D (Note 2)
23 Dec 41	K-XIV	2	Katori Maru	Trans	9849	S
23 Dec 41	K-XIV	2	Hiyoshi Maru	Cargo	4943	D (Note 3)
23 Dec 41	K-XIV	2	Hokkai Maru	Trans	8416	D
23 Dec 41	K-XIV	2	Nichiran Maru	Cargo	6503	D
24 Dec 41	K-XVI	2	Sagiri	Destr	2090	S
10 Jan 42	O-19	2	Akita Maru	Cargo	3817	S
23 Jan 42	K-XVIII	1	Tsuruga Maru	Trans	6987	S (Note 4)
1 Mar 42	K-XV	2	Tsurumi	Oiler	15050	D
27 Jul 42	O-23	1	Shofuku M. #2	Aux	729	D
2 Aug 42	O-23	1	Zenyo Maru	Cargo	6440	S
2 Aug 42	O-23	1	Ohio Maru	Trans	5873	D (Note 5)
25 Oct 42	O-23	3	Shinyu Maru	Cargo	4621	D (Note 6)
21 Feb 43	O-24	4	Bandai Maru	Cargo	165	S
13 Mar 43	O-21	1	Kasuga M. #3	Trans	3967	S
22 Apr 43	O-21	2	Yamazato Maru	Cargo	6925	S
20 Aug 43	O-24	8	Chosa Maru	Gunbt	2538	S
21 Jun 44	K-XIV	6	Tsugaru	Minelr	4000	D
10 Sep 44	O-19	6	Korei Maru	Cargo	599	S (Note 7)
4 Oct 44	Z'visch*	2	Kagawa M. #7	Tanker	500e	S (Note 8)
6 Oct 44	Z'visch	2	U-168	Sub	1247	S (Note 9)
10 Oct 44	Z'visch	2	Koei Maru	Picket	19	S
15 Oct 44	Z'visch	2	Kaiyo M. #2	Subchsr	143	S
15 Oct 44	Z'visch	2	Kaiyo #1	Aux	277	S (Note 10)
17 Oct 44	Z'visch	2	Itsukushima	Minelr	1970	S
17 Oct 44	Z'visch	2	Wakataka	Minelr	1890	D
9 Jan 45	O-19	8	Shinko M. #1	Aux	935	S
10 Apr 45	O-19	9	Hosei Maru	Tanker	676	S
22 Apr 45	O-19	9	Ashigara	Cruisr	13380	D (Note 11)
Also at various times	K-XIV		4 small craft		40e	S
	K-XV		3 small craft		70e	S (Note 12)
	O-19		3 small craft		360e	S
	O-21		1 small craft		10e	S
	O-21		2 small craft		600e	D
	O-24		1 small craft		40e	S
	Z'visch		6 small craft		300e	S

NOTES

* ZWAARDVISCH (ex-HMS TALENT).
1. Sunk in shallow water, later salvaged.
2. Claimed sunk; possibly salvaged, similar ship sunk 11 Nov 44 by aircraft.
3. Claimed sunk; other sources say damaged; similar ship sunk 4 Dec 43 by USS GUNNEL (SS-253).
4. Claimed sunk; some sources credit surface ships.
5. Claimed sunk; Japanese records show sunk 6 Aug 42 by USS TAUTOG (SS-199) at different location.
6. Claimed sunk; damaged 15 Apr 44 by USS REDFIN (SS-272).
7. Claimed sunk by Dutch but not by British; may be same ship sunk by USS PARGO (SS-264) at a different location on same date.
8. Claimed as unidentified; name from Ultra intercept.
9. German submarine, 27 survivors picked up.
10. Some Japanese sources list both KAIYO MARU #2 and KAIYO #1 sunk here, but names may be confused; Dutch claim only one.
11. Dutch identified as HAGURO; some doubt found missing when cruiser was drydocked, believed from scraping a wreck.
12. One not claimed; Ultra intercept reported sailing ship shelled by a sub 13 July 45 in area where only K-XV was present.

DUTCH COMMANDING OFFICERS

K-VIII	Lte 1 M. A. J. Derkzema (1 patrol)
K-IX	Lte 1 P. G. de Back (no patrols)
	Lte 1 Th. Brunsing (no patrols)
K-X	Lte 1 P. G. de Back (2 patrols, scuttled)
K-XI	Lte 1 A. H. Dekruif (patrols 1-6)
K-XII	Lte 1 KMR OV H. C. J. Coumou (patrols 1-5)
	Lte 1 Th. Brunsing (patrols 6-9)
	Lte 2 J. H. Baron Mackay (patrol 10)
K-XIII	Lte 1 M. A. J. Derkzema (1 patrol, scuttled)
K-XIV	Lte 1 C. A. J. van Well Groeneveld (patrol 1)
	Lte 2 Th. Brunsing (patrol 2)
	Lte 1 P. A. Mulock van der Vlies Bik (patrol 3)
	Lte 2 J. H. Gelja (patrol 4)
	Lte 1 J. F. Drijfhout van Hooff (patrols 5-7)
	Lte 1 KMR OV J. Smith (patrols 8-9)
K-XV	Lte 1 C. W. Th. Baron van Boetzelaer (patrols 1-11)
K-XVI	Lte 1 L. J. Jarman (lost on first patrol)
K-XVII	Lte 1 H. G. Bessenon (lost on first patrol)
K-XVIII	Lte 1 C. A. J. van Well Groeneveld (1 patrol, scuttled, Groeneveld killed at Surabaya)
O-16	Lte 1 A. J. Bouwmeister (lost on first patrol)
O-19	Lte F. J. A. Knoops (patrol 1)
	Lte 1 KMR H. F. Bach Kolleg (patrols 2-5)
	Lte 1 A. van Kamenbeek (patrols 6-7)
	Lte 1 J. F. Drijfhout van Hooff (patrols 8-10)
O-20	Lte 1 P. G. J. Soippe (lost on first patrol)
O-21	Lte 1 J. F. van Dulm (patrols 1-3)
	Lte 1 P. J. Krocaco (patrols 4-5)
O-23	Lte 1 A. M. Valkenburg (patrols 1-7)
O-24	Lte 1 W. J. de Vries (patrols 1-10)
	Lte 1 P. J. S. de Jong (patrols 11-12)

ZWAARDVISCH

	Lte 1 H. A. W. Goosens (patrols 1-4)
	Lte 2 J. van Dapperen (patrol 5)

Note:	Lte 1 equivalent to Lieutenant Commander
	Lte 2 equivalent to Lieutenant

SUBMARINE DESIGN: AEROENGINEERING DIMENSIONS

by Theodore L. Gaillard, Jr.

In any high-speed successor to LOS ANGELES-class SSN's, it's clear that the submarine design community needs to pay more attention to aircraft design concepts in solving the dangerous snap-roll problem, which is not entirely dissimilar to dangerous roll-coupling effects experienced in early supersonic aircraft. And the need for computer assistance in maintaining high-speed underwater maneuvering control is obvious. Henry E. Payne, III, has drawn our attention to these concepts with a call for action in two superb articles both in this magazine (January, 1988) and (with William P. Gruner) in Naval Institute Proceedings (July, 1992). May I suggest, however, the need to go even farther both in the exploration of potential aeronautical engineering parallels and in the consideration of roles for advanced artificial intelligence computers on submarines.

If we are to have the most effective -- and cost-effective -- attack subs, we need to make use of research and development findings already available to us from the aircraft industry. Aircraft and submarines both have to manage the fluid flow of the environments in which they are immersed. Although density, sound propagation speed, and other factors may differ, air and water still possess relevant similarities as support and propulsive media. Under the circumstances, we should consider a number of additional aeronautical engineering concepts that deserve brain-storming as possible performance enhancers in the areas of submarine propulsion, hull design, and tactical maneuvering. To provide these faster, deeper diving submarines with essential C^3-I capabilities and full real-time maneuvering control under adverse combat conditions, we need to look to advanced computers for assistance in a number of monitoring and systems management areas.

Propulsion

In the area of propulsion, a 5/8"-depth boundary-layer bleed plate on the hull immediately forward of a shrouded propulsor intake might help boost propulsion efficiency by removing boundary layer turbulence and increasing the laminar flow potential of water entering the propulsive duct. At the next stage, intake (and exhaust) stator blade stages in shrouded prop

designs would both improve intake flow impingement angle and minimize tell-tale exit turbulence. Regarding water mass flow entering and exiting the propulsive duct, aircraft convergent/divergent engine nozzle design concepts should be investigated as possible optimizers of flow through the propulsor duct system. Within the power section itself, increased efficiencies might arise from possible use of propeller blades with variable-pitch, variable sweep, and automatic digitally controlled mission-adaptive wing design technology (pioneered by Boeing and NASA) for shaping foil, camber, and sweep angle as a function of operating depth, propeller diameter, and r.p.m. Furthermore, a look at aircraft engine turbine blade convection cooling passage design could, within large sub prop blades, lead to internal fluid flow carefully engineered to exit at the tips in such a way as to minimize tip vortices and cavitation -- thereby both improving propulsive efficiency and minimizing the sub's signature and consequent vulnerability to ASW detection systems.

Hull Design

Potential for such increased propulsive efficiency is only a first step, one that needs to be combined with improvements in overall hull design if potentially synergistic effects are to benefit the whole system. For example, with sub commanders already spending far less time on deck (or even at the periscope), the functions of the sail should (as Messrs. Gruner and Payne suggest in their July, 1992 Naval Institute Proceedings article) be re-evaluated. With the periscope housed directly in the hull, the sail could be entirely eliminated. Benefits would include drag reduction, higher underwater speed, roll reduction while surfaced in heavy seas, elimination of snap-roll hull-sail coupling effects, and greatly reduced vortex generation and wake.

In terms of specific hull-shaping, perhaps we ought to be exploring radical *dimpling* of the stern quadrant -- or, as on aircraft, installation of vortex generator minivanes -- to detach the boundary layer for the sake of lowered overall wake drag (golf ball concept). In designing for reduction of interference drag at all fin/hull interfaces, perhaps even a look at aircraft fuselage area rule (originally pioneered by Whitcomb at NACA in the 1950's) might be worthwhile. Transonic flight is clearly not involved, but might not there be some parallel benefits

accruing from minimized total cross sectional area at fin/hull (or sail/hull) interfaces? In water's higher density fluid flow, such potential benefits might include: lower total drag; improved boundary layer control; and reduction of the interaction effects of speed, viscosity, and trailing vortices. Then, of course, designers need to look at stealth aircraft fuselage-shaping and materials technology to minimize the hull's sonar, radar, and magnetic signatures.

Finally and more subtly, we need to consider laminar flow control at boundary layer separation points in order to reduce drag and increase the hull's speed and stealth characteristics. Easiest to implement would be the intake boundary layer bleed plate mentioned above. Far more complex and potentially more beneficial might be suction slots of the kind researched by NACA/NASA and Northrop in their Douglas WB-66D/X-21 conversion in the early 1960's; or possible adaptations of suction hole plates on the F/A-18, or now being tested on the perforated pumped wing glove fitted to the two F-16XL prototypes. Clearly, such investigations would have to proceed concurrently with development of a compliant, sonar/radar-absorbent composite outer hull sheathing (on which both we and the Soviets/Russians have already done some research) -- a sheathing in which suction slots could be machined, this same sheathing also chemically formulated to eliminate boundary-layer slot fouling by algae and barnacles. No small challenge, to be sure.

Tactical Maneuvering

Such design enhancements would obviously improve overall speed and maneuverability characteristics of a next-generation attack submarine, but for the quick (bordering on extreme) responses which may be required in combat, tactical maneuvering capabilities could be significantly increased were two major control-surface changes to be considered. First, keeping in mind snap-maneuvering air-to-air missiles, should designers not look into the possibility (after elimination of the sail) of replacing current diving planes and rudders with two cruciform sets of four control fins, each set mounted fore and aft? The mid-mounted bow diving planes would be coordinated with the all-moving vertical bow stabilizers/rudders, with four similar all-moving fins at the stern -- all capable of both tandem and independent movement. Change of plane maneuvering at high

speeds might thus be accomplished far more quickly, with more controllability and with fewer adverse side effects. Because such control surfaces could be smaller, they would in turn contribute to further drag reduction and speed enhancement.

Second, the external after-hull could incorporate spoilers, *pop-up* flap segments ringing the stern quadrant to serve as waterbrakes acting either differentially or simultaneously to contribute to change of direction and/or suddenly slower speed. Similarly, in shrouded-prop propulsion systems, aircraft engines' clam-shell thrust-reverser concept could be explored for its emergency maneuvering potential in causing enemy surface vessels, attack subs, or even torpedoes to overshoot their quarry. In addition, both the fore and aft cruciform control surfaces might be designed to split into hydro-brake systems -- as do control surfaces on many aircraft.

Computer Monitoring and Systems Management

As Payne and Gruner suggested in their recent Proceedings article, it is clear that high-speed underwater maneuvering already calls for computer assistance in current sub designs. With any next-generation attack sub, however, a computerized artificial intelligence command center (AICC) should be a prerequisite -- for additional reasons ranging from maintenance and navigation to damage control. Many aircraft (among them the F/A-18 and the prototype YF-22A) have been designed with automated, computer-controlled maintenance analysis capability -- including that of the computer system itself. Shouldn't our most advanced submarine systems have the same potential?

Furthermore, in conjunction with the more advanced sensor systems coming on line, the AICC could provide ocean-floor mapping and contour-matching navigation and avoidance capabilities similar to those in the Tomahawk cruise missile's guidance system, at the same time serving as the center of the tactical and strategic data system link with other friendly submarine, surface, air, or space combatants or sensors.

In approaching its quarry, an advanced attack sub could have the potential to shield itself from premature detection by utilizing active low-volume sonar stealth masking in the form of AI-generated matching of ambient background noise. Further enhancement of this cloak of near-invisibility could occur through AI computer-generated *white noise* masking in wave-

lengths reciprocal to those of standard tell-tale noise sources on most submarines (coolant pumps, bearing vibration, cavitation, etc.). All the while, the AICC's own active target-seeking system would be on full acquisition and homing alert, using passive sonar target/threat analysis (via sound and other radiation pattern anomalies measured against ambient background sound, magnetic field, infrared signature, et al.).

Once contact has been made with a target or with threatening ASW forces, the AICC could be put in control of the sub's advanced anti-ship, anti-aircraft, anti-satellite active countermeasure systems. As the moment of engagement approached, it would provide firing solutions for torpedoes and cruise missiles (anti-ship or land attack) and would serve as controller of any defensive RPV decoys. And should the sub itself come under attack in this process, the AICC could, through the possible use of the unique properties of organic metal (and/or other) sensors, initiate activation of semi-automated damage control systems (see my "AI: What's Our Obligation?", SPECTRUM, Spring 1988, p. 10).

It is clear that for such an AI-assisted system eventually to operate with maximum potential in all these areas, subs would need to be designed for modular substitution of subsystems incorporating normal evolutionary improvements in the spectral range and sensitivity threshold of all SSN sensors. It would also need to be able to absorb inevitable advances in basic data-bus system technologies in the areas of organic metals, lasers, and optronics.

Does it make sense, as the SEAWOLF program is being severely curtailed or even about to be canceled entirely, to consider building an attack submarine with even more advanced capabilities? Of course it does. It always will. But here's where persistent questions of national and economic policy understandably arise. We've heard them before. If we build an attack sub with such capabilities, how many can we afford? And with the apparent demise of Soviet and Warsaw Pact threats, which is our most technologically advanced potential enemy? Is a simpler CENTURION based on a less forward-looking design philosophy sufficient for our needs? On the other hand, how politically stable is Russia -- and what radical group might take over if economic reforms are not given a chance to work?

Whatever the situation, we need to design and work smarter,

not just harder. For 1990's military aircraft procurement the Defense Department, turning away from the 1960's TFX practice of awarding contracts on the basis of computer competitions and paper proposals, has returned to a competitive prototype, fly-before-you-buy, system reminiscent of the 1950's. And even the Soviets used their 6-boat titanium hulled ALFA class high-speed attack subs as a developmental tool, as they did with the ill-fated single-sub MIKE class KOMSOMOLETS prototype -- not to mention the reported BELUGA experimental alternative powerplant prototype. In this light, should we use our computer-assisted design and manufacturing capabilities to build one prototype attack sub incorporating advances outlined above, test it, and hold the supercomputer-generated production software in storage until there is a real need to produce additional numbers of such an advanced sub?

But in the meantime, with no subs to produce, what happens to General Dynamics' and Newport News' construction teams and highly specialized subcontractor supply base? What happens if there's an unexpected *short war* -- but it takes several years to build a submarine?

Clearly, we're at a watershed. Some vital policy questions need to be answered before we produce large numbers of new attack subs -- SEAWOLFs, CENTURIONs, or an advanced prototype incorporating such aeroengineering concepts as those outlined above. The issues are, therefore, ones not just of hull design, advanced aeroengineering cross-fertilization, and artificial intelligence systems management, but also ones of production base preservation and control of soaring budget deficits and a ballooning -- almost crippling -- national debt. For such fundamental, urgent, and conflicting issues of basic national and economic policy there are no easy answers -- but we, and the new Clinton administration, must somehow find an acceptable compromise.

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FT. TRUMBULL - A NAVY HIGH TECHNOLOGY SITE

by John Merrill

[Ed. Note: John Merrill is an electronics engineer emeritus of the Naval Underwater Weapons Center at New London, CT. He was NUWC program manager for the ELF system known as Project Sanguine. Following retirement in 1979 he co-authored a history of the Center, Meeting the Submarine Challenge.]

Colonial Period

In 1775 with increased military action against the colonies by the British, the Connecticut Council of Safety recommended fortifications be built for the towns of New London on the west bank of the Thames River and Groton on the east bank. At that time, New London with a population of about five thousand was the third largest town in the Connecticut Colony.

During the next two years, two earthworks type forts were constructed by relays of citizens and recruits from the countryside. The fort on the New London side was located about two miles north of the mouth of the river where it flows into the Long Island Sound. The fort site on the east side of the river on Groton Heights was opposite and just slightly to the north. This first New London fort was south of the town. Today, the fort area is surrounded by New London on both the south and west. The rocky point location for the fort rises at some places to about thirty-five feet above the river bank. In early times, the location was called Point Mamacock. Later it was sometimes referred to as Fort Neck.

It has been suggested that in 1637 the same site was the location of the first English houses in the area which later became New London. The house or houses are said to have been built at the initiative of a Captain Stoughton. In June 1637, Stoughton with one hundred twenty men from Massachusetts Bay Colony arrived at Pequot Harbor (New London) on an expedition to exterminate if possible the Pequot Indians.

The fort on the New London side of the river was a rectangle about eighty feet on a side with earthworks on the north, east and south sides and open to the west. The heavy cannon were cast in Salisbury, Connecticut about 75 miles away in the northwest corner of the colony near the New York line.

The first fort at Point Mamacock was named in December 1775 for the current colonial governor of Connecticut, Jonathan Trumbull. The fort on the high ground on the east bank in Groton was named Fort Griswold for the then deputy governor, Matthew Griswold.

Fort Trumbull was manned and in March 1778 was strengthened and repaired, while additional batteries were added. On September 6, 1781, Benedict Arnold, British brigadier general, led an expedition against Forts Trumbull and Griswold. Arnold, a native of nearby Norwich, Connecticut and former Continental Army brigadier general was well acquainted with the locale. Captain Adam Shapley, Fort Trumbull's Captain of Artillery, shot one volley, then followed orders to spike his guns. He then took his 23 men across the river to aid Fort Griswold which was also under siege. Less than a month later on October 19, the British armies surrendered at Yorktown, Virginia.

After the Revolution, Fort Trumbull continued under the aegis of Connecticut. During President Washington's second term, in 1794, Sieur de Rochefontaine, who fought with Washington's Continental Army, was appointed civilian engineer to fortify certain harbors along the coast including New London, Connecticut. Money was authorized by the 3rd Congress to upgrade the Fort. Details of garrisoning for both peace and war were established. In October 1798, the Connecticut General Assembly ceded the Fort to the United States Army. This stewardship continued until 1910.

Nineteenth Century

Starting in the 1830s, the United States undertook the building of a series of strategically located forts. The forts were to provide long term security against invasion. Collectively they were referred to as the *permanent system.*

A new Fort Trumbull was included in this new fort system. It was to be located in the area nearby the site of the 1775/77 Revolutionary fort. It was located on a hillock slightly south of the original construction. The new fort would be constructed of granite from the nearby quarries and in the Egyptian Revival style which was popular at the time. Increased land was purchased for the War Department by an Act of Congress. Further land was also ceded to the United States. By the end

of the century, the total area of the fort was about twenty acres.

Senate appropriations in the order of $400,000 were approved in 1836 for the new fort. Construction of the granite fort was begun in 1836 and completed in 1854. An original painting of the fort by Seth Eastman in the 1870-75 period was hung in the Capitol in Washington, DC.

As the century moved on, Fort Trumbull was overtaken by technological events. Coast artillery to resist invasion changed in capabilities such as range and placement. New forts and emplacements moved closer to the sea. After the turn of the century, Fort Trumbull and the adjoining real estate became available government property.

Twentieth Century

Fort Trumbull and the adjacent acreage have coves on the north and south sides of the promontory. The coves are manageable for small boats, and piers on the river can accommodate a wide range of ships. Extensive nautical use of the fort area began in 1910 with the arrival of the United States Revenue Cutter Service at Fort Trumbull.

Revenue Cutter Service ships, shore personnel and cadet corps became the primary tenant at Fort Trumbull. The following year, this use of the Fort Trumbull area was formalized with a transfer of Fort Trumbull from the War Department to the Treasury Department. In 1914, the Revenue Cutter Service's officer school at the Fort was designated as the service's academy. This location for the academy was used until 1932, when the present United States Coast Guard Academy was opened at a site also on the west bank of the Thames River in New London, about two miles further north. Overall, the Coast Guard has had a continuous presence since 1910. The kind, size and scale of the activities have varied.

World War I

After the outbreak of World War I in August 1914, Germany's first merchant steamship sinking by submarine occurred October 26, 1914, bringing attention to this form of warfare. America's attitude toward the German U-boat sinkings hardened when on May 7, 1915, the British liner LUSITANIA, on its way from New York to Liverpool, was sunk off the coast of Ireland by two torpedoes fired from the German submarine U-20. The LUSITANIA sank in twenty minutes. In the sinking,

over one thousand lives were lost including 128 United States citizens.

Concern regarding the U-boat menace and United States military preparedness led to establishing of the Naval Consulting Board in July, 1915. The Board brought together some of the country's senior inventors and engineers (including Thomas Edison) to address technology problems including antisubmarine considerations. The Board's structure and deliberations did not include the membership of either the American Physical Society (physicists) or the National Academy of Sciences.

The U-boat sinkings continued and by the end of 1916 Germany had 102 U-boats. During 1915 and 1916, unrestricted German submarine warfare by the U-boats was an off-on affair somewhat dependent upon the American diplomatic pressures and their reception by the German government and military.

The Naval Consulting Board addressed the submarine threat with a Special Problems Committee investigating submarine detection. By 1917, a research activity for the development of sound detection devices was in operation on the coast of Massachusetts east of Boston at Nahant. Industrial scientists and engineers from General Electric, American Telephone & Telegraph, and the Boston based Submarine Signal Company were engaged in the research and development efforts.

New London Area 1917

The declaration of war against Germany on April 6, 1917, generally increased the scope and scale of several activities in the area. The Navy with twenty first-line submarines instituted the United States Navy Submarine School in Groton across the river from New London at the site of the Navy's New London Coaling Station. The Coast Guard transfer to the Navy for the duration of the war increased the activity at Fort Trumbull. The Electric Boat Company[1], a submarine builder since the turn of the century, owned a subsidiary in Groton, the New London Ship and Engine Company. Diesel engines for ships and submarines had been produced at that location since 1911. Orders for submarine diesel engines for new construction for both United States and Great Britain provided further stimulus to the industrial activity in the region.

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1. Construction of submarines at the Groton location by the Electric Boat company began in 1925.

National Academy of Sciences (NAS)

A year earlier, George Ellery Hale, one of the country's leading academic scientists as spokesman for the National Academy of Sciences, offered the services of the membership to President Wilson. Until this time, the academic physicists had not been involved in the search for solutions to military technological problems. In April 1916, the President accepted the Academy's offer to help. In response the NAS set up the National Research Council made up of some NAS members and military representatives.

On January 9, 1917, Germany renewed its unrestricted submarine campaign. The following month the Navy asked the National Research Council to develop submarine detection devices. The committee addressing this effort was chaired by Robert A. Millikan, a well known physicist from the University of Chicago on duty as an Army officer. By the end of June 1917, the Navy authorized the National Research Council to start research at New London with a staff of academic professors. An initial staff of six academic scientists and Millikan met at the Mohican Hotel in New London to discuss a submarine detection device that had been recently brought from France. The academic scientists who came to the Fort Trumbull area to work occupied buildings on the cove south of the Coast Guard facilities at Fort Trumbull.

Fiscal support for the initial research and salaries at New London was from academic and professional scientific organizations. Vannevar Bush, one of the researchers, was supported for his work in New London on submarine detection equipment by a J. P. Morgan firm. Academic institutions represented included Harvard, McGill, Yale, Wesleyan, MIT, Cornell, Chicago, Rice, Columbia, and Swarthmore.

By early July 1917, Max Mason, a member of the New London research team and a mathematician from the University of Wisconsin, had conducted experiments both in the lake at Madison, Wisconsin and on a dock at New London with an underwater sound detector he invented. This detector was considered in some circles at the end of the hostilities to be the best of those available to the allied navies. Many of the researchers had come to New London from significant scientific and academic careers and after the closing of the research activity in late 1918 went on to continuing scientific achieve-

ment in several fields of science. Two would receive Nobel prizes; R. A. Millikan in 1923 and P. W. Bridgman in 1946.

President Roosevelt, as Assistant Secretary of the Navy during World War I, also had involvement with the research activities at Fort Trumbull. Early government support for the work was limited. In October 1917, Roosevelt was concerned with the transfer of funds for research on submarine detection devices. The Navy released $300,000 in support of the research. On October 12, the Navy took over the research effort; and the location was designated the Navy Experimental Station at New London.

Research and experiments at the Station included Navy aircraft planes and dirigibles. The seaplanes were located at the cove south of the Fort. Training of Navy personnel in operating the detection equipment, listeners school, was another aspect of the activities at Fort Trumbull. By November 1918, the Station included laboratories and test facilities for thirty-two professors, three submarine chasers, three yachts, a destroyer, and more than 700 enlisted men.

A destroyer, USS JOUETT (DD-41), arrived at New London on January 15, 1918 for experimentation with antisubmarine devices. The JOUETT continued experimental work at New London until June 4, 1918. The JOUETT was fitted with the most sophisticated World War I non-electric binaural listening system. The destroyer was able to track a target submarine at ranges of 500 to 2,000 yards while it was operating at speeds of 20 knots.

In 1950, in his autobiography, Millikan observed regarding the Experimental Station, "long before the war closed, the New London Station had practically absorbed the Nahant Station and become one great center of antisubmarine and other naval experimenting, all done after the beginning of 1918."

The Fort Trumbull site for the submarine detection research provided a waterside location with reasonable access to open water and proximity to the Navy's Submarine School across the river several miles to the north, while the Electric Boat Company's submarine engine subsidiary was within view on the east bank of the river in Groton.

The end of the War in November was followed by the closing of the Navy Experimental Station. However, many of the assemblage of scientists who comprised the resident, visiting

and technical managers of the research at Fort Trumbull would, during the next two decades, grow in stature and prominence at both the national and international level, some in academia and some in industry. In 1940, when the submarine threat again became more menacing, they provided the core of the leadership which returned the Fort Trumbull area to a high technology site.

A theme promulgated by Hale in engaging scientists' participation in the war effort was need for independence in the work in support of the military. A. Hunter Dupree, in his 1957 Science in the Federal Government, noted "As the war went on, more and more of the NRC's program went over to military control... less capable of initiating projects, depending increasingly on the assumption that the military knew what to ask for." The need for independence was not lost on Vannevar Bush, one of the 1917-18 researchers, in 1940 as he organized the national scientific and engineering resources to meet the German threat.

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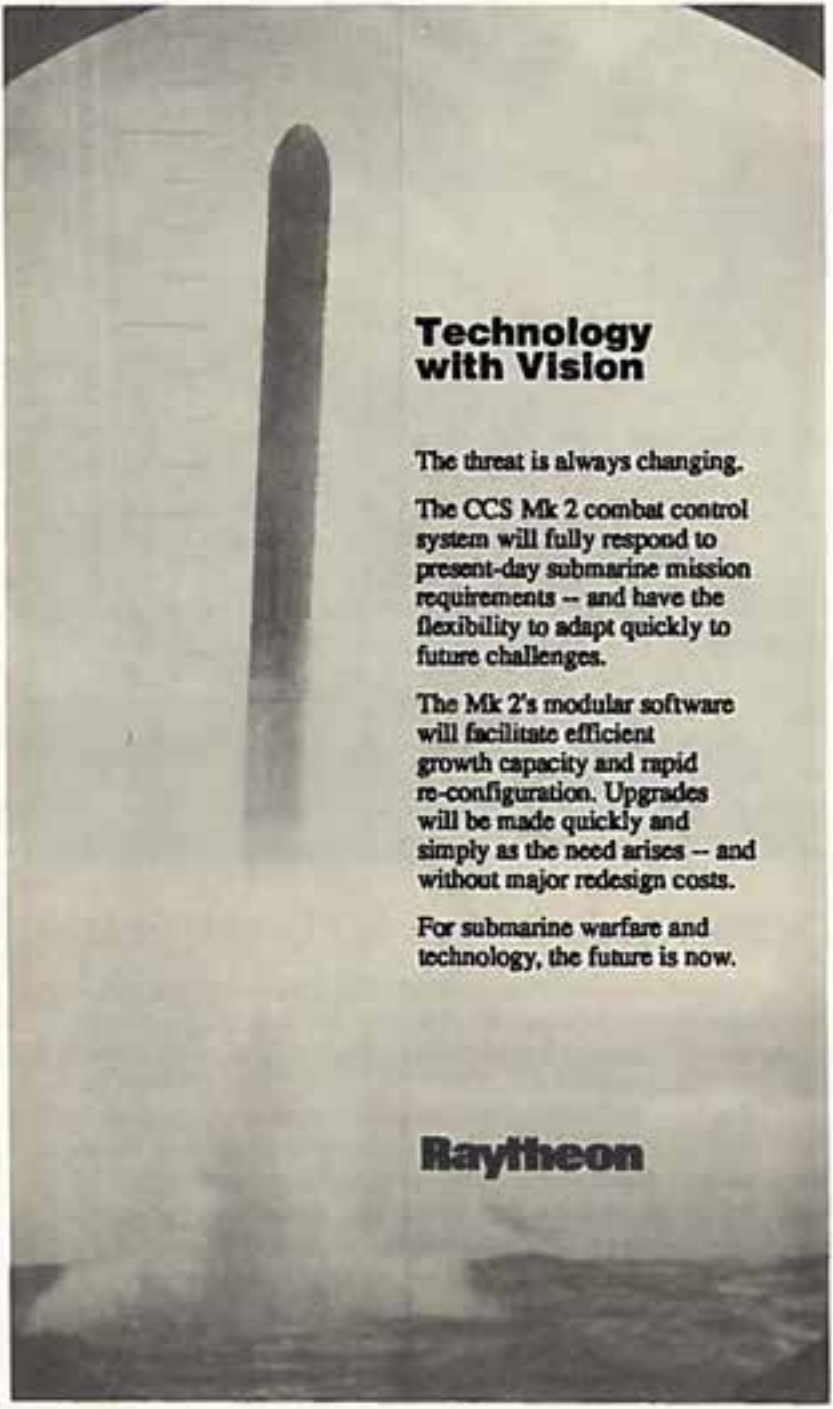
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LAUNCHING OF THE NAVAL UNDERSEA MUSEUM!

by Captain R. C. Gillette, USN(Ret.)
Executive Director
Naval Undersea Museum Foundation

Bricks and Mortar construction of the Naval Undersea Museum on the grounds of the Naval Undersea Warfare Center Division, Keyport, Washington, is essentially complete, and acquisition and design for some 18 exhibit areas has begun. The second of these exhibits is due to open in July, 1993.

The Secretary of the Navy has stated that the NUM will be the only one of its kind in the nation and will house artifacts related to all aspects of undersea exploration and utilization, including commercial and military applications. Thanks to a library and 450 seat state-of-the-art auditorium, the NUM will be more than a collection site for relics, rather, it will serve as a national repository for undersea technological advances and will eventually be a valuable resource for professionals in the field, researchers and scientists, undergraduate and graduate collegiate institutions, and even elementary through high school classes.

From March 1 to 14, the recently completed Jack Murdock Auditorium was the scene of Project Jason. This nationally publicized undersea program is sponsored by the Jason Foundation. The project permits students to interact with scientists in real time on a variety of undersea research projects including controlling remote cameras at the research site. This project was sponsored in conjunction with the Naval Undersea Warfare Center at Keyport, WA and the Jason Foundation of which Dr. Ballard of Woods Hole Institute is the Chairman. Over 8,000 students participated.

Visitors are currently getting "a little taste of what the museum will be like (through the Preview Center). We are building anticipation in people," says Ron Roehmholdt, the NUM's exhibit director. The Preview Center houses exhibits detailing the development of undersea technology and exploration. In addition, visitors can sneak a peek at a Japanese *manned torpedo*, undersea remote controlled vehicles and a half-scale mock up of a DSRV -- deep submergence rescue vehicle -- used in the film The Hunt for Red October. All of these items, as well as mines and other undersea vehicles, appear suspended in the darkness shrouding the museum's future main exhibit hall. The darkness, combined with the

sounds of whales and sonar piped into the viewing area give visitors a real *feel* of the undersea world. In addition, NUM spaces have been constructed to recreate an underwater grotto, the superstructure of a Navy ship and an ocean pier with authentic wooden pilings. The first major exhibit of the NUM, Legends of the Sea and History of the Navy and the Sea, is also part of the Preview Center. Another is the Naval Archaeology Exhibit of the Civil War engagement between the USS KEARSARGE and the CSS ALABAMA which will be on temporary loan to the NUM. Other temporary exhibits are also in the planning stage.

Some 18 exhibit areas are being designed and built around some remarkable artifacts. The NUM obtained the deep submergence vehicle TRIESTE II, a deep sea exploration and research craft, displayed outdoors on the NUM grounds. The MAKAKAI, a manned submersible built by the Navy to study the use of new materials and devices underwater will also be displayed. More recently, parts of the WW II fleet submarine SAILFISH are being acquired, including the periscope.

Currently, the Naval Undersea Museum Foundation has been attempting to piece together the role of Professor Einstein in solving World War II torpedo problems. The artifacts currently on-hand will be built into exhibits such as Nautical Archaeology, Commercial Applications of the Undersea World, History of Undersea Exploration, ASW Story, Saga of Submarines, Mines and Torpedoes, Naval Undersea History and Development of Undersea Technology. In July, 1993, the NUM plans to open its second major exhibit, the Ocean Environment.

The Naval Undersea Museum is located on Olympic Peninsula, approximately 10 miles north of Bremerton, between Silverdale and Poulsbo, in Keyport, Washington. Ferries from Seattle via Bremerton or Bainbridge Island connect with State Highway 3 and State Route 308 leading to Keyport and the NUM. The NUM is open from 10 a.m. to 4 p.m., Tuesday through Saturday. Admission is free. For more information, call (206) 396-4148.

The NUMF invites individuals and companies who have artifacts, documents, photographs, books and other appropriate undersea memorabilia to donate them and invites interested parties to become part of this exciting undertaking by becoming a sustaining member of NUMF. For more information, contact the Naval Undersea Museum Foundation, P.O. Box 408, Keyport, WA 98345-0408, or phone (206) 697-1129. ■

SUBGUIDE: THE KILO

by Norman Polmar

One of the most successful -- and controversial -- modern submarines is the Russian KILO, a diesel-electric craft designated Project 877 by the Russians. The size of the KILO program has marked its success while the recent KILO transfer to Iran has sparked international controversy.

The KILO entered production in the early 1980s, being the long-awaited successor to the WHISKEY/ROMEO medium-range attack submarines. The craft was designed by Yu.N. Kormilitsyn of the Rubin submarine design bureau specifically for transfer to Warsaw Pact navies. Reflecting this purpose, the craft was given the Russian name *Varshavyanka*, meaning "woman from Warsaw" and assigned the code name KILO by NATO. The KILO is highly touted by Academician Igor Spassky, head of the Rubin design bureau, [Ed. Note: See Conversion of a Russian Delta III Submarine in this issue.] who proudly presents gifts of a detailed scale model of the KILO to special visitors. The Rubin design bureau -- previously designated TsKB 18 -- was the principal designer of Soviet SSBNs and SSGNs; it was also responsible for the WHISKEY, QUEBEC, WHALE, FOXTROT, and TANGO designs.[1]

The KILO is the first Soviet diesel-electric submarine to have a modified tear-drop or ALBACORE (AGSS-569) hull form, although the craft's underwater speed is only some 18 knots (compared to a maximum of 33 knots achieved by the ALBACORE in one of several configurations). The Russian design has a double-hull configuration with bow-mounted diving planes. Like most Russian submarines, the KILO has an anechoic hull coating to reduce hostile sonar effectiveness.

At about 2,500 tons surfaced and 3,000 tons submerged, the KILO is larger than the earlier FOXTROT although at 239½ feet in length she is 60 feet shorter but with a beam of 32½ feet the KILO is 8 feet broader than the FOXTROT, reflecting the tear-drop hull design. The KILO has six 21-inch bow torpedo tubes, two of which are fitted for launching wire-guided torpedoes. The tapered, single-shaft stern configuration prevents the fitting of stern tubes. A total of 18 torpedoes or an equivalent load out of mines can be carried. In addition, the KILO has eight SA-N-5 surface-to-air missiles fitted in a launch position at the after end of the sail.

There is a large bow sonar array, probably the medium-

frequency sonar given the NATO code name Shark Teeth coupled with the high-frequency Mouse Roar attack sonar. The mast-mounted antennas include the Snoop Tray search radar, the Quad Loop direction finder, and Squid Head electronic surveillance measures.

The KILO's propulsion plant consists of three diesel generators producing an estimated of 5,475 brake horsepower with a single electric motor rated at 5,900 shaft horsepower. The diesel engines have a high degree of supercharging; other improvements include reducing the specific weight of the engines and notably reducing the specific fuel consumption in comparison with previous Soviet diesel-electric submarines. There also appears to be a *creeping* motor for low-speed, quiet operation. The single shaft has a six-bladed propeller. All previous Soviet diesel-electric attack submarines had two or three shafts. Only a lower rudder is fitted.

Operating depth is rated at 1,000 feet.

The first KILO was launched in September 1980 at the Lenkom shipyard at Komsomol'sk shipyard (No. 199) on the Amur River in the Far East; she was placed in service in April 1982. The continued Soviet design and construction efforts in the field of diesel-electric submarines led a senior U.S. naval intelligence officer to write:

> "The Soviets see a continuing utility of the diesel submarine. It is excellent for confined waters such as those in the Mediterranean, it makes a superb *mobile mine-field* in Soviet parlance; for purposes of forming [anti-]submarine barriers, it can be most effective; and it can serve quite successfully for delousing high-value units, reconnaissance, sealing off choke points and many traditional submarine missions where the speed and endurance of a nuclear submarine are not required. ...the Soviets clearly have a commitment to diesel boats forever."[2]

More units for Soviet service followed, but by 1986 new construction KILOs were being transferred to several other countries. Series production was additionally undertaken at the Krasnaya Sormova yard (No. 112) in Gor'kiy (now Nizhniy Novgorod) and at the United Admiralty-Sudomekh yard (No. 194) in Leningrad (now St. Petersburg). This marked the first time since the massive WHISKEY production program of the 1950s that a single submarine design was produced at three yards (the WHISKEYs were built at four Soviet shipyards).

KILO construction has averaged three submarines per year over the past decade.

However, in late 1992, Russian President Boris Yeltsen announced that submarine production -- nuclear as well as diesel -- would end at Komsomol'sk and at Gor'kiy; thus, only Sudomekh would continue diesel submarine construction. (The Severodvinsk yard currently constructs only nuclear submarines; see "Reducing the Russian Submarine Construction Base," THE SUBMARINE REVIEW, January 1993.)

At Igor Spassky's Rubin design bureau, however, an improved variant of the KILO has been developed and is now being offered for export and could ensure the viability of the Admiralty-Sudomekh yard during the current cutback in submarine construction for the Russian Navy. The new design -- reportedly designated Project 636 -- is 50 percent more fuel efficient than the basic KILO, with redesigned control facilities, additional air conditioning, and increased fresh water and compressed air stowage.

These improvements -- which are intended to make the KILO more attractive to potential Third World customers -- bring the KILO's overall length to 242 feet.

By the beginning of 1993 there were an estimated 20 KILOs in Russian service and another 13 flying foreign flags: 2 having been transferred to Algeria, 8 to India, 1 to Iran, 1 to Poland, and 1 to Romania; at least two more are under construction for Iran. The Russians are making a hard sell to several other countries in an effort to keep the KILO program alive and to help underwrite the costs of submarine construction for the Russian fleet. Probable KILO clients include Libya, Syria, and Vietnam as well as China, the last reflecting the increased Russia-China military trade in the wake of the demise of the Soviet union.

Thus the KILO attack submarine -- with more than 33 units constructed over the past 11 years -- must be considered one of the world's most successful contemporary submarine programs.

NOTES

1. Mr. Polmar visited the Rubin design bureau in November 1992 as a guest of Academician Spassky.

2. Captain Thomas A. Brooks, U.S. Navy, "(Soviet) Diesel Boats Forever," U.S. Naval Institute Proceedings (December 1980), p. 107. Rear Admiral Brooks served as Director of Naval Intelligence from 1988 to 1991.

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DRAWBACKS TO CONVENTIONAL WARHEAD SUBMARINE LAUNCHED BALLISTIC MISSILES

by Richard D. Lanning, Jr.

The article, We Need Conventional Warhead Submarine Launched Ballistic Missiles, by CAPT F. Mark Conway, III, USN(Ret.) which appeared in the October 1992 issue of THE SUBMARINE REVIEW puts forth an interesting hypothesis that conventional warhead submarine launched ballistic missiles (CSLBM) can be used to deter terrorist threats. While there is no question that the proliferation of high technology weaponry throughout the Third World poses a significant threat to U.S. interests and security, it is questionable what impact the employment of CSLBMs would have on this threat.

This whole hypothesis is based on the assumption that one is dealing with a rational opponent. This has been the fundamental basis of our nuclear deterrence strategy and, as history has shown, it has worked. However, when dealing with terrorists or a terrorist nation we are no longer dealing with a rational opponent. As Saddam Hussein clearly showed the world, he had no regard for his people or the infrastructure of his nation. Had we rained down upon him ballistic missiles with conventional warheads it is unlikely his actions would have been any different.

It was stated that sea and air launched cruise missiles provide reasonable effectiveness against some types of Third World and terrorist threats. The author did not elaborate as to what threats cruise missiles are and are not effective against. The drawbacks to such weapons, however, were indicated. These drawbacks included the difficulties in obtaining permission to overfly adjacent nations, difficulty in mapping target approach routes, masking of targets by adverse weather conditions, the potential for shootdown by point defense systems in the target area and lastly range limitations. Each of these drawbacks needs to be addressed further.

Examining the nations that currently pose a potential threat to the U.S. one will see that most have access to the sea. Such sea access provides a convenient avenue to the interior of these nations through which one can guide a cruise missile attack. For those nations without access to the sea an argument for CSLBMs can be made. Still, considering the great strides the

world community has made; receiving overflight permission may no longer be as difficult to obtain as in the past, especially when dealing with terrorists. Since ballistic missiles do not fall straight down it is questionable whether every conceivable target can be attacked by a CSLBM without it passing through the airspace of another nation at some point in its trajectory.

The Gulf War clearly showed the strengths and weaknesses of our cruise missiles especially in target mapping capabilities. The lessons learned from that conflict will undoubtedly result in a much improved cruise missile weapon system. A cruise missile, while limited in its capabilities, is still far more flexible in its ability to attack moving targets than a CSLBM would be.

It is unclear how weather masking would hamper a cruise missile attack any more than a CSLBM launch. Before either system can be used the ultimate objective must be positively identified. Once identified either system could be sent on its way. The cruise missile can compensate for wind and other weather effects along its flight path. How it identifies its target during the terminal phase could be affected by weather though a stationary object would not necessarily need to be identified optically or thermally but only geographically fixed by means of a Global Positioning System fix. A CSLBM, upon reentry, simply follows a ballistic trajectory which could be adversely affected by weather. Carrying only a conventional warhead makes accuracy extremely important for a CSLBM.

Certainly a CSLBM is almost invincible to a point defense system. Still, cruise missiles do not provide a very big target cross section. Night attacks, multiple simultaneous attacks, terminal area evasive maneuvers and the incorporation of stealth technology could overwhelm any point defense system currently in use.

Regarding range there are really no targets not within reach of our cruise missiles. Given our air and sea delivery capabilities it is simply a matter of getting them close enough initially. CSLBMs have a unique problem, that of minimum range. A CSLBM equipped submarine would be forced to maintain a certain distance from all potential targets unless elaborate lofting, depressed trajectory or fuel management options are incorporated into the missile design. Such options would be costly and increase the complexity of the missile system. It would effectively prevent the submarine from being employed

in other direct support roles.

While the CSLBM offers the advantage of eliminating the need to introduce U.S. forces, this is somewhat short sighted. Every major conflict that the U.S. has been involved in has required the introduction of U.S. forces. Conflicts are ultimately won on the land. Merely dropping CSLBMs onto an adversary may make their life difficult but it is unlikely to eliminate the problem. As our air strike on Libya and war with Saddam Hussein proved, it is difficult to target individuals. A primary role, implied by the article, for the CSLBM.

Should Trident submarines have to be retired because of arms control agreements or force reductions every effort should be made to find alternative uses for these platforms. The idea of converting them to support Navy Seals and other special operations has great merit. Of all the potential roles our submarines can fill this would have the greatest deterrence effect on potential terrorists. Using a Trident submarine as a CSLBM carrier does not appear to be a prudent use of these sophisticated war machines. It was postulated that only two Trident submarines would be required. It was further implied that the current Trident missiles would be utilized to carry approximately three maximum payload high explosive conventional warheads per missile. Thus two Trident submarines would carry 48 missiles that could only target a maximum of 144 soft targets. The cost to benefit ratio appears to be very excessive when compared to alternative means of delivering the same destructive firepower.

The greatest concern over such a concept is the potential for mistaking a CSLBM launch as a nuclear SLBM launch. The great advantage to the CSLBM is the speed by which it can arrive on target. The author correctly suggests that prior to any CSLBM launch pre-launch notification procedures should be used to notify other nuclear capable nations of the impending launch. Such notification will significantly delay a launch as one waits for receipt confirmation of the launch notification. The risk that an adversary may be tipped off also increases.

Even with the pre-launch notification the risks of misinterpreting the launch are great. Questions will immediately be raised as to whether we are telling the truth or merely attempting to deceive the recipients of the pre-launch notification. The author is only partially correct in stating that the ICBM/SLBM

detection capabilities of the major nuclear powers are capable of early confirmation that the trajectory of a CSLBM is not a nuclear or conventional threat. This is only true if the trajectory is clearly away from their respective territories. Unfortunately, many CSLBM trajectories will have to pass over or near other nations enroute to their particular target. In these cases early confirmation is not possible. It is certainly not possible to determine if the detected missile is a nuclear or conventional threat until after it detonates since the CSLBM uses the same Trident missile as our nuclear warheads. Considering the tragic misidentification of the Korean Airlines flight 007 by the Soviets and the similar misidentification of the Iranian Airbus by the USS VINCENNES the consequences of misidentifying or misinterpreting a CSLBM launch are simply too great to risk.

There is very little added value to the use of CSLBMs over what our current cruise missile capabilities can provide us. What little value that is added costs us the flexibility of a very valuable submarine asset, is extremely expensive and runs the risk of being misinterpreted by other nations. The premise that such a system could provide an overwhelming credible deterrent to terrorist operations cannot be supported by current experience.

■

NAVAL SUBMARINE LEAGUE

REUNIONS

USS JOHN C. CALHOUN (SSBN-630) - Deactivation - Scheduled to Deact on 3 July 1993, at Port Everglades, Florida -- the first deactivation for a nuclear submarine in a civilian port. Activities are planned to support the ceremony from 1-5 July, and include a boating regatta, picnics, parties, golf tournaments, ship tours and other special events for veterans and other visitors. Participation by all former crew members is invited. Contact should be made no later than 15 May to receive details of schedule and accommodations information. Contact:

Veterans Affairs Chairperson, Dianne (Bunny) Stellmacher
1970 NE 158th St.
North Miami Beach, FL 33162
(305) 940-7071

USS DANIEL BOONE (SSBN-629) - Deactivation - July 1993, Charleston, SC Contact:

Jack Burdick
3594 Normount Road
Oceanside, CA 92056
(619) 941-6798

USS CASIMIR PULASKI (SSBN-633) - Deactivation - 23 July '93, Charleston, SC. Contact:

Ensign William Smith, USN
(803) 743-6643

USS DOGFISH (SS-350) - Reunion - Sept 21-25, '93 - Colorado Springs, CO. Contact:

Ken Andrew
6765 Prince Drive
Colorado Springs, CO 80918-1052
(719) 598-5544

USS THOMAS JEFFERSON (SSBN-618) - Reunion - Sept, '93 - Groton, CT Contact:

Paul Wm. Orstad
30 Surrey Lane
Norwich, CT 06360-6541
(203) 889-4750 (h)
(203) 433-8941 (w)

Bill Hunter
4 Brown Crossing
Gales Ferry, CT 06335
(203) 464-6940 (h)

USS ROBERT E. LEE (SSBN-601) - Reunion - 22-23 Oct, '93 - Orlando, FL Contact:

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

USS GREENLING (SSN-614) - Inactivation - 1st week in August - Groton, CT. Also wish to contact former crew member of SS-213 to attend. Contact:

Submarine Squadron Two
Greenling Coordinator
Groton, CT 06349-5100
(203) 440-3242/3316

SubRegatta 93

The second annual all submarine model contest will be held at the Naval Submarine Base, Groton, CT on July 31 and August 1, 1993. The weekend activities include surface and submerged navigation events, a static display of submarine models, two monster raffles, vendors, and a Saturday lecture and demonstration series. Here is your opportunity to meet and talk with America's top r/c and static submarine modelers. For SubRegatta 93 registration forms and area information package contact:

The Subcommittee
C/O Jerry Pavano
17 Laurel Street
Manchester, CT 06040

or call: David Merriman
1-804-468-4687

NAVAL SUBMARINE LEAGUE
HONOR ROLL

BENEFACTORS FOR MORE THAN TEN YEARS

1. AMERICAN SYSTEMS CORPORATION
2. ARGOSYSTEMS, INC.
3. BOOZ-ALLEN & HAMILTON, INC.

BENEFACTORS FOR MORE THAN FIVE YEARS

1. ALLIANT TECHSYSTEMS INC.
2. ALLIED-SIGNAL AEROSPACE COMPANY
3. ANALYSIS & TECHNOLOGY, INC.
4. APPLIED MATHEMATICS
5. AT&T
6. ATLANTIC RESEARCH CORPORATION, DEFENSE SYSTEMS DIV.
7. BABCOCK AND WILCOX COMPANY
8. BATTELLE MEMORIAL INSTITUTE
9. BENDIX OCEANICS INC.
10. BIRD-JOHNSON COMPANY
11. CAE-LINK CORPORATION
12. COMPUTER SCIENCES CORPORATION
13. DATATAPE, INC.
14. EDO CORPORATION
15. EG&G SEALOL ENGINEERED PRODUCTS DIVISION
16. EG&G, WASHINGTON ANALYTICAL SERVICES CENTER, INC.
17. ELIZABETH S. HOOPER FOUNDATION
18. GE AEROSPACE
19. GNB INDUSTRIAL BATTERY COMPANY
20. GTE GOVERNMENT SYSTEMS CORPORATION
21. GENERAL DYNAMICS/ELECTRIC BOAT DIVISION
22. GENERAL ELECTRIC MARINE & DEFENSE PSO
23. GENERAL ELECTRIC OCEAN & RADAR SYSTEMS DIVISION
24. GLOBAL ASSOCIATES, LTD.
25. HAZELTINE CORPORATION
26. HUGHES AIRCRAFT COMPANY
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28. KPMG PEAT MARWICK
29. KOLLMORGEN CORPORATION, E-O DIVISION
30. LIBRASCOPE CORPORATION
31. LOCKHEED CORPORATION
32. LOCKHEED SANDERS INC. (formerly Sanders Associates, Inc.)
33. LORAL CONTROL SYSTEMS
34. LORAL DEFENSE SYSTEMS - AKRON
35. MARTIN MARIETTA AERO & NAVAL SYSTEMS
36. NEWPORT NEWS SHIPBUILDING
37. NOISE CANCELLATION TECHNOLOGIES, INC.
38. PRC, INC. (formerly Advanced Technology)
39. PACIFIC FLEET SUBMARINE MEMORIAL ASSOCIATION
40. PLANNING SYSTEMS INCORPORATED
41. PRESEARCH INCORPORATED
42. PURVIS SYSTEMS, INC.

43. RAYTHEON COMPANY, SUBMARINE SIGNAL DIVISION
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46. SCIENTIFIC ATLANTA, GOVERNMENT PRODUCTS DIVISION
47. SEAKAY MANAGEMENT CORPORATION
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51. STONE AND WEBSTER ENGINEERING CORPORATION
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53. SYSTEMS PLANNING & ANALYSIS, INC.
54. TASC, THE ANALYTIC SCIENCES CORPORATION
55. TECHNAUTICS CORPORATION (formerly Argo-Tech)
56. TITAN SYSTEMS, INC.
57. TREADWELL CORPORATION
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59. VITRO CORPORATION
60. WESTINGHOUSE ELECTRIC CORPORATION

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Sargent Controls (Donation)

FIFTY YEARS AGO, THE ESCAPE OF THE CASABIANCA

[Translator's Note: As a loyal submariner and a member of the largest submarine family who are members of the Naval Submarine League (along with brother, CAPT Hank Bress, and son, LTjg Mike Bress), I am pleased to forward to you the enclosed article which I translated from the 28 October 1992 issue of the leading French newspaper, Le Figaro.

During a business trip in Europe last October, I noticed this most interesting article on the fiftieth anniversary of a French submarine's escape from the Germans just before the French Navy scuttled its fleet in Toulon. Since I am certified Naval Interpreter of French, I decided that I would translate the article into English, type it, and submit it to the Naval Submarine League.

I elected to translate it exactly as it is written, namely in the present tense. It comes across somewhat awkwardly in the present, but appears to retain a bit of suspense.

As an historical note, the CASABIANCA was named after a French ship of the line which was anchored in the harbor of Aboukir in 1798 and was surprised by an attack from English ships commanded by Admiral Lord Nelson. It survived the attack but lost its Corsican captain. The captain also lost his son who was a twelve year old apprentice seaman, embarked in a sister ship called the ORIENT, and refused to abandon the burning ORIENT without his dead father's permission to do so. During World War II, CASABIANCA participated in the liberation of Corsica which had been occupied by 80,000 Italian soldiers and two divisions of the Afrika Korps.]

Allyn V. Bress
Captain, U.S. Navy (Retired)

Tomorrow at Toulon Admiral Bodart will unveil a plaque commemorating the historic saga of CASABIANCA and her crew.

Toulon, 27 November 1942, 0500. Three weeks earlier, the news of the Anglo-American landing in North Africa had exploded like a bomb! As soon as the immense Allied convoy was recognized at Gibraltar, security measures were taken. Emergency condition "danger" was adopted. The crews are kept

aboard their ships. The Strasbourg battle group is ready to get underway with boilers lit.

On 19 November, the Germans give the order to disband the French army of the German/French armistice. They no longer want "to trust these French dogs." Their planes have taken over all the ex-free zone air fields. Those planes based at Hyères are within five minutes of the harbor at Toulon, their bombs at the ready, with magnetic mines ready quickly to block the channels.

The Wermacht deploys itself along the entire Mediterranean coast. The ships of the Strasbourg battle group are forced to lower their boiler fires. It will take five hours for them to get underway.

The submarine flotilla, on the other hand, is prepared to escape from their trap in the greatest of secrecy, and resume a combatant role. Everything had been checked: watertight integrity for diving, surface full power speed tests, which, with 20.5 knot capability, are most satisfactory. Since demagnetizing coils had been installed, the submersibles are "vaccinated" against magnetic mines up to a distance of 20 meters. Small arms, rapid fire 10 mm guns, machine guns, are loaded aboard. All fuel tanks are topped off.

On board the submarine CASABIANCA, the sentries are patrolling. The crew -- 85 officers and men -- are in a state of watchfulness. On 27 November at 0500, the whistle sounds: "Alert!" The machine guns crackle from the arsenal of Mourillon and toward the Bazeilles gate, two blocks from the piers. The Germans were moving quickly. The officers' building, 30 meters from the submarine, is already surrounded.

Without wasting any time, the captain L'Herminier, "pacha" of the CASABIANCA orders "let go all lines!" Then, "ahead four."

At the same moment, the VENUS, a submarine of 600 tons, faster at achieving ordered speed, takes a position in the lead. The CASABIANCA comes to all stop immediately in order to permit the ship in the lead to cut the anti-submarine cable, and then follows the VENUS half a meter on her stern. The SS units, unfamiliar with naval procedures, had not thought of manning the two breakwaters that close the port of Mourillon.

The two submarines move quickly through the opening at 12 knots. The surface ships appear to be dead. About twenty aircraft fly overhead, lights on as though they were in training.

But it is a trick. The aircraft turn off their lights and launch blazing rockets. The harbor becomes bright like a silver platter.

A bomber aircraft dives on the CASABIANCA. The Executive Officer, Henri Bellet, revolver in hand, boards the tug whose captain refuses to open the harbor net. The German aircraft, at the end of its dive, releases a bomb which explodes less than 10 meters astern of the CASABIANCA. The submarine weaves its way ahead while scraping the buoy. The magnetic mines, attached to their parachutes, rain down like little beads. The shower gushes forth close aboard, ahead to port. We must dive. All ahead six: the klaxon sounds. The venting air whistles and the CASABIANCA settles into the sea. After the bombs, the mines leap under the keel. The explosions violently shake the submarine and its crew.

Meeting with the British

The day wears on toward 0700. The CASABIANCA proceeds ahead in a southerly direction at a depth of 40 meters. At 0800, the ship shifts course to the north. Sadness grips the heart of the submariners. Sinisterly, one hears the reverberations of the explosions, transmitted by the sea, of the fleet which did not have the time to light off their boilers, and prefers to scuttle itself than to surrender its ships. A great cloud of black smoke obscures the sky over Toulon: the navy officers have set fire to the oil storage tanks.

On 30 November at 0700, the CASABIANCA surfaces, coming face to face with a British corvette which readys its forward deck gun. Two French sailors raise the French tricolor. The British, ready to fire, are at a distance of 300 meters from the CASABIANCA. A conversation ensues by signal lights:

- "What is your British liaison officer doing?"
- "We do not have one."
- "Why?"
- "We are arriving from Toulon."

The British captain throws his cap in the air in an expression of joy. The crew gives a cheer.

At 0945, the French submarine moored in berth number 9 at the north jetty in the port of Algiers.

The CASABIANCA enters the war against the Axis powers, and into legend.

■

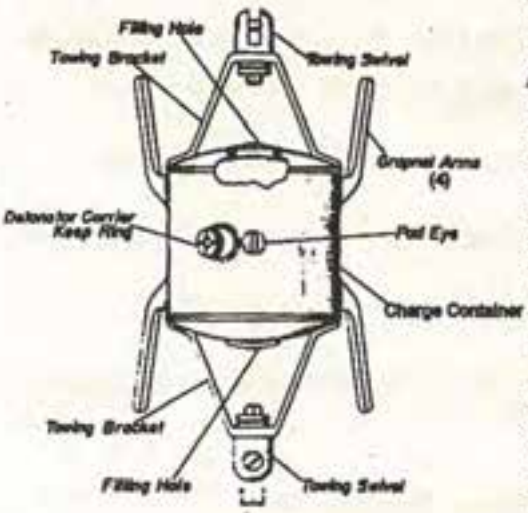
GRAPPLING FOR U.S. SUBMARINES

by CAPT W. J. Ruhe, USN(Ret.)

The personnel in several U.S. submarines during World War II were certain that they were being grappled for by Japanese anti-submarine surface vessels. In some cases, the submariners were equally certain that their submarine had been caught by a grapnel.

In the case of the CREVALLE, which had been bottomed, she was literally towed a short distance into deeper water -- the changing depth on the depth gauge attesting to this. (Remember that a submarine at neutral buoyancy -- and that's the condition for a bottomed submarine -- is just about weightless and can be easily towed by a small ASW warship.)

Submariners weren't imagining this sort of thing. The Japanese did have an explosive grapnel which was labeled the "Mine Type JD" and was used mainly to destroy snagged enemy mines. But it could have been used against a submarine -- the mine exploding against the side of a submarine which had been grabbed.



MINE TYPE JD

The Type JD grapnel-mine, labeled *the explosive hook* is shown here; reprinted from a Navy Department Bureau of Ordnance pamphlet on Japanese Underwater Ordnance, dated 20 April 1945. In part, the Type JD mine is described: "When used as a grapnel, a sweep wire serves as the towing cable. The mine, with a charge of up to 19 lbs of Type 88 granular explosive, has a towing bracket on each end. It is electrically connected to the towing ship by a rubber covered cable. When an object is snared, an observer on the towing boat fires the charge electrically. Or, it fires automatically when an additional tension of 55 lbs is put on the mine." ■

SUBMARINE BIBLIOGRAPHY
Part II

Editor's Note: This part of the Bibliography lists those books reviewed in THE SUBMARINE REVIEW through 1986 and that were not included in Part I of the Bibliography in the last issue. This list also includes those that have been suggested by several readers. Dan Curran of Adamsville, RI and Col. Richard Morain of Millersville, MD both sent in lists that are very helpful. Many others have suggested their own favorites.

These listings include books published outside of the United States, but again, only those in English -- at least for the present. The novel is another category of submarine books which are not yet included in THE SUBMARINE REVIEW Bibliography. We do hope to make that the subject of a later installment, but we need help -- please send in your favorites.

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ON PATROL FIFTY YEARS AGO

by Dr. Gary Weir

WAHOO's third war patrol was LCDR 'Mush' Morton's first in command of the boat. He was commissioned in 1930 and entered submarines in 1933. He commanded the R-5 in New London until April of 1942. On December 31, 1942 LCDR Dudley W. Morton relieved LCDR M. G. Kennedy onboard WAHOO in Brisbane, Australia. For this patrol the ship was credited with 31,890 tons of enemy shipping. LCDR Morton was awarded the first of four Navy Crosses and the Army's Distinguished Service Cross. The ship received the Presidential Unit Citation.

USS WAHOO -- Report of Third War Patrol
Period from January 16, 1943 to February 7, 1943

NARRATIVE: January 16th

0900 L Departed Brisbane, Queensland, Australia.

January 21st

1820 K Dived on SD radar contact. Upon reaching 70 feet stern planes jammed on hard rise causing us to broach at 30° up angle. Fortunately SD contact was false, the pip being an internal disturbance.

(All times K) January 24th

0330 Dived two and a half miles north of Kairiru Island and proceeded around western end to investigate Victoria Bay. Went around southwestern tip of Kairiru Island to observe the strait between this and Mushu Island, a foul weather anchorage.

At 1318 an object was sighted in the bight of Mushu Island, about five miles farther into the harbor, much resembling the bridge-structure of a ship. Commenced approach at three knots. As the range closed the aspect of the target changed from that of a tender with several small ships alongside to that of a destroyer with RO class submarines nested, the latter identified by the canvas hatch hoods and awnings shown in ONI 14. The meager observations permissible were insufficient for positive identification.

It was our intention to fire high speed shots from

about 3000 yards, which would permit us to remain in deep water and facilitate an exit. However, on the next observation, when the generated range was 3750, our target, a PUBUKI class destroyer was underway. Angle on the bow 10 port, range 3100. Nothing else was in sight. Maneuvered for a stern tube shot, but on next observation target had zigged left giving us a bow tube set up.

At 1441 fired spread of three torpedoes on 110° starboard track, range 1800 yards, using target speed fifteen since there had been insufficient time to determine speed by tracking. Observed torpedoes going aft as sound indicated 18 knots, so fired another fish with enemy speed 20.

Destroyer avoided by turning away, then circled to the right and headed for us. Watched him come and kept bow pointed at him. Delayed firing our fifth torpedo until the destroyer had closed to about 1200 yards, angle on the bow 10° starboard. Then to insure maximum likelihood of hitting with our last torpedo in the forward tubes, withheld fire until range was about 800 yards. This last one, fired at 1449, clipped him amidships in twenty-five seconds and broke his back. The explosion was terrific!

The topside was covered with Japs on turret tops and in the rigging. Over 100 members of the crew must have been acting as look-outs.

We took several pictures, and as her bow was settling fast we went to 150 feet and commenced the nine mile trip out of Wewak. Heard her boilers go in between the noise of continuous shelling from somewhere plus a couple of aerial bombs. They were evidently trying to make us lie on the bottom until their patrol boats could return.

No difficulty was experienced in piloting without observation out of Wewak using sound bearings of beach noises of reefs and beach-heads. With the aid of a one-knot set we surfaced at 1930 well clear of Kairiru and Valif Islands. Cleared area on four engines for 30 minutes on course 000°T. Huge fires were visible in Wewak Harbor. We wondered if they had purposely created these fires to silhouette us in case we tried to escape out of the harbor.

Slowed to one engine speed (80-90) at 2000. 2230 As the enemy convoy route from Palau to Wewak was known to pass between Wuvulu and Aua Islands commenced search by criss-crossing base course at 30° on two hour legs. 2345 Sent report of Wewak engagement to COMTASK FORCE FORTY-TWO.

(All times K) January 25th

0530 Passed between Aua and Wuvulu Islands. Changed base course for Palau and went to two engine speed (80-90) continuing the criss-cross search for enemy shipping. 1000 In accordance with Operation Order, shifted from TASK FORCE FORTY-TWO to SUBPACFOR without dispatch. Commenced guarding SUBPAC radio schedules. 1645 Dived for a half-hour and held various drills. While submerged passed under the equator.

(All times K) January 26th

0757 Sighted smoke on the horizon, swung ship towards and commenced surface tracking. Adjusted course and speed to get ahead of the enemy. After three quarters of an hour and when we had obtained a favorable position with masts of two ships just coming over the horizon, dived and commenced submerged approach.

The two freighters were tracked at 10 knots on a steady course of 095°T., which was somewhat puzzling as it led neither to nor from a known port. During the approach determined that the best firing position would be 1300 yards on beam of leading ship. This would permit firing with about 15° right gyro angle on approximately a 105° track on the leading ship, and with about 30° left gyro angle and 60° track on the second ship 1000 yards astern in column. However at 1030 found we were too close to the track for this two ship shot so reversed course to the right and obtained an identical set-up for a stern tube shot. At 1041 fired two torpedoes at the leading ship and seventeen seconds later two at the second freighter. The first two torpedoes hit their points of aim in bow and stern. There was insufficient time allowed for the gyro setting angle indicator and regulator to catch up with the new set-up cranked into the TDC for the third

shot. This torpedo passed ahead of the second target. The fourth torpedo hit him.

Swung left to bring bow tubes to bear in case these ships did not sink. At 1045 took sweep around to keep the set-up at hand and observed three ships close about us. Our first target was listed badly to starboard and sinking by the stern, our second was heading directly for us, but at slow speed, and the third was a huge transport which had evidently been beyond and behind our second target.

At 1047 when the transport presented a 90° starboard angle on the bow at 1800 yards range fired spread of three torpedoes from forward tubes. The second and third torpedoes hit and stopped him. We then turned our attention to the second target which was last observed heading for us. He was still coming, yawing somewhat, and quite close. Fired two bow torpedoes down his throat to stop him, and as a defensive move. The second torpedo hit, but he kept coming and forced us to turn hard left, duck and go ahead at full speed to avoid.

There followed so many explosions that it was impossible to tell just what was taking place. Eight minutes later came back to periscope depth, after reaching 80 feet, to observe that our first target had sunk, our second target still going, but slowly and with evident steering trouble, and the transport stopped but still afloat. Headed for transport and maneuvered for a killer shot. At 1133 fired a bow torpedo at 1000 yards range, 85° port track, target stopped. The torpedo wake passed directly under the middle of the ship, but the torpedo failed to explode. The transport was firing continuously at the periscope and torpedo wake with deck guns and rifles. At 1135 fired a second torpedo with the same set-up except that the transport had moved ahead a little and turned towards presenting a 65° angle on the bow. The torpedo wake headed right for his stack. The explosion blew her midships section higher than a kite. Troops commenced jumping over the side like ants off a hot plate. Her stern went up and she headed for the bottom. Took several pictures.

At 1136 swung ship and headed for the cripple, our

second target, which was now going away on course 085°. Tracked her at six knots, but could not close her as our battery was getting low.

At 1155 sighted tops of a fourth ship to the right of the cripple. Her thick masts in line had the appearance of a light cruiser's tops. Kept heading for these ships hoping that the last one sighted would attempt to pick up survivors of the transport. When the range was about 10,000 yards, however, she turned right and joined the cripple, her masts, bridge structure and engines aft identifying her as a tanker. Decided to let these two ships get over the horizon while we surfaced to charge batteries. Then set course 085° at flank speed to overtake the cripple and the tanker.

At 1530 sighted smoke of the fleeing ships a point on the port bow. Changed course to intercept. Closed until the mast tops of both ships were in sight and tracked them on course 350°. They had changed course about 90° to the left apparently to give us the slip. Maneuvered to get ahead undetected, but kept mast heads in sight continuously by utilizing No. 1 periscope and locating look-out on top of periscope shears. At 1721, one half hour before sunset, with the two ship's masts in line, dived and commenced submerged approach. Target zigs necessitated very high submerged speeds to close the range. Someone said the pitometer log indicated as much as 10 knots. Decided to attack tanker first, if opportunity permitted, as she was yet undamaged. At 1829, when it was too dark to take a periscope range, fired a spread of three bow torpedoes with generated range 2300 yards, on a 110° port track. One good hit was observed and heard one minute, twenty-two seconds after firing. This apparently stopped him. Started swing for stern tube shot on the freighter but he had turned away.

Surfaced twelve minutes after firing and went after the freighter. Was surprised to see the tanker we had just hit still going and on the freighter's quarter. We were most fortunate to have a dark night with moonrise not until 2132, and to have targets that persisted in staying together. Our only handicap was having only four torpedoes left, and those in the stern tubes.

Made numerous approaches on the tanker first, as

he was not firing at us. Even attempted backing in at full speed, but the ship would not answer her rudder quickly enough. After an hour and a half was able to diagnose their tactics. Closed in on tanker from directly astern, when they zigged to the right we held our course and speed. When they zigged back to the left we were on parallel course at about 2000 yards range. Converged a little on the tankers port beam, then twisted left with full rudder and power. He thus gave us a stern tube shot, range 1850 yards on a 90° port track. At 2025 fired two torpedoes at tanker; the second hitting him just abaft of his midships breaking his back. He went down in the middle almost instantly.

Immediately after firing changed course to head for the freighter and went ahead full. Passed the tanker at 1250 yards by SJ radar, at which time he occupies full field in 7x50 binoculars. This fixed his length at about 500 feet. Only the bow section was afloat and its mast canted over when we left him astern.

At 2036, eleven minutes after firing on the tanker, commenced approach on our last target. It was quite evident that this freighter had a good crew aboard. They did not miss an opportunity to upset our approach by zigs, and kept up incessant gunfire to keep us away. Much of this firing was at random, but at 2043 they got our range, placed a shell directly in front of us which ricocheted over our heads and forced us to dive.

We tracked the freighter by sound until the noise of shell splashes let up then surfaced at 2058, fifteen minutes after diving, and went after him. Two minutes later a large search-light commenced sweeping sharp on our port bow, its rays seemingly just clearing our periscope shears. Assumed this was from a man-of-war and that the freighter would close it for protection. Our attack obviously had to be completed in a hurry. Headed for the search-light beam and was most fortunate to have the freighter follow suit. At 2110 when the range was 2900 yards by radar, twisted to the left for a straight stern shot, stopped and steadied. Three minutes later with angle on the bow 135° port by radar tracking, fired our last two torpedoes without

spread. They both hit, the explosions even jarring us on the bridge.

As the belated escort was now coming over the horizon, silhouetting the freighter in her search-light, we headed away to the east and then five minutes later to the north. Fifteen minutes after firing the freighter sank leaving only the destroyer's search-light sweeping a clear horizon. It had required four hits from three separate attacks to sink this ship.

At 2130 set course 358° for Fais Island. At 2345 sent dispatch to COMSUBPAC concerning new route and engagement.

(All times K) January 27th

0720 Sighted smoke over the horizon, commenced tracking and changed course to intercept. At 0801 when masts of three ships were in sight, dived and continued approach. The mean course was plotted as 146° with the whole convoy zigging simultaneously thirty degrees either side of base course. At 0830 the tops and stacks of two more freighters, and those of a tanker with engines aft were in sight.

It was first our intention to intercept one of the lagging freighters which did not appear to be armed, but a zig placed the tanker closest to us. Surfaced with range about 12,000 yards and headed at full speed to cut him off. Trained gun sharp on starboard bow, then sent pointer and trainer below to standby with rest of gun crew. The convoy sighted us in about 10 minutes, commenced smoking and headed for a lone rain-squall. Only two of the larger freighters opened fire and their splashes were several thousand yards short. Their maneuver left the tanker trailing, just where we wanted him.

At 1000 when we had closed to 7500 yards, however, a single mast poked out from behind one of the smaller freighters. Almost immediately the upper works of a corvette or destroyer were in sight. Turned tail at full power to draw the escort as far as possible away from the convoy in case we were forced to dive, as this would greatly shorten the time he could remain behind to work us over.

Ordered contact report to be sent out, but could

not raise anyone.

Found that our engineers could add close to another knot to our speed when they knew we were being pursued. We actually made about 20 knots, opening the range to thirteen or fourteen thousand yards in the first twenty minutes of the chase. In fact he was smoking so profusely that we called him an "Antiquated Coal-burning Corvette." He was just lighting off more boilers evidently, for seventeen minutes later he changed our tune by boiling over the horizon, swinging left, and letting fly a broadside at estimated range of 7000 yards. There was no doubt about his identity then, especially when the salvo whistled over our heads; the splashes landing about 500 yards directly ahead. Dived and as we passed periscope depth felt gun splashes directly overhead. Went to 300 feet and received six depth charges fifteen minutes later. They sounded loud, but did no damage.

Lost sound contact at 1120. As the DD had some forty miles to catch up with his leading ships he evidently didn't stay around. We decided to catch our breath none-the-less, so stayed deep until 1400 when we surfaced and commenced running again for Fais. At 2058 sent contact report of convoy to COMSUBPAC.

(All times V-W) February 7th

0830 Arrived at Pearl.

The following paragraph from the remarks section of the Patrol Report is included as being of interest for organizational innovation and the practice of the command function:

(a) The fire control party of this ship was completely reorganized prior to and during this patrol. The Executive Officer, Lieutenant R. H. O'Kane is the co-approach officer. He made all observations through the periscope and fired all torpedoes. The Commanding Officer studies the various setups by the use of the Iswas and analyzing the T.D.C. and does the conning. A third officer assists the Commanding Officer in analyzing the problem by studying the plot and the data sheets. On the surface the Executive Officer mans the T.B.T., makes observations and does the firing; the Commanding Officer conns. ■

REVISITING WAHOO WATERS

2 January 1993

Suspending my sense of time that cold October day in '92 over stormy La Perouse Strait in northern Japan, I was mindful of the drama that unfolded in those waters an October 49 years earlier as WAHOO (SS-238) failed to evade the enemy and was lost. Skipper Mush Morton's problems that morning when he was spotted by the Japanese reminds one of the Captain Bill Ruhe tale of the perils CREVALLE endured in Marudu Bay way back when.

I migrated to Japan's northernmost shore to gather first hand details on WAHOO's loss, partly out of my own curiosity as an avid Space A buff. More importantly though, a Pennsylvania lad, Robert Logue, is among WAHOO's prisoners there in those turbulent currents where the Okhotsk and Japan seas clash.

Bob was a Fire Controlman First aboard the 238, a younger brother to George E. Logue. Enterprising George, it was, who engineered erection of the WAHOO memorial he and his Lehigh Valley chapter shipmates dedicated this past May 16. And he, too, is all set to make a run this year up to Soya Cape, there on the edge of the small Japanese village of Wakkanai where shore batteries shook up the neighborhood while hurling shells at WAHOO. Jubilant residents, it is said, watched the fireworks around 9 a.m. that finished her off.

Space A took me as far north in Japan as Misawa on Tsugaru Strait in Northern Honshu. An overnight train ride saw me in Wakkanai the morning of October 23, looking for a place to hang my hat. After two or three room inquiries I was fortunate to select the Grand Hotel. The manager spoke English. Awed by my search for WAHOO data, he directed me to the coffee shop in his hotel with instructions not to move. With that, he got on the phone and alerted, it turned out, the entire City Hall, and the press. I overheard the English word WAHOO and knew that I was onto something.

Directly the manager, Mr. Izumi, asked me to join him, giving me no time to finish my coffee. At City Hall the press was at the ready, along with Mr. Shinichi Shibata, a man who rode Japanese Repair Ship #18. His ship, along with Nippon warships, two submarines, aircraft and shore batteries sent the

spirited Morton and his warriors to the bottom. NHK TV news taped us too.

A history book I reviewed at City Hall between interviews carried the 1943 WAHOO attack story -- in Japanese. It pretty much reflected Shibata's words. Our own Ted Roscoe's book on WWII submarine operations is mentioned. The book credits Shibata's #18, two I-type submarines, Japanese Army Air Troop #38, Naval Air Troop #701 and shore batteries with participation in the attack.

Choking back tears, Mr. Shibata, owner of a print shop in town, at one and the same time felt grief over that attack, and stressed that this was one of the most exciting experiences the Japanese Defense Troops had since founding of the Japanese military. After this incident, he said, the shaken residents were glad for the relative quiet that settled over Wakkanai.

Together we toured the famous lookout tower atop Cape Soya where the call "enemy submarine" was first sounded. The repair ship sailor who himself had earlier served aboard submarines, pointed northeast out into the Strait where WAHOO went down. That puts the boat in about 20 fathoms of water, half way between the Cape and Sakhalin Island and about 12 miles off shore.

Storm, wind, cold and rain greeted us that day as Shibata reminisced over the day WAHOO was lost. Back then it had been clear, the Strait calm. And grim verification was at hand. That day at about 2 p.m., as the ships circled on station, a huge volume of oil boiled to the surface -- WAHOO's last gasp.

So ended valiant Dudley W. Morton's career as the one-submarine-wolfpack skipper, as well as the callings of young Williamsport, Pennsylvania native, Robert B. Logue and 78 others.

Martin F. Schaffer

■

RE: SUBMARINE LIAISON OFFICERS

3 February 1993

Congratulations on another fine issue of the REVIEW. The article by Captain John F. O'Connell on submarine liaison officers for carrier group staffs triggered a memory from the past that will illustrate how far things have advanced since 1950.

That was a year when the spirits of the Navy were at a low

ebb. Secretary of Defense Louis Johnson and Secretary of the Navy Matthews were determined to cut expenses to the bone, and planned to eliminate 50,000 officers from the Navy alone, if memory serves me right. Having applied to transfer from the line to Engineering Duty, on 15 June of that year, I was detached from the SEA CAT (SS-399) and ordered to the escort aircraft carrier PALAU (CVE-122) pending action on my application. Ten days later the Korean War broke out, so by the time I reported on board my new ship at Norfolk things were in a state of turmoil.

The PALAU, however, was kept in the Atlantic to train aviators and work with anti-submarine groups for the eleven months I spent aboard as Electronic Repair Officer. At that time escort carriers had a collateral billet for a Submarine Boarding Officer, the legacy of Dan Gallery's capture of the U-505 on 4 June 1944. Naturally, I inherited this position.

There was a practice boarding operation in the standard exercise book, so in due course an exercise was scheduled with one of the fleet boats out of Norfolk, whose name I have completely forgotten. Along with a party of about half a dozen men, one or two of whom may have been on a submarine previously, I climbed down into the ship's motor whaleboat and we clambered aboard the submarine, an unconverted fleet boat, that was lying-to in a placid sea. All I can recall about the exercise was stopping in the wardroom for a chat with the commanding officer and a cup of coffee, while the enlisted men socialized with the crew in the after battery. After a short visit we reboarded our whaleboat and returned victorious to the carrier. No doubt I wrote up a report and we got credit for completing the exercise. Of one thing I am sure: I did <u>not</u> get submarine pay for my brief duty on the boat!

Notes on some other subjects.

Footnote to RADM Rindskopf's "Vignette from U-Boat History." Among other things, <u>The U-Boat War in the Atlantic 1939-1945</u>, released by the British Ministry of Defence (Navy) in 1989, has this to say about the German torpedo failures: "... on 20th April (1940) Raeder appointed a special committee of investigation with officers of the U-Boat Command and representatives of the Torpedo Inspectorate... . The findings of the committee, together with the results of other enquiries, led

to the court martialling of several members of the Torpedo Experimental Command and of some officials, who between 1936 and 1939 had been in charge of torpedo development." [Underlining added for emphasis!]

A useful first-hand account of Japanese submarine operations in WWII that seems to have received little recognition: Orita, Zenji with Joseph D. Harrington. I-Boat Captain. Canoga Park, CA: Major Books, 1976. ISBN 0-89041-103-4 (paperback).

Finally, there is no excuse for the repeated misuse of the name MERRIMAC for the ship that fought the MONITOR; it was the CSS VIRGINIA, ex-USS MERRIMACK. Tsk, tsk.

Best regards,
John D. Alden
CDR, USN(Ret.)

■

SUBMARINE MUSEUMS

February 4, 1993

In his article, "Silence is Not Golden" (THE SUBMARINE REVIEW, January 1993), LCDR Michael Baumgartner neglected to mention one successful organization dedicated to educating the public about the U.S. Submarine Force: The NAUTILUS Memorial/Submarine Force Library & Museum. Located adjacent to the main gate of the Naval Submarine Base in Groton, the NAUTILUS Memorial is a federal institution and the Navy's official submarine museum. The site includes both the submarine NAUTILUS (SSN-571), now open to the public for visitation, as well as an award-winning museum. Since it opened in 1986, the NAUTILUS memorial has attracted almost 2,000,000 visitors; 1992 visitation was 285,000.

Other private, non-profit museums around the country, such as the USS BOWFIN Submarine Museum and Park in Honolulu, USS ALBACORE at the Portsmouth (NH) Submarine Memorial Association, and the numerous WWII fleet boats preserved across the nation also contribute to informing the public about the importance of submarines to the United States.

Sincerely
William Galvani
Director
NAUTILUS Memorial Submarine Force Library & Museum

■

FROM A SHIPMATE IN THE SUBMARINE D-1

1 February 1993

Greetings

I have just learned of the NSL from a former submariner and friend of mine.

I enlisted in the U.S. Navy on November 9, 1934, and was discharged as a Seaman First Class on August 16, 1938. I was stationed at the Sub Base, New London, CT, on USS HOLLAND, USS DOLPHIN (D-1) and USS PERCH (P-5).

While serving on the DOLPHIN, a popular movie was made on board, by Warner Movies Corp. "The Submarine D-1" -- starred George Brent, Pat O'Brien, Frank McHugh and Gloria Dixon. It meant a lot of extra duty for the crew; however, they gave us an outstanding party at the Elks Club in San Diego when the movie was finished.

While on PERCH, we made an interesting cruise to Dutch Harbor, Alaska. We ran into a rough storm (Willie Waw) and much of our super structure deck was destroyed. The Commanding Officer was Rear Admiral, USN C. C. Crawford, nicknamed *Turkey Neck*, I believe; an outstanding officer and gentleman.

I have a small amount of interesting photos of those days, to share if returned, of movie stars while on D-1 etc.

I am sending along $20.00 contribution.

I regret to have to tell you that I am suffering from advanced lung cancer, but I'm no quitter, and had a great career as a locomotive R.R. engineer for 35 years. Plus, later, 12 years in law enforcement. I ran some important trains. My Navy training served me well. I'm grateful.

I will welcome any communication from anyone who might remember me, and trust that I be able to respond.

I congratulate and thank you for what you are doing.

Respectfully

John Vernon (Pete) Foster
1019 S. Dogwood Drive
Harrisonburg, VA 22801-1617

■

RE: SUBMARINE COMBAT SYSTEMS

January 22, 1993

The October 1992 issue was first rate and the January 1993 looks as good or better. I have a couple of comments. First, there was a couple of printer's errors in the chart on page 37 that accompanied my January Submarine Combat Systems article. The MK 113 was installed on the SSN-594 class and all SSBNs up to Trident; 688 and 637 are transposed in the MK 117 column; and it should be the 688 class vice the 688I class in the same column.

The other comment is on John Will's excellent review of Dr. Gary Weir's Building American Submarines 1914-1940. Lesson 3 might include the comment that 40 odd S class submarines were built as result of a flawed mission requirement. These boats were practically useless in WW II because of operating range and habitability. The resulting question is very cogent to today's situation. Will we build a new class of submarines that will not be able to meet tomorrow's mission requirements?

Keep up the good work.

Very truly yours,
Daniel Curran

■

MEMBERSHIP STATUS

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Life	243	242	232
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Honorary	21	20	22
Total	4086	4058	4130

PLEASE RECRUIT 2 NEW MEMBERS FOR 1993!

BOOK REVIEW

THE U.S. NAVY IN THE 1990s: Alternatives for Action

by Dr. James L. George
Naval Institute Press, Annapolis, MD 1992
ISBN 1-55750-325-7 • ISBN 1-55750-326-5 (pbk)

reviewed by Dr. James J. Tritten
Naval Postgraduate School

The U.S. Navy in the 1990s: Alternatives for Action is a welcome contribution to the literature and should be added to the CNO's list of recommended reading for senior naval officers. The book's author, well-known on the pages of the U.S. Naval Institute Proceedings and for his work at the Center for Naval Analyses, provides the reader with hard-hitting analysis of the "disarray" in some parts of Navy program planning that he then describes in detail. This book is **not** a diatribe against the Navy from an academic lacking salt water exposure; rather it is constructive criticism by a former naval officer with plenty of hands-on Washington experience. Jim George provides us with a series of positive steps that might be taken by the Navy itself to come up with its own solutions to some of the current problems that it faces.

The U.S. Navy in the 1990s opens with an examination of the changing roles and missions that have also dominated the pages of THE SUBMARINE REVIEW for the past few years. Jim George falls into that category of analyst who believes that we should approach the questions of force structure in a decidedly top-down manner. Although the author acknowledges the budget agreements that resulted in President Bush's top-down regionally-focused National Security Strategy and the Base Force, Jim favors an examination of alternative strategies and force structures. Due to our inability to predict, the uncertainty of the future "demands flexibility and many different alternatives and approaches."

Although an unabashed supporter of the Navy as the force of choice under our emerging strategy ("there is some consensus that the Navy should continue receiving the largest slice of the budget"), Jim cautions the reader that "the influence of sea-power should not be taken out of context." Jim argues that impartial mission analysis, however, can demonstrate that "the Navy should become the dominate service in ... nuclear deter-

rence, the still important U.S.-Russian commonwealth scenario, and Third World crisis response."

In the area of nuclear deterrence, the author bemoans the general lack of concern within the Navy as a whole for things strategic, and then demonstrates that the Navy can and should take on the predominant role for both strategic and theater nuclear deterrence. Jim also argues for more SSBNs with fewer launch tubes due to the increase of overall numbers of targets. Although the chapter on nuclear deterrence was updated for the June 1992 deep cuts regime that became START II, this section would benefit in a second edition from an analysis of a possible fundamental change of U.S. and Russian targeting philosophy from countervailing/force to assured destruction/countervalue that might result from START II or deeper cuts. This analysis must be done before we can make the case for increased numbers of SSBNs.

In his examination of the U.S-Russian context, Jim George concludes that "the post-CFE world could well see the emergence of SACLANT as the senior NATO military commander, or at least the senior American leader." Left unexamined, however, is whether this commander needs to be a naval officer under the new NATO strategic concept and U.S. program planning scenarios. This section will need updating prior to a second edition since it predates NATO's new security concept and the leaks of the U.S. DPG European planning scenarios found in last year's Washington Post and New York Times.

The chapter on Third World missions is well-researched and leads into the author's recommended division of labor for ground forces: the Marine Corps for crisis response and the Army at the operational level of war. Jim recommends new ships designed for overseas presence and crisis response, including an SSGN. Although not acknowledging GEN Colin Powell's "Contingency Force" idea, Jim recommends that the "Navy should at least be placed in charge or at least in rotation for any new Readiness Command."

When the author wrote The U.S. Navy in the 1990s, the Navy had not yet issued ...From the Sea, exactly the type of declaratory maritime strategy that Jim recommended was needed to implement the changing strategies, roles and missions. At the January 1993 AFCEA/USNI Conference in San Diego, USCINCPAC and CINCPACFLT outlined how the regional commanders have implemented the new national military strategy and service concepts in their own declaratory strategies.

The second major theme of the book is that of development of building blocks and new concepts for the consideration of reasonable and affordable alternatives for forces to accomplish the nationally-mandated missions. For the reader that is interested in and/or understands the program planning process, chapter 8 constitutes the most important contribution of The U.S. Navy in the 1990s.

This eighth chapter offers the reader a menu of building concepts that should form the basis of Navy program planning. Jim George repeatedly delivers the message throughout The U.S. Navy in the 1990s that "from earliest times, navies have always balanced larger warships with smaller, less expensive ones, for mission reasons as well as budgetary concerns."

The follow-on four chapters use Jim's recommended building concepts and his previous mission analyses to deal with naval aviation; the submarine force; the surface fleet; and auxiliaries, amphibs, mine warfare, and the Marine Corps. There are no surprises in his recommendations. These four chapters are quite detailed in their analyses of existing programs, previously canceled programs, programs from other services and nations, reserve *flying squadron* options, and other innovative solutions. *Less of the same* is simply not Jim's answer. Generally, including for the submarine force, Jim suggests a high/low mix.

Two chapters near the end of the book discuss Operations Desert Shield/Desert Storm and naval arms control. In keeping with his general top-down approach, Jim might have discussed the Persian Gulf War in the section on mission analysis. Although this reviewer agrees with many of the points made in the discussion of naval arms control, this chapter appears out of place.

The conclusions to the book outline "the perils of 'less of the same'." His recommendation for a Navy Strategy Think Tank parallels similar calls made by others to help the Navy reform its long-range strategic planning process. There is much to chew on in The U.S. Navy in the 1990s. The reader will probably not agree with everything that Jim George recommends, especially if he skips the mission analysis and building block introductions and goes right to the chapter dealing with his own platform of interest. This is a serious book about a serious subject written by a loyal supporter of the Navy. It deserves careful reading and introspection; can we do better? Jim George thinks that we can and has taken the time to explain how. Buy it. ■

THE SUBMARINE REVIEW

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

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

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

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

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

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