

THE SUBMARINE REVIEW

OCTOBER 1986

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FROM THE PRESIDENT

Our Fourth Annual Symposium has come and gone and by any measure of success I feel that those members who were in attendance were well served. The Symposium attendance was 650 and the banquet attendance 826. Our speakers were all very informative. One of the highlights was listening to three of our submarine Commanding Officers tell about the activities of their ships. We hope next year to hear from submarine tender and submarine base Commanding Officers.

The Fifth Annual Symposium will be held on 10-11 June, 1987, at the Mark Radisson Hotel in Alexandria, Virginia. Please try to attend.

Perhaps you will recall that earlier this year, a Submarine League questionnaire was provided along with your ballot. We received about 700 returns on the questionnaire and about the same response for the ballot. The varied comments to the questionnaire were tallied and summarized in preparation for a Submarine League Director's review. Listing the questions raised, and their responses briefly summarized:

- A. What role do you feel is being fulfilled by the Naval Submarine League?

Uniformly, our members felt that the League provided a necessary submarine-oriented forum; a means/mechanism to educate the public; or a means to support a strong submarine Navy. Only twelve members felt that the League was a mutual admiration social club. And one member called it a captive voice for the DCNO (Submarines) (OP-02).

- B. Do you believe that this is the proper role? If not, what should it be?

Most of our members felt that the Submarine League was on the right track with a control-

led expansion and involvement. Additionally, fifty of our members indicated that they would like more League sponsorship of submarine activities and awards, and more civic involvement. A lesser number felt that the League should encourage a discussion of innovative ideas and be a forum for controversial volatile issues.

C. What is your opinion of the image/reputation of the Submarine League?

Most members felt that the League was too young to be subject to a constructive opinion. A small number of comments which are of concern centered about the issue that a few of our active duty members think that the League is comprised of, for the most part, "old fogies." A few members from industry felt that "if one wasn't a submariner he didn't count."

D. Could the image/reputation of the League be improved? If so, how?

Twenty members felt that advertising the Submarine League in the Navy Times, Proceedings or Sea Power would give the League added and necessary exposure. Several members desired to see active duty members on the Board of Directors. Finally, there was a desire to establish the League as a distribution point for information on submarine matters.

E. What are your thoughts on League growth and what actions are necessary to reach new members?

The most prevalent comment was that "big is not necessarily better." But more positive, we should "help the submarine service by joining the League."

F. Any other comments?

By far the most frequent comment was "THE

SUBMARINE REVIEW is great -- keep up the good work." Four members felt that the articles published were borderline classified, and fifteen members wanted to have "a first-class glossy journal like the ANA magazine or the Proceedings."

The Directors and I are very sensitive to any possible breach of security and as I have discussed before, we do not intend to let any security lapse occur. Our approach will be similar to that expressed by our new CNO, Admiral Trost.

Recently, while discussing the Submarine League and the problems of security vis-a-vis the SUBMARINE REVIEW, Admiral Trost noted that the SUBMARINE REVIEW was a fine professional journal and with careful review can provide an excellent forum for discussing submarine issues while being informative. So be it.

Finally, I would like to express my appreciation to the Naval Submarine League Board of Directors for electing me as your President for the next two years. We all owe Chuck Griffiths a hearty "well done" for leading the League into this major phase of growth and development. I shall earnestly try to continue on with the programs he has started. I need and ask for your support. Onward

Shannon Cramer

FROM THE EDITOR

The U.S. nuclear submarine has been called "the finest naval weapon in the world today." Submariners accept the use of the word "weapon" to describe their submarines. And military writers, as well, carelessly term military weapon-carrying

platforms as "weapons." Yet, the submarine is not a "weapon"; while the torpedo it fires is.

Is it worth making this distinction?

Apparently it is. Calling a submarine a "weapon" makes it easy to forget the actual importance of submarine torpedoes. In the process: stockpiles of torpedoes are inadequately funded; torpedo research and development lags; systems analysis of submarine effectiveness emphasizes submarine capability rather than torpedo capability; strategic planners worry about how the oceans' geography impacts on submarine employments -- with far less regard for how torpedoes will function in various sea environments; in the same sense, potential U.S. submarine exchange rates against Soviet submarines are based on platform capabilities with lesser emphasis on how the torpedoes of both sides effect an outcome. In fact, because more seems to be known about the enemy's submarine capabilities than torpedoes, it is easier to discount the enemy's torpedo capability and "sweep it under the rug."

By frequently labeling the submarine as a weapon, one is lulled into believing that it is actually a weapon. Yet the only warship that has proved to be a "weapon" is one with a ramming capability. The Phoenician oar-propelled galleys with their prows hardened and made sharp, are a classical example of a warship made into a weapon. Today's submarines, on the other hand, with their "soft" rounded bows are certainly not designed to carry out the ramming function satisfactorily.

One knows that it is the "weapon" that destroys the enemy ship -- not the platform itself. So clearer focus on weapons would be achieved if the term "weapon" was not applied to military platforms.

Calling a nuclear submarine a "weapon" is

akin to calling it a "ship" -- which obfuscates its uniqueness from other vessels. Similarly, calling oneself a "nuke" places nuclear propulsion in a preeminent position ahead of the submarine itself, as well as the identity of being a "submariner." But perhaps this sort of misuse of military terminology has become acceptable, after the Air Force introduction of the term "strategic" to mean the employment of intercontinental ballistic nuclear missiles against an enemy's homeland -- instead of pertaining to the meaning of "strategy."

You can belittle what is outlined here about "weapons," and write it off as merely the quirk of an editor. But it should be realized that the points made stem from a personal belief that actual "weapons" have not gotten sufficient emphasis in a submarine force, focussed on nuclear powered submarines.

ADMIRAL CROWE'S REMARKS
at the
SUBMARINE LEAGUE BANQUET

I am pleased to be here this evening. While I have spent a lot of time in Washington, I must tell you it was a "cold water" shock to return after five years outside the Beltway. Aside from some of the political hazards, I'd forgotten how expensive this town was. Someone was telling me the other day that they received a letter from a woman saying that her son had gotten a job in Washington for \$30,000 a year. She wanted to know if he could lead a good Christian life on that in Washington. He wrote her back. "He can't lead any other kind."

But the everyday problems in Washington aside, I want to say in a more serious vein that it's a distinct pleasure for me to be here

tonight, among long-time friends and associates. As you know, I have been associated with submarines off and on for many years, mainly off for the last few years. But one never sheds his affection for the submarine service. I know there are many people in this room who appreciate that.

The fact is that submarines sort of get under your skin. It's hard today to realize that submarines used to be oily, smelly, and dirty. But that's the way they were. I was reading Dolphin Tales and one of the stories reminded me of my own career. It was about an S-boat tied alongside the dock; one night one of the men went ashore and had a few drinks and came back leading a skunk which he wanted to bring aboard. The gangway watch said, "You can't do that. You know you can't bring that skunk on this ship." And he said, "Why not? Jones has got a dog." This argument went on for awhile and finally the duty officer appeared on the scene. He likewise tried to convince the young man he couldn't bring the skunk on board. Finally in desperation he said to the sailor, "Have you thought about the smell?" The sailor said, "He'll get used to it just like I did."

Now that's a real submarine story. But even though the submariner's act has been cleaned up somewhat over the passage of time, one thing from the past still remains: submariners are an elite element of the world's finest navy. I don't think there's any question about that. As a group they probably enjoy the highest standard of education and training of any military organization in the world.

And the men-of-war they run and have mastered are pound-for-pound the best warships afloat today.

In today's navy, submarines are not only important but they are vital. They field an

invulnerable leg of our nuclear deterrent. If war comes, their role will be critical not only in combatting enemy submarines, attacking merchant traffic, and carrying the war to places where no other units can go, but also in fighting alongside the rest of the Fleet in coordinated operations. It is, of course, nuclear power which has freed them and this rather dramatic change has enhanced their role.

In that connection I would be remiss if I did not acknowledge the passing of Admiral Hyman Rickover. There is no need to belabor the extent of Admiral Rickover's contributions to the nation. Suffice it to say that in a career that spanned six decades, this man moved the Navy squarely into the nuclear era by the sheer force of his personality and his intellectual capacity. Irascible, but as demanding of himself as he was of others, he left an indelible imprint on the country's defenses. The nation is safer because of his vision and his energy.

In a similar vein, earlier generations have left behind them a rich heritage of courage and achievements that today's submariners can draw on as we deal with the challenges of this era. Everyone here is familiar with that tradition. Indeed many of you have helped to build and to fashion it. Its sustaining influence is a vital element of the strength that the submarine service exhibits today. All submariners can and should be proud of this spirited and enduring legacy. Certainly the Naval Submarine League has been instrumental in not only focusing attention on undersea warfare but in keeping the retired community involved in the affairs of the submarine force. I salute your contributions. They benefit not only submariners, but also the armed forces at large.

And speaking of the armed forces at large, tonight I want to take just a few moments to share

with you some ideas about the state of those armed forces and about the role which they fulfill in today's world -- in today's complex world. I have spent considerable time in the last few months talking to audiences around the nation -- and also inside the Washington Beltway -- about these subjects, and about the need to keep our armed forces strong and healthy.

I've also beaten a well-worn but not particularly successful path to the Hill. This education effort -- or perhaps I should characterize it more accurately as this communications effort -- has proved to be a demanding task -- and not necessarily a rewarding one. But I believe firmly and sincerely in the importance of the civil-military dialogue in our country. The American public and their representatives in the Congress need to have the best possible information about our security posture and our defense needs. This is a burden that all of us who are devoted to a strong America can take up with great benefit to the nation and that includes the Naval Submarine League with its reservoir of defense expertise. I can tell you that in large part our ability to fashion an effective defense posture will rest, just as it has in the past, on our success in carrying our case to the electorate.

I think as we attempt to involve and inform the public in security matters that it is important to emphasize three particular areas where the level of understanding is often superficial in this country: the central role of the armed forces in American life, the spectrum of the threats we face, and the current state of our armed forces. At a high level of generality, of course, everyone is familiar with some of the basics. America's national security goals have never been complicated or mysterious. They have in fact remained essentially unchanged since I entered the Naval Academy in the early 1940's:

- We want to preserve the independence, freedom of action, and territorial integrity of the United States.
- We want to promote U.S. and Allied vital interests around the world; and
- We want to shape an international order in which our freedoms and democratic institutions can survive and prosper.

But what gets lost somewhere in translation, for many of our citizens, is the point that these are not just empty words. They genuinely describe what our military strength can and does do for us. It has provided a great deal more than simply a shield against direct attack. That same power underwrites our political and commercial dealings with the international community, our use of the sea lanes, our communications with friends overseas, our approaches to arms control negotiations, our credibility in dealing with mischief makers. It cements alliances which, in turn, enhance our own security. In fact, our strength has been an indispensable pillar not only of our freedom and affluence, but also the liberty and prosperity of our friends and allies around the globe. That's a fact of international life today.

During my time in NATO, I observed firsthand that our military contribution to that coalition literally anchors the unity and political structure of NATO as well as furnishing the centerpiece of its defense. When I served as USCINCPAC, a succession of Asian leaders emphasized to me the importance of a strong and vigorous America. Behind the bulwark of our power they have been able to seek economic prosperity and political maturity in their own fashion and at their own pace. They stressed that to me time and time again. I have visited recently in Central America and the Middle East. The leaders in both those areas clearly want a powerful America as a

backdrop for their efforts to build free and functioning societies.

The bottom line is that our military capability, our military strength, our military effectiveness provides us a host of benefits in terms of both national security and foreign policy, everyday. Americans -- and millions of hopeful people around the globe -- are able to go about their peaceful pursuits, and to move closer to fulfilling their aspirations, because the strength of U.S. armed forces operates, largely invisibly, to contain our adversaries and to facilitate our economic and foreign policies.

I know this because I have witnessed it firsthand. I have lived it. So have you. You know it for the same reasons. But for the general citizenry, these realities about the role of the armed forces in their lives tend quickly to be submerged in the press of day-to-day domestic business. So it is vital to continually remind Americans of these realities in today's complex world.

Of course, the nature of the peril we face complicates the challenge of educating our public about the need for strength. Again I am persuaded that there is a rather alarming lack of awareness of the diverse character of the threat. Security challenges now wear many faces other than the specter of conventional or nuclear war with the USSR. American interests are threatened on a number of fronts: terrorism that can occur anywhere on the globe, at any time; the diverse activities of Soviet surrogates who seek to promote instability even in our own backyard; and proliferating local conflicts in the Third World.

But the American public is not used to thinking of the world -- much less the threat -- in such terms. Henry Kissinger -- a philosopher of some note -- once observed that we tend to

think of "peace" and "war" as two entirely separate and incompatible spheres of activity. In the everyday world, of course, it is much more blurred than that. Jim Watkins, the former Chief of Naval Operations and a submariner of some note, uses the term "violent peace" to make the point that today even a "peaceful" world is marked by competition, conflict and strife.

Any newspaper testifies to the fact that he is right: in Central America, in the Eastern Mediterranean, Southwest Asia, Vietnam and Cambodia, Libya, South and North Korea, and in the Philippines we see the evidence.

As a matter of fact, I have a chart in my office with pins in the various trouble spots in the world. I am constantly sending out for more pins.

But our citizens don't keep these kinds of maps in their living rooms, and they have little incentive to follow these trends and themes. Most of all, the relative tranquility of their lives here at home numbs them to the significance of Soviet activities which are not only designed to promote the spread of Moscow's values and institutions, but also to undercut and limit the prospects for pluralism wherever the Free World is vulnerable.

The Kremlin understands very well the fundamentally competitive nature of the world, and seeks deliberately to take advantage of it at every turn. They have never altered their original goal of overcoming the West through political or military means. And make no mistake, the Soviets will use their power brutally and directly when they believe that the calculus is in their favor. Witness Afghanistan.

It has always fascinated me while many nations use force against their enemies, the

Soviet Union doesn't hesitate to use it against its friends, as members of the Warsaw Pact can testify. But the fact remains that many Americans find it difficult to appreciate the significance of the Soviet military buildup that has proceeded for years. The USSR's burgeoning military capability is well documented, and I won't belabor the statistics here. The people here are all too familiar with Moscow's investment in raw power. Suffice it to say that this growth is unprecedented -- also unprovoked -- and on sheer momentum alone the Soviet buildup will carry well into the 1990's, if not longer. Like it or not, it is increasing, not decreasing, qualitatively as well as quantitatively every year. The result is not only an impressive Soviet military apparatus, but also an expanding proclivity for Moscow to project that power, to foster instability, to encourage surrogates, to promote terrorism, to support small but fierce regional conflicts, and to encourage anti-American regimes to challenge Washington in a variety of ways and places.

It is imperative for Americans to recognize these realities and to confront them squarely. We ignore them at our peril. It is up to you and me to be sure that Americans understand that.

Faced with these diverse and ever-present prospects of harm to American interests and people, the Pentagon must build forces that can cope with the full continuum of challenges.

We do the best that we can, with the resources that Congress sees fit to provide. And I am convinced that the current state of our armed forces is sound by any commonsense measure, thanks to substantial improvements that have been made in the last five to six years.

The depressing trends of the 1970's have been reversed and we have seen our military capability improve in every category, in every dimension --

personnel, readiness, modernization, sustainability, force structure.

Submarine forces, likewise, benefited from this remarkable turnaround. These events have been accompanied by a resurgence of pride and morale at every level. I see it throughout the world in every Service. The spirit is the best that I have experienced in over 40 years in uniform. But I likewise believe strongly and genuinely that we must carry to fruition the President's programs. Though we have done well in restoring capabilities that atrophied in the 1970's, and the net progress thus far is encouraging, there is much yet to be done. For example:

- Only one-third of our armor units have the new M-1 tank.
- Only one-fourth of our battalions have the Bradley Fighting Vehicle.
- One-third of our Air Force has yet to receive F-16's and F-15's.
- Over half of our carriers do not yet field F-18's.
- Only one-third of our submarine force is made up of the latest attack units.

And I could go on and on.

Aside from these measures of the incompleteness of our progress, consider all the pressures on us to do more, to do better, in the realm of Special Operations Forces, limited intensity conflict, and in counter-terrorism and drug enforcement. In a similar vein, we have new missions and new command responsibilities. Fifteen years ago there was no CENTCOM or Indian Ocean Task Force. These unfulfilled goals and new

demands place a high premium on sustaining public support for defense. And, unfortunately, our budget problems, and deficit problems, have spawned a lot of specious and confusing rhetoric in the media and elsewhere about our defense programs. I know you are familiar with this phenomenon. Some critics would make defense spending the scapegoat for mounting budget deficits. Others have attempted to do what former National Security Advisor, Bud McFarlane, warned about several months ago: that is to "de-link" America's military strength from the threat, from our society's rising prospects and prosperity, from the decades of peace that our allies have enjoyed, and from the improving prospects for meaningful arms control. We simply cannot allow these detractors to obfuscate the real issue -- American security in a trying and challenging age, in a contest that is a marathon not a sprint.

Of course, we confront a genuine dilemma. On the one hand we acknowledge what is true -- that we have made great progress in the last few years. On the other hand we must ask for more effort, indeed more sacrifice. The public and the Congress hear the first part, the progress that we have made, and they note that we are "at peace." It's hard for them to hear the second part, too, when pressures on our resources are becoming more and more intense.

My point is not that we must match the Soviet Union or anyone else weapon for weapon, gun for gun, man for man. We all know -- in fact we insist -- that our humane and decent society must do many things in addition to building strength. We know, therefore, that in a major war or other engagement with the Soviets we are going into battle outnumbered in both manpower and equipment. Leaders of my generation have accepted that for many years.

But we move on to find ways to compensate

with quality weapons systems, excellent people, realistic training, broad and responsive logistic support, and the help of our Free World friends and allies.

It's a "sporty" course; a package that leaves little room for error, and no room for retreat from the challenge in any of those compensatory areas. The programs of the early 1980's have given us the right impetus. America is safer as a result, and the prospects for what many of our citizens understand as peace are higher.

But the job simply isn't finished, and the outcome of this year's budget agonies leaves us short of where we need to be. Moreover, given the state of the public mind on these matters, I am afraid we will face a similar struggle next year and maybe for several years. We can live with one or two points on a descending curve but several years of declining appropriations would be disastrous. That is why we -- you and I -- have much to do in this frustrating business of communicating with the public and the Congress about our defense posture. In next year's budget struggles, we must do all that we can to avoid a third successive year of shortchanging our defense systems and our military people.

No military leader in our nation desires war. To keep the peace is the fundamental mission of our armed forces. The primary measure of their success is the ability to deter conflict. But we must constantly remind our citizens that freedom is not free. It requires continuous effort, vigilance and, at times, sacrifice; the type of sacrifice for which our Republic is famous.

I am convinced that our current emphasis on maintaining a strong political and economic posture is sending the right signal to potential adversaries -- a signal that the United States, the world's greatest nation, will continue to play

a leading role in promoting stability and preserving freedom throughout the globe.

At the same time, however, it is imperative for American citizens to recognize that our military strength underwrites those policies and underwrites them in many ways. Our citizens must recognize that the threat is real, diverse, and part of the everyday world; that the Kremlin and its surrogates are working diligently to upset the balance and, lastly, that we have some ways to go in improving our armed forces before we can face the future with genuine confidence. If our deterrent policy is to continue to work well, we must match the growing danger with a consistent and rational defense policy geared for the long run instead of one marked by the peaks and valleys which have characterized so much of our peacetime history. Four times in the last 100 years we have let our military defenses deteriorate, as Americans were lulled into lethargy by their peacetime pursuits. And four times we paid the highest possible price for that imprudence, in the ravages of war and in unnecessary loss of lives. We seem to have painfully short memories. I heard a wag say that we remember the Maine, we remember the Alamo, we remember Pearl Harbor. Then when we win, we forget.

Our military is not separate from the state but an integral element of the society it serves. In the end our armed forces will only be as good as the American public wants them to be. Consequently, we need -- above all -- strong and patient and continuing support from all Americans. I deeply appreciate the role that the Naval Submarine League plays in generating that support.

I would submit that keeping this nation strong is doing the right thing.

Admiral William J. Crowe, Jr., USN
Chairman, Joint Chiefs of Staff

IN REMEMBRANCE

ADMIRAL HYMAN G. RICKOVER

STATEMENT BY THE PRESIDENT
of
THE UNITED STATES

Admiral Hyman G. Rickover was the Father of the the Nuclear-Powered Navy. His commitment to excellence and uncompromising devotion to duty were an integral part of American life for a generation. The nuclear-powered submarines, cruisers and aircraft carriers deployed throughout the world today in defense of liberty are a major part of Admiral Rickover's legacy. He was also a revered teacher who instilled in his pupils a desire to strive for the highest achievements. Countless thousands of sailors benefited from the skill and expertise of this talented public servant. Though he worked on tools of defense, he was a man of peace.

It is particularly poignant that his death should occur immediately following a weekend in which we celebrated the achievements of those Americans who came to our shores as immigrants. Few among them have had as distinguished a career as Admiral Rickover or contributed more to the maintenance of our freedom. We have lost a great American, and Nancy and I extend our deep sympathy to the Rickover family.

Ronald Reagan
July 7, 1986

THE SCIENCE SUBMARINE

In 1971 a U.S. patent was issued on an Underwater Support Vessel, in the names of William Kumm and Harley Smith. It can be thought of as an oceanographic or "science submarine", or in the case of the polar seas, as the preferred form for a polar research vessel. This submarine concept responded to a 1966 President's Commission (the Stratton Commission) whose Report in 1969, inspired the book The Ocean Quest. It recommended development of an oceanographic research vessel -- a submarine of 1000-foot depth capability, with its own divers, small submersibles and unmanned probes. Now, with the Arctic Research and Policy Act of 1984 calling for a five-year Arctic research plan, the Arctic Research Commission -- thus formed to "assess our national needs for Arctic research" -- has highlighted that "the U.S. is the only nation with substantial interests in the Arctic that does not have a dedicated polar research vessel." This suggests a renewed interest in the oceanographic submarine patented by Kumm and Smith.

Figures 1 and 2 show the physical configuration of the science submarine concept: the twin screw, twin hull, beamy configuration with the flat working deck in between providing excellent roll stability. Present day naval submarines, in contrast, have body of revolution hulls with little flat deck space and provide poorer roll stability. The point is, the "science submarine" configuration starts from a different set of missions and therefore functional requirements than those of an SSN or SSBN.

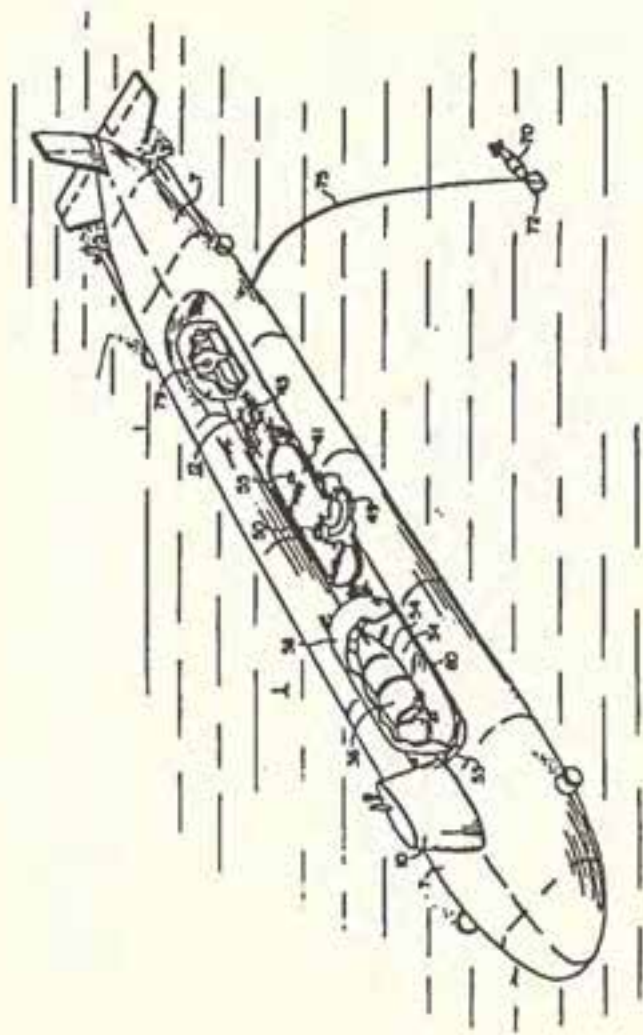


FIGURE 1, VEHICLE AND TOWED BODY SUPPORT

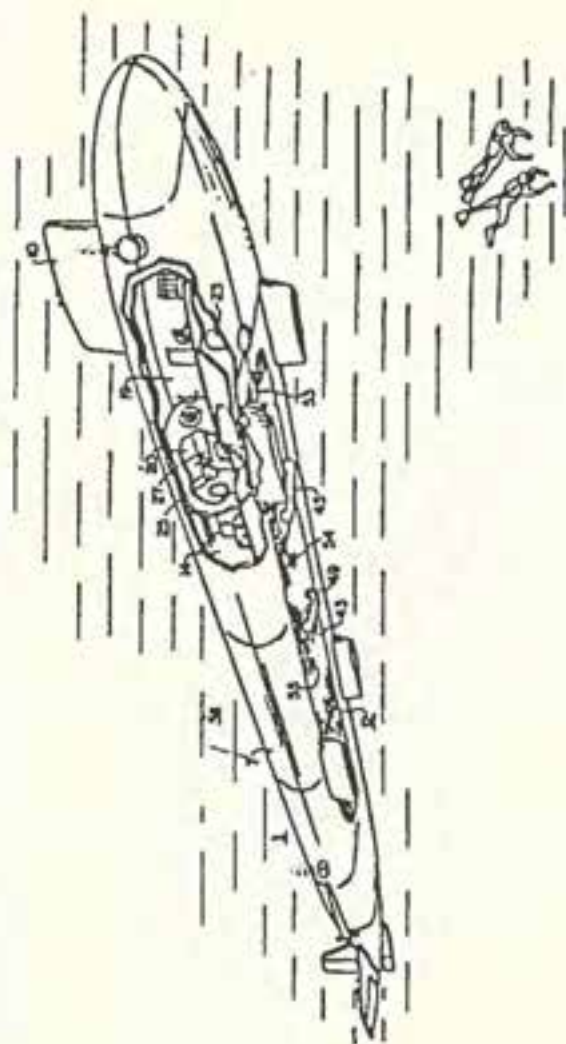


FIGURE 2. HYPERBARIC SECTION AND DIVERS

A recent study under a grant from the National Science Foundation notes that "in the case of research vessels, it is the science requirements which define the type of ship, along with its size, speed, endurance, arrangements and overall capability." Although six surface ship types are addressed for consideration, no mission requirements for an Arctic-capable science submarine appear. However, in specifying the requirements for "new oceanographic ships" which would include polar research vessels, the study lists "Endurance: sixty days, providing the ability to transit to most areas and work 3-4 weeks on station, 15,000 mile range at cruising speed." And then later in the study, there are additional requirements under Seakeeping, "Maintain science operations at the following speeds and Sea States: 15 knots cruising through Sea State 46 knots cruising through Sea State 7."

In the latter case, the words used include not only functional requirements i.e. "maintain science operations at following speeds ...", but also words which actually describe the inherent limitations of surface ships i.e. "6 knots cruising through Sea State 7." A "science submarine" transiting at 6, or at 15 knots submerged would have NO Sea State limitation, because it is by definition not at the sea surface, subject to these external forces.

Other requirements call for 60-ton loads, which are specified for stern-mounted A frames. Such heavy oceanographic objects put over the stern of an oceanographic ship and lowered into the seaway should, in all probability, be very close to neutrally buoyant in seawater -- weighing little, if anything, in water. For the oceanographic submarine the functional requirement definition for the capability to deploy such oceanographic objects needs more precise definition. Would the deployment cable tension be

relative to the object's dry weight or its drag, if in tow at a stated submarine transit speed? Or is there on-station vertical lift tension to be also considered for something such as a large-diameter piston corer stuck in the bottom. One method that the submarine could use for such a case, which a surface ship moving in a seaway could not, is to apply positive submarine buoyancy over a period of time to gradually overcome the bottom sediment suction force. It is thus very important to define the operating environment as well as the functional requirement in each instance, recognizing that surface ships have many inherent limitations.

Consider now, some of the inherent advantages that a science submarine platform would have over a surface ship as a sensor platform, or as a support system for deployed sensor platforms:

o Adequate Size.

For multibeam high resolution bottom mapping or hydrographic sonars, the hull must be of sufficient length to hold all of the transducers necessary to achieve the highest possible resolution on the bottom. This is true for downward looking keel-mounted arrays for use in deep water as well as for side-looking multibeam sonars mounted to port and starboard along the sides of the hull, as used in shallow waters such as continental shelves.

o Motion Stability.

A submerged submarine hull, unlike a surface ship in a seaway, will not pitch, heave or roll in random fashion. Thus there is no requirement for additional transducers to compensate for platform random motions during the round trip time of the sonar signal to and from the ocean floor. The motion stability also contributes to the resolving power of the system because the return signal from

a given bottom resolution cell is not affected by the platform-induced random angular noise.

o Terrain Following.

In the shallower portions of the offshore Exclusive 200-mile Economic Zone, for example, the science submarine would be able to use hull-mounted focused sensors such as multibeam side-looking sonars in an altitude-following mode, down to the maximum depth of the submarine's design; say 1000 feet. Such hull-mounted focussed sonar use is not possible with a surface ship because the altitude over the bottom is a variable over which the surface ship has no control.

o Reduced Towed Body Motion.

When a submarine is used in deep water to tow a bottom-terrain following focused sonar or optical sensor vehicle, the random motions imparted to the top end of the tow cable are dramatically reduced, compared to a surface oceanographic ship tow. The surface ship will be subject to weather, currents and other yaw-producing effects, which will almost always be from a bearing other than in the direction of the tow. It is worth remembering that the tow direction is set by the requirements of moving the sensors at the end of the tow cable across the ocean floor in the altitude-following mode, depending upon the local terrain. The random surface ship motions imparted to its tow cable cannot be fully decoupled, with the result that the accuracy of terrain-following for low altitude focussed sensors is thereby reduced. The science submarine, on the other hand, operating below the random motions of the surface seaway, imparts none of these motions to the tow cable and hence to the towed platform.

o Operation in Homogeneous Deep Water.

The portion of the water column in the first few hundred feet of water near the surface is less homogeneous than the water below the thermocline. The science submarine, on the other hand, is capable of operating below the thermocline and can take full advantage of the homogeneous water column to further improve the resolution of hydrographic sonar systems as well as seismic sensor arrays. This is another fundamental advantage that the submarine platform has over any surface oceanographic ship.

o Noise Reduction.

Present day U.S. oceanographic ships, (including the KNORR and the MELVILLE,) are acoustically noisy platforms with gear-driven diesel propulsion plants and propeller cavitation adding to the background noise. A fuel cell powered, electric drive science submarine would dramatically reduce the cavitation noise because it can operate at depths where the ambient pressure will reduce the cavitation to the lowest level possible. This advantage is particularly important for low-level, high sensitivity seismic studies which are of increasing interest to the ocean and geophysical science communities. The beamy science submarine configuration described, with its twin-screw electric drive, would also provide locations aft for streaming seismic arrays and deploying active sound sources, as appropriate.

o A Clean, Motionless Laboratory.

Except for the fact that the submarine may occasionally accelerate, decelerate or make heading changes, the laboratory spaces are as close to motion free as is possible underway. On station, these motions are likely to be minimized. The laboratory spaces will also be clean and free of atmospheric contami-

nants, as the submarine's life support system should be of a much higher caliber than that of a surface ship. The addition of a hyperbaric section to the submarine permits saturated diving on station at depths of 300 to 500 feet, permitting marine biological studies to be carried out inside and outside the submarine, with the ability to keep the living samples at the ambient pressure of the sea, in the water.

o Submerged Support for Submersibles.

Deployment of one-atmosphere, manned, deep diving submersibles of the ALVIN type will be made much safer. They would be totally weather and surface independent. It therefore will become possible to operate under the Arctic and Antarctic icefields. Submerged support, for example servicing external equipment fitted to the submersibles, would be performed by saturated divers -- part of the crew of the science submarine. Small vehicles and oceanographic instruments would be brought into the submarine pressure hull for one-atmosphere servicing through the use of suitable equipment "air locks."

These are some of the first-order advantages that the science submarine will offer over any surface oceanographic ship. Many other second-order advantages will no doubt occur to the readers of the REVIEW, and are limited only by one's imagination. This paper makes the case for the science submarine, not yet part of the U.S. submarine inventory, but producible with will and appropriate funding.

The science submarine need not be nuclear powered, and the use of "Solid State" fuel cell electric propulsion would permit it full civilian port access around the world. Once operational, the ocean science community will look back and

wonder how they ever got along without it. In that respect it is akin to the science revolution occasioned by the availability of spacecraft for space science as compared to traditional terrestrial and atmospherically limited telescopic astronomy of the past.

Bill Kumm

ARTIFICIAL INTELLIGENCE IN THE ART AND SCIENCE OF SUBMARINING

INTRODUCTION

It is difficult to find a popular or scholarly publication today that has not recently hosted a debate about the promise of artificial intelligence (AI). For many AI is a problem-solving panacea; for just as many others it is a field more than worthy of a skeptical eye. Where is the balance? What perspective should submariners adopt?

WHAT IS ARTIFICIAL INTELLIGENCE (AI)?

AI is an interdisciplinary sub-field of computer science that seeks to recreate in computer software the processes by which humans solve problems. AI "knowledge engineers" would extract expertise from professionals like submariners and then structure it in ways that permit relatively flexible problem-solving in a specific area, such as for the submarine planning and decision-making, or signal data analysis.

AI systems differ from conventional computer-based systems in a number of important ways. First, conventional systems store and manipulate data within some very specific processing boundaries. AI systems store and apply knowledge to a variety of unspecified problems within a selected problem's domain. Conventional systems

are often passive, where AI systems actively interact with and adapt to their users. Conventional systems cannot infer beyond certain pre-programmed limits, but AI systems can make inferences, implement rules of thumb, and solve problems in much the same way we routinely decide whether or not to buy a Ford or a Chevy, or accept a new professional challenge -- though AI systems cannot usually infer beyond a set of pre-programmed events and conditions.

The representation of knowledge is the mainstay of AI research and development, and is the reason why so many otherwise staid managers and scientists are so enamored with AI. If knowledge and expertise can be captured in computer software and applied at a moment's notice, then major breakthroughs may be possible in the production and distribution of knowledge. If it is possible to capture the best naval tacticians in flexible and friendly computer-based systems, then productivity and efficiency might explode across a "domain."

Perhaps surprisingly, AI is a very young field of inquiry. Twenty years ago very few would admit to a commitment to AI research, but largely through the efforts of a few farsighted individuals the field began to grow by the early 1970s. Today it is difficult to find designers of interactive computer-based systems who have not given serious thought to the promise of artificial intelligence.

AI systems designers use a set of unique tools to represent knowledge and build intelligent problem-solving systems. Imagine for a moment the detailed subjects that appear in the many Navy tactical manuals. Then imagine a computer program -- not at all unlike the ones resident in human brains -- capable of searching through the sources for information in order to solve a specific problem. AI software languages permit information

to be structured as knowledge and permit system users to apply the knowledge to a variety of problem-solving tasks.

Today's AI tools and techniques permit programmers to develop search capabilities through networks of facts and relationships which in turn, permit users of AI systems to solve analytical problems. Special purpose software languages permit AI systems designers to represent knowledge in several ways, including frames, scripts, semantic nets, and rules (Andriole, 1985). Perhaps the most widely utilized knowledge-representation technique involves the development of cognitive rules of thumb usually expressed in "if...form." Imagine, for example, rules regarding the placement of sonobuoys for ASW that might calculate currents, ranges, capabilities and a variety of other aspects that comprise optimal placement tactics all programmed within an expert system capable of generating advice about where and when to drop sonobuoys. In fact, such a system exists today.

Many other systems use rules to make inferences about what is happening and what to do about it.

As you have no doubt already surmised, the key to the power of all rule-based AI systems lies in the accuracy and depth of their rules. Bad rules (or doctrine) produce bad conclusions, just as bad human probability estimates frequently result in strategic and tactical surprises. It is the job of the "knowledge engineer" to make sure that the rules (or networks) in a system represent substantive expertise to the fullest extent possible. This requirement, in turn, means that doctrine-based systems can never stop developing. In order for them to keep pace with the field they are trying to capture electronically, they must routinely be fed new doctrines.

One of the earliest AI research goals was to develop computer-based systems that could understand free-form language. The "natural language processing" branch of AI represents knowledge by endowing software with the capability to understand the meaning of words, phrases, parts of speech, and concepts that are expressed textually in whatever language is "natural" to the intended system user. It is now possible to converse directly with a computer in much the same way we converse with human colleagues. Natural language systems are today in use in DOD to track ships at sea, organize and manipulate huge data bases, and bridge the gap between smart but otherwise crude expert systems -- though it is important to realize that nearly all of these systems are "prototypes."

Finally, there are vision and robotic systems that also exploit the incarnation of knowledge into software. Some vision systems are capable of interpreting objects and environments and acting accordingly while robotic systems soon will be capable of performing rudimentary tasks in real time.

It is important to distinguish between the tools and techniques of AI and the substantive areas targeted by the AI R&D community. Tools and techniques consist of special purpose software languages, rules, semantic and inference networks, natural language processing, and even unique hardware systems. But not every area is vulnerable to these tools and techniques. There is currently a great debate raging between those that feel that AI can be applied to virtually all kinds of problem-solving and those who feel just as strongly about the limits of AI. This latter group believes that it is theoretically impossible to capture the essence of intuitive problem-solving in computer software, while the true believers insist that even the most complex problems can be modeled. What about submarining?

How much can AI help?

ARTIFICIALLY INTELLIGENT SUBMARINING

Where are the opportunities in submarining? There are at least four areas that might benefit from the selected application of AI. They include systems status monitoring and diagnosis, situation assessment, tactical operations, and planning and decision making.

Systems Status Monitoring and Diagnosis

There are any number of submarine systems that require constant monitoring. When they malfunction, corrective action must be taken. Unfortunately, there are sometimes not-so-good diagnosticians on board submarines. What if time and effort was devoted to culling the procedures used to diagnose and fix systems problems from the very best diagnosticians? What if their expertise was incarnated in software and accessible to experienced and inexperienced operators?

It is well within the capability of today's state-of-the-art to capture and represent such expertise and to embed expert diagnostic systems on submarines -- so long as the problem is selected carefully and genuine problem-solving experts exist (see below). Such expert systems might reduce the analytical burden on operators substantially, and permit them to predict systems and sub-systems failures long before they occur.

Intelligent systems might thus be developed to monitor internal systems, diagnose and predict faults, correct or compensate for selected faults, and even respond to emergencies. All that is necessary for these systems to be built, is access to expertise, time, and, of course, funding.

Situation Assessment

AI tools and techniques can make direct contributions to the interpretation of systems data that monitor the external environment, correlate sensor, sonar, and other information, and make assessments about the actions of adversary and friendly forces. The procedures that are now implemented manually or with the aid of unintelligent computer-based systems might very well lend themselves to knowledge-based processing. But note that we are not suggesting that expert systems replace on-board analysts and decision-makers, rather that AI assume some of the low-level analytical burden now placed on certain crew members and thereby free them to devote their expertise to more complicated problems.

AI tools and techniques can help with situation assessment via their ability to deal with uncertain or incomplete information through which they can generate probabilistic likelihoods about the nature and threat of the situation at hand. These likelihoods will not override the analyst's judgments, but augment them, and permit him to play what/if sensitivity analyses with the expert system -- to experiment with different assessment hypotheses in real time.

Tactical Operations

What might intelligent systems do for the undersea tactician? They might sort and prioritize threats and targets, recommend countermeasures, and support weapons employment. All of these tasks are within the reach of current knowledge-based systems technology. It is possible, for example, to develop systems that might discriminate among threats. Expert systems are under development to compute target values. Systems have been conceived that will match targets and weapons and assist in weapons employment.

The key to the design and development of these systems lies in the capturing of the expertise necessary to drive them. So long as experts can be found, and so long as the problems are defined realistically and manageably, knowledge-based systems might soon offer substantial support to their human counterparts.

Planning and Decision Making

At the highest, most complicated level are problems that require planning, re-planning, and decision-making under conditions of great uncertainty and stress. How can intelligent systems help here?

It is possible to develop crude planners, contingency planners, re-planners, and decision option generators/selectors. Selecting among competing tactical options -- that may have been generated by an AI system -- is much more difficult than generating candidate strawmen. Ultimately it is the captain's job to select -- and defend -- a decision to implement a specific option.

The differences among systems monitoring and diagnosis, situation assessment, tactical operations, and planning and decision-making should be evident. As we move up the complexity ladder, the prospects for knowledge-based systems application grow dimmer. While this is not to suggest that the applied potential of AI ends at tactical operations, it is to argue that there are planning and decision-making tasks that will be much more difficult to support with AI -- or any analytical methodology for that matter. Time will tell if high level functions can be supported with intelligent systems; as this article is written, the jury is definitely still out.

AI, SUBMARINING, AND THE LIMITS TO GROWTH

While it may be difficult to build all of the systems described above, efforts must be made to make the systems that are deployed easier and easier to use. The use of natural language interfaces, interfaces capable of anticipating user queries, and displays with extra-wide communications channels must become commonplace if knowledge-based systems are to succeed.

There is no danger -- immediate or otherwise -- of AI systems replacing trained operators or experienced decision-makers. In fact, the whole notion of AI as a threat to operational personnel represents the wrong way to think about the applied potential of AI. AI represents yet another tool for the defense problem-solver, a tool that should be used to augment and amplify the expertise resident in prospective users, not replace it. The only exception to this rule of thumb involves the application of AI tools and techniques to very low-level, computationally intensive problems, tailor-made for AI -- and that for far too long have burdened human analysts and operators.

There are, however, a number of issues and problems that will define the role of AI in submarining. They include problem "bounding," the crisis of expertise, and the potential for new forms of information warfare as more and more intelligent systems are deployed.

Bounded Vs. Unbounded Problems

It is relatively easy to bound the diagnostic problem of a device. If a system malfunctions, there are only so many diagnostic possibilities. Even complicated systems have finite solutions. But as we move from simple system diagnostics to complicated tactical planning and decision-making we begin to move from bounded to unbounded

problems.

The more unbounded the problem the more difficult the solution, and the correspondingly greater challenge to AI. Since warfare cannot be pre-defined against every possible contingent action and re-action, and since command is as much an art as it is a pseudo-science, it will be difficult to develop intelligent systems capable of inducting in real-time. It is important that our expectations about the efficacy of AI be held short of creative problem-solving -- i.e. for the kind of problem-solving exhibited by commanders who have never been trained to improvise, but who do it very, very well.

The Crisis of Expertise

Two kinds of expertise must be present to develop a knowledge-based system. The first is resident in the subject matter expert -- in the fire control officer, the ASW analyst, the sonar operator, and captain, while the second is resident in the intelligent systems designer (usually referred to as the "knowledge engineer" in the systems design process). There are precious few of either. Before an expert system can be built, for example, an articulate expert must be found. This problem is subtle because there are far more self-proclaimed experts than there are experts with impressive empirical track records. Genuine expertise presumes a successful history and a consensus about, for example, maneuver tactics. If twelve experts yield twelve solutions to the same problem, the domain is not ready for AI.

A related problem to the shortage of subject matter expertise is the over-reliance upon but one or two experts who might communicate bad or incomplete knowledge. Similarly, it is difficult to know when you have captured enough expertise. The more unbounded the problem, the more difficult

it is to know when to stop.

There is also a shortage of skilled knowledge engineers, the professionals who must elicit and represent expert knowledge. Here too we find a preponderance of self-proclaimed experts, though not nearly enough with applied experience. If knowledge-based systems design and development is to continue, more knowledge engineers must be trained.

Information Warfare

Assuming that low-level and some mid-and high-level AI systems are eventually fielded, what new security challenges will we face? Precious little thought has been devoted to the sabotage, theft, or alteration of knowledge bases. If access is gained to the rules that govern adversary behavior then the battle can be won. If the rules are altered to produce predictably incorrect decisions then the mission can be fulfilled, and if access to a critical knowledge base can be denied then it will be impossible for a commander's unit to survive. Perhaps such possibilities are far-fetched; perhaps they are not. Regardless of their likelihood, some thought should be given to the new forms of information warfare that the application of AI will suggest -- just in case.

CONCLUSIONS

This short article has attempted to introduce the key components of artificial intelligence and to map the applied potential of AI for submarining and, by implication, naval warfare. We have also tried to discuss the key issues surrounding the design, development, and deployment of intelligent systems. It is clear that tremendous opportunities exist above and below the sea for the application of knowledge-based expert, natural language, robotic and vision systems. It is also

clear that AI is not a problem-solving panacea and the design of knowledge-based systems is not without problems. AI systems certainly present no threat to operators; the real challenge lies in creating environments where AI systems can augment human expertise without competing with or replacing it.

Stephen J. Andriole and Jon L. Boyes

CANOPUS

Having finished my command tour of a submarine tender, the EMORY S. LAND, I can now sense more clearly what went on behind the scenes in World War II and can appreciate the efforts of the 14 U.S. submarine tenders and several submarine bases which supported my boyhood heroes -- the submarine skippers of that War. The work, sweat and tears expended in repairing, rearming, refueling and reprovisioning those underseas submersibles -- who carried the fight across the Pacific to Japan herself -- now amazes me with their magnitude. How could I not have appreciated such an obvious and fundamental basis for successful submarine warfare? I'm sure that it is because the function of supporting submarines is never glamorous. It is hard work and often a labor of unrequited love -- love for the operating "boats."

Even amongst submarine tenders there is a heroine. She doesn't produce an exciting story; but it's a story of dedicated service and support that continued until she was sunk -- well after the submarines she had mothered had left her sides. The heroine of this story is "The Old Lady," the original USS CANOPUS (AS-9).

She was one of three located in the Philippines with the Asiatic Fleet when war came to the Pacific, December 8, 1941, Philippine time.

All three survived the first major Japanese air attack on the Manila area on 10 December -- which caused the loss of the submarine SEA LION. The following day, the tenders HOLLAND and OTUS were directed to leave the Philippines and proceed to Australia. CANOPUS -- old and slow -- was detailed to remain behind to support the submarines which were defending the Philippines.

CANOPUS remained in Manila, servicing her submarines by night because they were forced to rest submerged on the bottom of Manila Bay during the day -- away from the Japanese bombers. Damaged in a Christmas eve air attack, "The Old Lady" moved to Mariveles Bay at the tip of Bataan. Attacked again on the 29th, she suffered a hit from an armor-piercing bomb which would have passed clean through her had it not hit her propeller shaft. The irony was that literally "the flooding put out the fire." The blast from the bomb had ruptured steam lines which wet down exposed explosives and torpedo warheads and also put out the fires started by the bomb's explosion.

On the last day of the year, the remaining U.S. submarines were ordered out of the exposed Philippines to proceed south to Australia. However, "The Old Lady" was told to remain. In the face of this unwelcome news, the course of action and the activities which the CANOPUS undertook will long remain an outstanding example of the Navy, the Submarine Force, and the American bluejacket in the face of adversity. "The Old Lady" had already moved her torpedo shops ashore into Corregidor's tunnels. And now her craftsmen and technicians began to provide any and all support for all comers. The CANOPUS crew repaired rifles, made aircraft parts, built tunnel supports, fabricated make-shift dental parts -- and a thousand other things for the Marines, the Army, Navy Patrol Wing 10 and the Philippino Scouts. CANOPUS became an oasis for the beleaguered defenders of Bataan. All visitors to

CANOPUS could find there, ice cream, real china, ice, bed sheets and even dry beds. A remarkable tourist trade flourished as a result.

Because supply records and accounts had been an early casualty of enemy action, the supply system became a model of simplicity -- "If we have it and you need it, it's yours." Pay days became unnecessary. There was nothing available to be purchased.

Another air attack on 5 January left CANOPUS with a hole in her side and a pronounced list. "The Old Lady's" commanding officer, Commander Earl Sackett, ingeniously devised a stratagem. The hole was patched by the ship's welders, but the list was purposely left on CANOPUS. The bomb holes in the deck and the fragment scars were also left intact. The ship's cargo booms were cast askew and oily rags were carefully ignited below decks -- in the daytime -- to provide realistic smoke issuing from the -- to all appearances -- abandoned hulk. Her few anti-aircraft guns were moved ashore to provide protection without drawing attention to "The Old Lady." In this state of playing "possum", she looked deserted by day but was always busy at night for the remaining several months of her life.

The CANOPUS sailors were active ashore as well. With sailors from Patrol Wing 10, they formed the Naval Defense Battalion. Coached by a few Marines, they were armed with castoff or "borrowed" weapons. This Naval Defense Battalion was also outfitted in sailors' whites, dyed in coffee. But the desired khaki color was not achieved -- rather, the uniforms looked a sickly yellow.

In late January, the battalion saw action countering a Japanese landing behind the American lines. For five days the U.S. battalion opposed a large number of Japanese forces. Often

outflanked, our sailors remained unaware of their disastrous position, but instinctively some of the battalion was sent back to clear the rear area. Such an unconventional approach to jungle warfare bewildered the Japanese. Later, the naval battalion was relieved by Philippino scouts who drove the Japanese back to the coast where the enemy survivors took refuge in coastal caves.

By mid-February the Naval Defense Battalion had been incorporated into the Fourth Marines on Corregidor.

The cave-dwelling enemy caused CANOPUS people to invent the "Mickey Mouse Battleship." Each "battleship" was a forty-foot CANOPUS launch, but protected by boiler plate and armed with machine guns and a light field piece. The Mickey Mouse battleships fought the enemy in the seaside caves. During this period, one of the three armed launches was lost to an aircraft bomb while the other two finished their careers as make-shift minesweepers at Corregidor -- keeping the submarine link to the outside world open to the end.

As the situation in the Philippines rapidly deteriorated and became more desperate, "The Old Lady" could have been dispatched to Australia after her submarines had departed for good. But her chances of surviving the enemy's air and surface forces enroute were not judged to be good -- she was too slow and too vulnerable. So she finished her final tour at Mariveles Bay where she was backed into deep water under her own power and then sunk there by her own crew -- as Bataan fell. Then her sailors joined the death march to Japanese prison camps.

"The Old Lady" had done herself proud. No other support ship or tender had ever been subjected to such an ordeal. None has ever done a better job of fulfilling her mission.

On leaving EMORY S. LAND, I was filled with pride to look back at the accomplishments of my tender versus those of "The Old Lady." I recognized that CANOPUS had set a standard of resourcefulness, dedication, pride and tenacity which we on the LAND had worked hard to duplicate. Though the EMORY S. LAND was not tested in the hot furnace of war -- and I pray that she never will -- LAND's testing has come from a period of incredibly high standards which rise continuously, heavy work loads which increase constantly, and vital operations whose support becomes ever more complex and demanding. But I feel confident that the LAND and her crew have perhaps become the equal of "The Old Lady." Submarine tenders are proud ships too!

Captain R. Keith Young, USN

SOVIET NAVAL POWER IN THE PACIFIC

This article addresses the composition of the Soviet Navy in the Pacific, its basing, some of the reasons for its modernization, its missions in a major war, and its challenge to the U.S. Navy as the latter tries to advance American interests and the interest of America's allies in the Pacific.

Soviet naval power in the Pacific resides in the Soviet Pacific Fleet. It is one of four fleets in the Soviet Union, but it's the only one that's located in Asia. The other three are located on the European side of the U.S.S.R.. The Pacific Fleet has about 775 ships and submarines, including 85 major surface combatants, about 30 ballistic missile submarines, and about 90 general purpose submarines. Beyond that, there are about 500 combat aircraft. Those numbers reflect a fairly good period of quantitative growth since the mid-1960s which now has essentially leveled off. Compared to its sister fleets in the Western

U.S.S.R., the Soviet Pacific Fleet has traditionally been the "poor sister." One reason is that the Soviet's most modern ships have been designed and constructed in the European side of the U.S.S.R., and it took a while for them to migrate to the Asian side. But more importantly, it probably reflected wartime considerations. Clearly, a war in Europe would take higher priority, or there was a greater challenge there. If that was the case, the Soviets had to put their best units on the European side, and their less good ones on the Asian side. Since 1978-79, however, there has been a step-level increase in the qualitative capabilities of the Soviet Navy in the Pacific.

Because of the quantitative changes mentioned before, some people have argued over the last few years that maybe the Soviet Pacific Fleet is the strongest of the four Soviet fleets. Though that seems doubtful, the point is that statement couldn't have been made ten years ago. No one suggesting that, then, would have been taken seriously.

The Soviet Navy essentially operates out of four main bases in the Pacific. Two are Vladivostok and Sovetskaya Gavan. Those bases are both at the end of a rail terminal. That's an advantage in terms of resupply -- making sure that you have what you need, when you need it. A disadvantage -- or an advantage depending upon how you look at it -- is that, if you're operating in the Sea of Japan, in order to get out into the open ocean, you've got to go through certain straits or chokepoints. From the point of view of offensive operations this might be a disadvantage -- considering the fact that Japan is likely to be an American ally. Then, you'd have to make sure to get through those chokepoints before war occurs, or you'd have to try to capture those chokepoints. From the defensive perspective, though, the chokepoints might be an advantage. By

capturing or mining them, the Soviets could prevent the U.S. from operating in the Sea of Japan. So to some extent it's a two-edged sword.

A third major Soviet base is at Petropavlovsk on the Kamohatka Peninsula. It has the advantage of having access to the open ocean but it has the disadvantage that it is in one of the most isolated parts of the world. There are no railroads or roads leading into Petro. The only way it is resupplied is by sea, and from Sovetskaya Gavan that's roughly 800 nautical miles.

There's a fourth base worth mentioning -- one we built. The Cam Ranh Bay facility in Viet Nam provides the greatest amount of support for the largest number of Soviet units outside of the Soviet Union itself. For instance, there are about 20-25 Soviet Navy ships being supported by and operating out of Cam Ranh. Cam Ranh has advantages for the Soviets for a number of reasons. It can provide a dual threat axis, from the Navy point of view, vis-a-vis China, because the Soviet base at Vladivostok and the other Soviet bases are north of China. So from the Chinese perspective, it may be considered a major irritant. Another factor is that the Soviet Navy operates in the Indian Ocean and maintains about 20-25 ships at any one time there. Cam Ranh Bay is a very useful stop-over point for ships on their way to the Indian Ocean and back. A third aspect of operating out of Cam Ranh is that the Soviets can monitor traffic in the whole South China Sea area. This might be important in a conflict with China or with the West. Finally, flying from Cam Ranh, or from Viet Nam in general, with Badger or Backfire aircraft can pose a significant threat to U.S. naval and air facilities in the Philippines or to the Philippines itself.

There is nothing special about the growth of the Soviet Navy in the Pacific independent of what has been going on in the rest of the Soviet

military. It fits into a larger context of what's been going on with the Soviet military overall, and what's been going on with the Soviet military, particularly in Asia.

Five factors are relative here. One is that since the mid-1960s -- and maybe the Cuban Missile crisis had a lot to do with this -- the Soviet Union has been determined to provide itself with an unassailable nuclear deterrent posture. They wanted to see themselves in a situation where they could say, "We are absolutely assured that we can deter the Americans from ever thinking in terms of striking at the Soviet Union with nuclear weapons." There has been a tremendous buildup of their strategic nuclear forces. A good part of that buildup involved ballistic missile submarines. They're tremendously important to the Soviets and have a lot of effect on how the Soviets think about utilizing their Navy. Their SSBNs in war are going to be the Soviet Union's secure strategic reserve, because they are mobile and presumably harder to find than fixed land-based missiles. With a secure strategic reserve in something that's mobile and under water, the Soviets can think in terms of deterring escalation. The Pacific fleet now has about 30 ballistic missile submarines compared with the mid-'60s. That's about a 200% increase of ballistic missile submarines. Again, that increase has now tapered off, but the fact that it's increased so much gives one the sense of the Soviet's priority.

Paradoxically, while the Soviets were building up their strategic forces they felt they also had to build up their conventional forces as the USSR gained confidence over time, that it could deter the Americans at the nuclear level. They came to believe that if a major war breaks out, it might be kept at the conventional level, or that at least there may be some period of conventional war that might make a difference.

Hence the desire to have conventional military power in the nuclear age. The 745 or so general purpose naval forces that you have in the Pacific fit to some extent within this context.

A third reason for the Pacific fleet's buildup has to do with the Soviet Union's self-image. Read Khrushchev's memoirs. You get a sense of the inferiority complex that the Soviets have, particularly vis-a-vis the West. In this context, Soviet writings suggest that the Soviet Union is a world class power, not because of ideology, its economy, or its culture, but because of its power. Indeed the reason why the Soviet Union is a world class power has to do more with her military capability than with anything else.

A fourth reason for the buildup is the Soviet Union's desire to be an active player around the world. The Soviets have found that if you have globally mobile military power, that that can help in terms of being an active player. To some extent the British provided the example earlier on. The U.S. has certainly provided the example since the end of World War II. We've been able to influence events around the world by simply having forces that deploy to various areas. The recent events in the Mediterranean are a good example of that. The Soviets, among other things, must have said to themselves, "If we are a world class power, we need to have that kind of globally mobile capability. We need to be able to influence events in peacetime -- by being Johnny-on-the-spot at the right time, and the Navy in particular can help provide that capability."

Finally, the fifth reason is the Sino-Soviet rift. From the Soviet perspective the rift is bad enough, and the U.S. rapprochement with China made it even worse.

What will the Soviet Navy do should a war occur? One mission is ensuring that Soviet ballis-

tic missile submarines are secure, in order to guarantee nuclear deterrence. The submarines would likely operate in the Sea of Japan, in the Sea of Okhotsk, somewhere outside of the Kamchatka area and probably in a fairly large ellipse off the United States. It should be pointed out that the submarines patrolling in the sea of Japan have the missile range to strike most of the desired targets in the United States. To ensure the strategic nuclear reserve, the Soviets will devote a large proportion of their general purpose forces to directly providing protection to the ballistic missile submarines so as to keep them always safe, or as safe as they can be made.

That protection role fits into a second mission to establish what might be called a maritime defense perimeter around the Soviet Union. That perimeter has two zones, a sea-controlled zone that covers areas relatively close to home and a sea-denial zone. The latter could be a kind of no-man's water area. How far does the sea-denial zone go out? In an exercise last year a Soviet carrier group steamed 1500 miles east of Tokyo, then headed back towards the Kuril Islands chain. This Soviet force was subjected to attacks by Backfire bombers and submarines about 600 miles east of Tokyo. This gives one a sense of where the sea-denial zone might be -- though it might stretch even farther.

A third activity of the Soviet Navy would be to try to deal with our SSBNs coming out of their base at Bangor, Washington. They will probably devote some of their best submarine assets to that job because, from the Soviet perspective, our SSBNs may provide the most destructive threat to the Soviet Union.

A fourth mission would be the interdiction of sea lines of communication, particularly to and from Japan as well as to and from Korea. We are dependent enough upon Japanese components and

materials produced in Japan that in a major war the U.S. would be thinking in terms of what we take out of Japan as well as what we supply to Japan.

Fifth, the Soviets might be thinking in terms of protecting their own lines of communication to places like Petropavlovsk. Finally, as for Soviet amphibious forces, they might be used against areas such as the northern tip of Hokkaido in order to capture both sides of LaPerouse Strait. This would help guarantee one passage for naval forces in and out of the Sea of Japan.

What does all this mean for the U.S. Navy in the Pacific? The Soviets have to be concerned with the fact that they're up against an extremely formidable challenger. There are things the Soviet Navy wants to do and there are things we want to do. Clearly, we want to make sure that if a war occurs, our SSBNs get out on patrol and remain secure for the course of the war. Next, we want to establish maritime superiority, and we want to be able to project power. We want our general purpose forces to operate where they need to operate and do what we want them to do. We also want to put the Soviet Navy on the defensive -- particularly within the context of their maritime defense perimeter. Our general purpose submarines are going to have a big role in that. Also, we want to be able to establish and maintain sea control -- at the very least -- east and south of Japan. In the Sea of Japan or the Sea of Okhotsk, sea control might be questionable. But we want to be able, if necessary, to project power ashore against the Soviet Union. And, we want to maintain the sea lines of communications necessary to support our efforts. It's really the converse of what the Soviets want to do.

One weakness that the Soviet Navy has is of antisubmarine war-forces. What about their threat to our attack submarines which intend to

take the war to the Soviets, and keep them on the defensive? Our SSNs aren't going to have the advantages of an SSBN which can just simply hide. They must go out and take the war to the enemy. That way they're going to tie down a tremendous number of Soviet forces -- but the U.S. will lose attack submarines in the process. It's not going to be an easy thing, particularly if our SSNs are involved in an anti-SSBN campaign. U.S. SSBNs however should be survivable in a major war. In addition the U.S. should probably have general sea control east and south of Japan. In particular, in terms of Western sea lines of communication, the longer the war becomes, the better the situation should be.

In peacetime, if something occurs in the midst of a crisis, there's no great problem to having the U.S. forces necessary to deal with it. With two major crises in widely distant locations in the Pacific, we might have trouble getting all the forces we want in the right places at the right time. But even in a worst case there shouldn't be a great problem in at least getting the forces together. It's really a question of political will -- how to utilize those forces. We should recognize that the Soviets aren't reckless and that they take calculated risks. In their calculations there's only so far that they can go before the cost simply becomes too high for them. That's a political issue. In the end, we don't have to say to ourselves that we can't do it because the Soviet Navy is there. A second dimension of the peacetime challenge is more amorphous. The U.S. Navy must not only be strong in the Pacific, it must look strong. Present trends on both counts are good.

[Ed Note: This article is a condensation -- stressing submarine aspects -- of a talk delivered by Dr. Don Daniel at the Naval War College's Current Strategy Forum on June 19, 1986.]

A NAVAL MAN'S WAR IN THE SOUTH ATLANTIC

[Ed. Note: My remembrance of submarine combat in World War II indicates that what the men of Coventry experienced in the Falklands War will hold good, as well, for today's submariners when they go into a big sea war. To know what to expect is half the battle against the fear of going to war. And, the way a submarine crew is likely to react in combat can be more easily understood from this striking account by Captain Hart-Dyke, RN, in the Washington Post.]

Four years ago, my ship - the HMS COVENTRY - went to war in the Falkland Islands. The ship never returned; it now lies 300 feet down in the South Atlantic. The men who survived learned some fundamental things about themselves and about war.

The Falklands conflict showed that, as always in war, the critical factor is morale. High morale is the quality which makes men endure and show courage in times of fatigue and danger. It is this quality, not so much the advantage in numbers of men and weapons that counts. And the cultivation of morale depends on good leadership, discipline, comradeship and devotion to a just cause.

The British task force had all those ingredients off the Falklands in 1982, and the enemy did not. We had confidence and the enemy did not. Our men never doubted that they would win and they could not wait to start the battle and then to get home after the victory. That is what made the Falklands such a total triumph.

Oddly, the most testing and frightening time for me was the period before the conflict started, as we sped south and prepared for war. It was a time of sobering self-examination and adjustment. Somehow you do have to remove yourself from the safe and familiar world of peace and come to terms

with the largely unknown existence of real danger and violence. I found this far from easy.

The days of not knowing whether we had to fight or not - of listening to the BBC giving the latest reports on the chances of successful negotiations - were unnerving, mentally exhausting and for most people extremely hard to take. I suppose it was because we feared to go to war and to leave our safe and friendly world - maybe forever.

These days were hard for me because I had to remain outwardly unafraid and cheerful in order to provide that much-needed strength of leadership for my ship's company. My men began to watch me more closely and listen to every word I uttered, such that any chink revealed in my armor would have considerably increased their anxiety and even, perhaps, reduced their will to fight. Their lives were in my hands and I could feel it.

As the chances of a political settlement slipped away and war seemed a real possibility, we became somewhat concerned. A mood of anxiety pervaded the ship.

There was also the traumatic experience for many of preparing the ship for war; securing for action, for real. The issue of morphine, life jackets and identity discs to wear around the neck, together with the removal of pictures, trophies and soft furnishings made a dramatic impact. Letters from home, thoughts of family and friends, heartfelt messages and telegrams wishing us good luck and a safe return all added to the tension and highlighted the risks ahead.

After three weeks of worry and uncertainty, it finally came as a great relief when it became clear that there was no option left but to fight. Our anger mounted against this harsh and unpredictable enemy. Morale rose and we became

united to a man in our purpose. The faint-hearted became strong, the ship's company as a whole stiffened to the tasks and we went headlong into battle, confident and, outwardly at least, cheerful.

For myself, I was particularly thankful that I had had a long experience at sea in destroyers and frigates. I was confident and did not find it difficult to go to war. I was surprised how very quickly I discarded all peacetime inhibitions and thinking. Many rules and regulations became irrelevant. My life suddenly became very straightforward and my aims crystal clear: they were aimed solely at getting at the enemy and surviving; and that concentrates your mind on essentials.

One essential to grasp very early on is that you are on your own. It is no use worrying the flagship with your problems or expecting a spare part to appear out of the sky to overcome this or that defect. You have to fix things yourself. We somehow fixed our long-range radar in the middle of an air raid by using the elements of a toaster from the junior ratings' dining room. We used the steel legs of swivel chairs bolted to the floor of the helicopter to provide revolving machine gun mountings.

As we approached the war zone, the dangers and the challenges seemed to produce a step-up in ability overnight in most people. Young sub-lieutenants found themselves conning the ship while refueling alongside a darkened tanker in the blackest of nights and in the dirtiest of weather, and they did magnificently. The first lieutenant often took command of the ship for a few hours in the night so that I could get some sleep.

This was a new experience for us all and until the first disaster occurred we could not begin to imagine what the horror of war was really

like. Besides, there is always the hope that "it will never happen to you." Hopes such as this, however fragile in reality, are very strong in war; they actually keep you going, however dangerous the fighting might be. They prevent you from anticipating or imagining what disasters could befall you, or indeed what the real risks are. This is a perilous state of mind which I suspect prevails among all but the really war-hardened.

The first few days of war were nervously exciting and cheers erupted throughout the ship when enemy aircraft were shot down. But we had not yet seen real war, we were naive and far from being battle-hardy.

The real conflict started when we began to suffer losses ourselves. Attitudes then changed and our excitements and reactions became more measured and mature. We were quite close to HMS SHEFFIELD when she was hit and the effect on my ship's company was devastating. Hardly a word was spoken for nearly 24 hours and people had to struggle to overcome their fears and emotions.

At the end of that day my petty officer steward came into my cabin and with noticeable emotion remarked, "It has been a bad day today, sir," and I replied, "Yes, it has been a bad day." That is all we could say and that was difficult enough. It was hard to talk without giving away one's fears, and our minds were too occupied. We were stunned!

This incident shocked us into reality and made us all realize how difficult it was going to be to bring our ships close to the enemy air force and land the army with all its equipment safely on the beaches of the Falkland Islands. This was, after all, the only way to win the war. We were now rapidly becoming battle-hardened. Twenty-four hours after that first tragedy, we were no longer

gloomy. Morale returned to a high point and we became even more determined to hit back at the enemy just as soon as we could.

Thoughts of getting home to a hero's welcome were highly motivating, and I became acutely aware that nearly 300 people were depending on me to get them home safely. I told them that my holiday was booked from the 4th of August and so we would have to be back by then; out of this statement arose an almost mystical belief that no matter what happened, we would get back by this time -- because the Captain had said so.

After SHEFFIELD was sunk and HMS GLASGOW put out of action, we shouldered more of the hazardous tasks. We were frequently deployed to the front line against the enemy air force and to protect the vital amphibious shipping in San Carlos Water. Our task was to control the Sea Harriers (carrier jet fighters) so as to get them poised in the right place to meet the incoming air raids and to use our Sea Dart missiles. It was clear that we had to draw the enemy fire away from our troops and to be sacrificed if necessary.

We only saw our friendly forces to the east of the Falklands when we refueled or re-ammunitioned in the middle of the night. We always felt safe among the familiar dark silhouettes of the task force on these occasions and when we came to leave to return to our solitary post, we had to steel ourselves to do so and hide the fear at what the next day's battle might bring.

When we had survived the daytime, and darkness came to give us some measure of protection, I used to sit down in my cabin with a glass of port, a King Edward cigar and a Mozart symphony. That was sheer heaven!

During these last few hectic days we all knew

the odds were against us emerging unscathed. We always knew that we might be hit from the air; it was just a question of where and how many casualties we would sustain. After all, several other ships already had been damaged. I frequently thought along these lines and I am sure most of my sailors did, but we never admitted it openly. That would have been demoralizing. Conversations were brave and cheerful, and invariably confident that we would all get home safely. We were all strengthened by such reassuring talk, however much we inwardly believed that some of us might never get back.

I was shocked when, a day or two before the end, my first lieutenant came into my cabin and with hesitation said, "You know, sir, some of us are not going to get back to Portsmouth." Although it disturbed me to hear him say that, it was very brave to admit to his captain what he really felt, and we now no longer had to pretend to each other about the risks we were taking. He included himself among those that would not return and in his last letter home he told his wife so. She received the letter just after she heard the news of his death.

These were difficult days indeed, and I found it demoralizing to wake each morning to beautiful, clear and sunny weather which favored the enemy air force and illuminated us sharply against the calm blue sea. I waited on the bridge, heavily clothed for protection against fire, life jacket and survival suit round my waist, ready for the next air warning signal. I then went down to the operations room to prepare to counter the threat. These moments demand considerable nerve and a brave face as men watch you go below wondering whether they would see you again.

Tuesday, May 25 was one of those days. We had survived two air raids and shot down three aircraft with missiles. I responded to the next

inevitable air raid warning and went below with more feeling of fear than before. I paused momentarily at the top of the hatch and talked to the officer responsible for the missile system. I never saw him again. At 6 p.m., precisely, I pressed the action station alarm from the command position in the operations room.

We listened to the air battle and tried desperately hard to avoid losing the fast and low-flying enemy aircraft on radar and to predict where they were going next, so as to guide the Sea Harriers to the right place. It was like a fast-moving computer game, full of tension, all eyes strained and almost impossible to win. We knew we would lose if we could not keep up with the quickening pace. The pale and anxious faces told the whole story. I looked at the clock -- it was nearly 6:15 p.m. -- and prayed that it would go faster to see out this last air raid of the day and bring on the night. The light was already beginning to fade as another brilliant sunset developed.

At 6:15 p.m. we came up against a very brave and determined attack by four aircraft. We engaged with everything we had, from Sea Dart missiles to machine guns, and even rifles, but one of the aircraft got through, delivering three 1,000-pound bombs, which exploded deep down inside the ship. The severe damage caused immediate flooding and fire, and all power and communications were lost.

Within about 20 minutes the ship was upside down, her keel horizontal a few feet above sea level. Later she sank. It is still remarkable to me that, but for the 19 men tragically killed by the blast of the bombs, some 280 of us got out of the ship -- much of which was devastated inside and filled with thick suffocating smoke. I can only put that down to training, good discipline and high morale.

It was about 6:20 p.m. when my world stopped. I was aware of a flash, heat and the crackling of the radar set in front of my face as it disintegrated.

As I came to my senses, nothing could be seen, except for people on fire, through the dense black smoke but I could sense the total devastation of the compartment. Those who were able took charge calmly and effectively. It seemed like an age, but when you are fighting for your life, the brain speeds up and time slows down; your actions and thoughts are very narrowly focused, enabling a precise concentration on the right priorities for survival. At times like this, pain, injury and freezing seas are not even distractions; they do not enter into your calculations or decision-making. There are more important matters to think about.

When I eventually got to the upper deck, as the ship was beginning to roll over, I saw the ship's company abandoning ship. It was quite remarkably orderly and calm, looking just like a peacetime exercise. I am still trying to discover who gave the order to abandon ship! Perhaps no one did. People just very sensibly got on and did it. It was the only thing to do.

When I had watched everyone jump into the sea and get into their life rafts, I walked down the ship's side, jumped the last two feet into the water and swam to the life raft. My war was over.

When we were fighting for our lives and being rescued from the water, there were many brave deeds done by many of my sailors.

A young officer directing the close range guns from the very exposed position of the bridge wings did not take cover when the enemy aircraft were closing at eye level and strafing the ship with cannon fire. He stood there for all to see

and ordered the gun crews to stay at their posts and engage the enemy until he gave the order to stop. This order was not questioned by the very young sailors manning the guns, and they kept firing despite their totally exposed position. They remained at their posts, even though the ship was burning and listing steeply, in case of another air attack. Eventually they were ordered to join the rest of the ship's company in abandoning ship.

Between decks, two chief petty officers, separately and on their own initiative, revisited smoke-filled compartments when everyone else was on the upper deck and the ship listing dangerously to port; they ensured everyone still alive was got out of the ship. One found a senior rating unconscious, his clothes on fire and slumped over a hatch above the engine room. He got him to the upper deck and saved his life.

The other chief petty officer managed to get two very frightened young sailors, trapped in a compartment, to climb past a large hole in the deck through which intense heat and flame was flaring. He saw them safely to the upper deck and saved their lives. This chief petty officer then continued his search, totally alone, and by wriggling along on his stomach to keep below the layers of suffocating smoke, looked into several spaces for survivors before saving himself and swimming to a life raft.

It is, of course, terrible to lose a ship and some of your people, but it is made easier to bear when you have seen your officers and men, regardless of the dangers, being cheerful, fearless and totally dedicated to the ship and the cause for which they were fighting. It was an unforgettable privilege to have led such professional and brave men in action.

Since that fateful day I can say that I have

learned a great deal about the effects of shock. The most immediate effect is that you are unable to appreciate what has really happened and you are therefore largely unaware of the horrific experience you have been through. This is nature's way of shielding you from the awful reality and protecting you until you are ready to know the full scope of the tragedy.

It is a process which takes considerable time and cannot easily be speeded up. It is like entering a narrow tunnel whose limited and close horizons can be seen and coped with, and which gradually widens as progress is made through it, until emerging at the other end with full consciousness and a normal appreciation of events in the real world. The tunnel was very narrow when I started the journey of rehabilitation on the night of May 25 and I finally came out at the end some 14 months later.

It is only now, looking back, that I can fully realize what a dramatic and frightening experience I had been through. At the time you are so completely wound up and braced for war that everything is taken in your stride; fear and even disaster can be faced with not too much difficulty. Times of great stress that call for the hardest test of leadership are also comparatively easily coped with in the heat of war. But when it is suddenly all over, then it is impossible to adjust to an environment where there is no war and no requirement for decisions or leadership.

The city of Coventry presented my ship, when she was first commissioned, with a cross made from three large medieval nails from the timbers of the roof of the Coventry Cathedral, which was destroyed by German bombers in 1941. When it came to prepare the ship for action, all such trophies were taken down and secured in a safe place. However, at the particular request of a young and

rather frightened petty officer, I let this cross remain defiantly where it was. It had, I think, become a symbol of hope and survival for him, no doubt to many others as well at this time.

Tragically, like the medieval cathedral, our cross did not survive that day.

Seven months later the cross was recovered -- by chance -- from the wreck of the ship 300 feet down. I later returned it, quite unharmed, to Coventry Cathedral for safekeeping. I will present it at the end of next year to the new HMS COVENTRY.

Captain David Hart-Dyke, Royal Navy

ADMIRAL TROST'S LUNCHEON REMARKS

(at the Naval Submarine League Symposium,
10 July, 1986)

I want to speak about a number of things. And also I want to pass on to you a comment made by a former shipmate of mine out there in the audience as I was coming in a little earlier, who said, "How's the pace?" Now, when you are in your second week of a new job, the pace is always fast. The pace in this job is faster than anything I've had for some time. But I was also reminded by his question that I'm probably well prepared for the pace because Shannon Cramer told us in SIRAGO that there were two orders which must immediately follow the order to surface. The minute you hit the bridge the first thing was, "Answer bells on four engines", and immediately following that, "All ahead full." Now, that all sounds good, but the real reason was obvious -- it was to get into port before Bob Long hogged the best berth!

I believe I was originally to speak here as Commander-in-Chief of the Atlantic Fleet, and I was going to share with you my perspectives of the

fleet and especially those of the Submarine Force -- that very important component of not only the Atlantic but also the Pacific Fleet. I want to do that. But I also want to share with you some thoughts as to where we are going, what the problems are in the Navy at large, and what I would like you to do. I was told when I accepted this invitation that I'd be speaking to the choir, and that's certainly true. It's fun to speak to the choir once in a while because it's nice to know that there are people out there who agree with you, and hopefully will say that they do. When you speak to the choir you don't pass the plate in their direction. But I do intend to pass the plate in a sense anyway.

I want to start by complimenting all the officers of the Submarine League for the tremendous job you've done in recent years gaining this level of attendance. Its absolutely superb. And I'm delighted to see it at a time when the importance of the Submarine Force needs to be better recognized. We need this so sorely that it is especially gratifying today to see a group like this out there giving us support.

I'm reminded by my old staff down in the Atlantic Fleet that the half-life of sea water is about six months. So, before I forget all about the fleet, let me tell you about it. Bud Kauderer kept me informed over the last nine months of what the Submarine Force was doing. But he didn't have to -- because I told people repeatedly that the one organization under my command that could operate totally without my attention was the Atlantic Fleet Submarine Force. Why? Because they do things well. They do things professionally. They do things without reminder. Or as Admiral Joe Metcalf would say, "They scoot ahead of the rabbit, instead of trying to catch up with it." And that's pretty important. I have to tell you that in the entire time I've been a naval officer, I've never felt better about the Fleet,

about the Navy, about the Navy's readiness, and especially about the caliber of people we have serving in the Navy. That applies across the board. We in the submarine force have always prided ourselves on the caliber of our people. Let me tell you, it's there across the board. It's been said that we can look back on '85 and '86 as the good old days, because it will never be like this again. Well, one of my jobs is to make sure that that's not true. But things have really been superb. You've read a lot about the battle groups in the Mediterranean, in the Gulf of Sidra, off Libya, intercepting airplanes in the dead of night. I saw an interesting article the other day that said, "Gee, this was a piece of cake, anybody could have done it." Well, let me tell you, those guys launched airplanes, F-14's, A-6's for tankers, and E-2C's, in a period of sixty to ninety minutes after getting the "Go" from the President of the United States. They went out and found a single airplane in a twelve hundred mile lane. They had to sort that airplane out of hundreds of others in order to intercept it, and then they had to be really "heads up" to get it where they wanted it to go. That's good airplanes, that's good aviators, that's good navy personnel.

That kind of performance got the headlines, but so has the picture of the three submarines surfacing at the North Pole. Be assured the Soviet submariners watched that one very, very carefully; they are probably still studying those pictures and wondering how many more are going to pop up and where and when. And that's something we are going to keep doing. Most of what the Submarine Force does, you don't read about. You don't read about it because we're not talking about it or we don't want you to read about it. But it's there nonetheless. The Submarine Force has operated in every area of the world's oceans -- independently, carrying out some very, very key missions; as an element of battle groups;

providing an increasing contribution to integrated training as we work up our battle groups for deployment; and providing an increasing role in ASW and improving our ASW capability. Bud Kauderer has been working with all the LANTFLT TYCOMS for over a year to get better coordination among all forces providing our ASW capability. Many of you would, I think, be astounded at the fervor with which P-3 pilots strive to ride submarines, to find out what they're like and what is going on down there. You would be surprised at the coordination of anti-submarine warfare operations themselves in the Atlantic and the Pacific. You would be surprised at the strides we are making. I suspect you'd even be surprised by the attitude and caliber of the people you'd encounter if you went aboard ship. We were talking a bit ago about the many groups of senior businessmen who visit our ships. We literally run the socks off of those folks and they come out in the evening smiling and talking about all they've seen. But what they talk about the most is the amazing group of people they have run into. Just before I left the Atlantic Fleet I received a letter from one group of fifty-two gentlemen who were with us in June -- businessmen from all over the country -- and the comments focused on the quality of persons that they had seen. One gentleman said, "You know, I figured there would be a couple of nice looking guys out there in uniform to be the front men for every ship. So onboard USS RICKOVER I quietly talked to two guys, and got the same answers. And then I saw some guy over in the corner who didn't appear to have anything to do with the tour, and I talked with him, and he was just as sharp. I'm not sure how you guys do it, but it sure is great."

I can tell you how we do it, and we've been doing it in the Navy for the last five or six years: We've been recruiting some very, very fine people, and more importantly we've been retaining them.

In one of my confirmation hearings about a month ago, a member of the Senate Armed Services Committee said to me, "I don't know what you guys are worried about budget-wise, because if we did nothing right now, there is so much money out there unspent, some even unobligated, that you guys could coast for the next couple of years; and if we did nothing until the next presidential election we'd still look pretty good." And the answer to that is, O.K., that's true. We could ignore the personnel situation for a short time, We'd still get the hard work, and we'd probably still have most of the people, but we'd be right out there at the edge of the cliff ready to drop off because there wouldn't be anything left coming downstream. It is a fact that right now the submarine force is in pretty good shape. Support for programs in recent years has been strong. Support for the SSN-21, for example, on the Hill is very, very solid. The need is recognized, and so is the value of the sound judgement that designed the ship. In fact most of the systems in the SSN-21 are out there being tested in bits and pieces right now. I hope we get the ship in great numbers because we certainly need it.

My big concern is what is going to happen next. In the current fiscal year the Navy suffered about a six percent cut in real program growth. We can probably do that once. We'll have to wait and see whether we will do it twice depending on the outcome of this year's budget negotiations. But you can't do it for very long. It is valid to say that we've seen steeply increasing budgets over the last five years. That's absolutely true. But when you're in the hole and trying to get out, once you get your forces, get your good quality people, get sustainability, torpedoes, spare parts, and things of that nature, all of which has made us the ready force that we are today, then you've got something. We're almost there, but not quite there in the Navy. There is also criticism that the Navy has gotten the lion's share of the

budget over the last several years. Again, it's relative. The lion's share has in fact gone to the entire Department of the Navy, which includes our Marine Corps, at a proportion close to one-third of the defense appropriation over the last five years. It's also been a decreasing share by about a fraction of a percent a year. Not that anybody's going to notice much. It has been going up in real dollars, and that's where we need support. But if you went back, as I've done, to look at the budget starting in 1949, and if you look at a constant dollar chart adjusted for inflation -- we've had tremendous peaks and valleys ever since that time. Twenty-seven years of peaks and valleys in the budget. Peaks come when there is a war, and valleys come immediately thereafter and immediately after every opportunity to rebuild our strength.

So where are we headed? If we continue to play this yo-yo game, within a couple of years of serious budget decline we are going to see the biggest fraud, waste, and abuse this country has ever known. Because we are going to throw away not only the dollars we've spent but the quality of the men and women we've brought into the Navy, and that's even sadder. Congressmen find it hard to understand when I tell them that my first and foremost priority is people, and that they, members of Congress, have no credibility with Navy people. They are astounded. They shouldn't be. We have no constancy in the direction of support for our defense effort. The Russians don't worry about such problems. There's no Gramski-Rudmanovich Bill in Moscow to cut back on funding and solve the national deficit. In our country all of us in uniform recognize the need to cut the deficit. We recognize that that's one of the President's principal priorities, and we don't challenge that because we think he's right. What we do challenge is the assertion that somehow or other defense is something other than the absolute necessary underpinning of every other national

program. It is the first program to support our nation, not the one from which you pay the price for all others.

As I said, I'm not sure where we're going. I do know that I will try to influence where we are going because I don't think we have two months to waste. All of us on my staff are firmly committed to spending a lot of time talking to members of Congress. We will make sure that we do everything we can to help them support our strong Navy which we so badly need.

But we need understanding not only by Congress but by all of you. I've had a chance to do a lot of speaking in the last nine months to audiences in various parts of the country. One of the things that I told members of Congress when I was called for my confirmation hearings is, I have yet to go to a part of the country and speak to people who don't believe that defense is necessary.

People have pointed to waste in the defense budgeting, and there has been some. What has been reported in the papers is what we ourselves have found. I think all of you know that we have no tolerance whatsoever for people who are fraudulent in their activities or people who are wasting money. We can't afford that. What we in the Navy are going to do is keep working hard to root out waste and excess spending even though we recognize that it is a minuscule segment of the money allocated to us. For those of you who contract with us, we are going to continue to do our best to make you compete and make you carry your bottom line down to the point where although you are profitable, your profit is fair and reasonable and not excessive. I would add that it has been in most cases.

We are also going to look at ourselves. We are going to pick up every rock, turn it over, and

say, is this really the right way to do things? There is a tendency for us to become complacent and looked into a way of doing business, to say to ourselves, "We've always done it this way, this is time proven," and all the other old saws. I can tell you that having just come from a Fleet whose operations in steaming hours and flight hours were under funded by a combination of budget cuts and Gramm-Rudman reductions this past year -- underfunded to a tune of 14 percent -- when you get cut a little here and a little there, you start looking hard at everything you are doing and asking yourself if what you are doing is really the right way of doing it. I know Admiral Kauderer constantly shared with me a feeling that what we were doing in the Atlantic Fleet was the right thing to do. We simply threw it on the wall and started over and said let's look at how we are operating. Let's look at what we are doing. Let's re-sort our priorities and let's look at how we can continue to deploy very ready battle groups, very ready submarines, very ready support ships, and do it at a total cost that is probably about 10 to 12 percent below what anybody would have anticipated at the start of the year. And that's the kind of thing we will have to do Navy-wide, because the money is not going to be there. The budget is going to be tight, and that's a fact of life. That's not a bad fact of life either, because it tells us that maybe we can contribute to reduced budgets and a declining national deficit without at the same time giving up the readiness that is so important.

And that's where I need help and understanding. I can't stand here and pass the plate and say, "Go out and lobby for the Navy." That would be inappropriate. But what I can tell you is that there is a tremendous need in this country for people who are knowledgeable not only about our achievements, but about the problems we face in the future. Those problems are first and foremost the budget, and within the budget, people

programs. Since 1983 we have gained anywhere from 50 to 80 percent of the personnel end-strength increases we needed to man today's Navy. When Congress appropriates funds and authorizes the construction of new ships and aircraft, they do so several years ahead of the manning requirement. Unfortunately, by the time the manning requirement comes along they have forgotten what they did previously. So, we have never gotten all the people that we needed. We did pretty well last year. They only cut 5,000 from a request of 15,500 people. This year our new requirement, taking into account the deficit in prior years, and the need still to come from the ships under construction, is about 11,400. The Senate lopped that in half. The House then said, "We'll give you 2,000." That kind of thing has resulted in Fleet support being narrowed down to the point where the guy who says to you, "we see no impact on the Fleet side" is right. He hasn't seen it. But the sailor on shore duty who used to work forty-eight hours a week is now working seventy hours a week. He isn't complaining yet. He'll have his opportunity the next time somebody sticks a reenlistment contract under his face. We are being told that the way to save money on defense budgets is simply to freeze pay. The troops are saying, "Hey, why me Lord, why always me?" Congress is going to have to understand that that's not the answer. People are challenged. They are satisfied with what they are doing. And we owe them support, in the areas of decent compensation, and from my point of view, good back-up services in the kind of help they need when they're deployed, where dependents who need understanding can come for help. That's why I ask you all to weigh in. Understand us -- and most of you do -- understand our requirements -- at least keep up with what is going on -- and whenever you get the opportunity to speak up in our behalf we would appreciate it.

Admiral Carlisle A. H. Trost, USN
Chief of Naval Operations

SOVIET WRITINGS

[Ed Note: In response to requests by SUBMARINE REVIEW readers for more unclassified Soviet writings on submarine subjects, the following two items are included here.]

SOVIET NAVAL DEFINITIONS

Submarine Screen

SUBMARINE SCREEN (Zavesa podvodnykh lodok), one of the forms of tactical alignment (of a hunting or battle formation) of submarines in their accomplishment of a common combat mission. The regulated positioning and order of coordinated submarine maneuvering in the screen increase the probability of detecting and attacking the enemy, help attain tactical coordination, and increase safety against mutual destruction. Depending on the purpose, the following submarine screens are distinguished: attack screens, assuring delivery of an attack by the largest possible number of submarines in the screen; reconnaissance screens, ensuring high probability of detecting the enemy and the subsequent guidance of other forces to him; and reconnaissance-attack screens, permitting an optimum combination of accomplishment of reconnaissance missions and a subsequent attack on the enemy by the screen's submarines. The alignment of the submarine screen includes establishing coordinates of the center of the screen, and designating screen formation (line abeam, quarter line of bearing, wedge), distance between and adjacent submarines, submergence depth, and so on. Coordinated maneuvering is achieved by establishing the screen's heading, lap duration, general speed on the lap, time for beginning movement in the screen, and other elements. Control, movement, and vectoring of the submarine screen to the enemy is supported by information passed from shore or shipboard control stations. Operations of submarine screens were

employed widely by the command element of the fascist German fleet against allied convoys in the Atlantic, as well as by fleets of other states during World War II. Submarine screens retain their significance under present-day conditions. (Sovetskaya voyennaya entsiklopediya, Vol 3, 1977, p. 359. USSR)

UNDERWATER FLIGHT

by

V. Voskresenskii, 1976

Up to the present time, man has not experienced any economic need to accelerate underwater speed. Exploratory devices probing the depths of the World Ocean move at a speed of less than 10 km/hr, and their mobility is further reduced with depth. Although the "speed ceiling" underwater is approximately 100 km/hr, the speed of the fastest submarines does not exceed 50-60 km/hr for a number of reasons.

Today there are two distinct types of autonomous bodies: living creatures, created by nature, and transport equipment, created by man.

An interesting picture is formed of the competition between hydrocraft and hydrobionts (creatures living in water). The maximum speed of sailfish and certain species of squid (100-120 km/hr) is still not attainable for hydrocraft and cannot be explained from the standpoint of modern hydromechanics.

At the present time, studies conducted on animal motion have revealed the possibility of effecting an energy analysis of autonomous body motion, in particular, a comparative analysis of the motion specific to hydrocraft and hydrobionts. Such an analysis will be useful in predicting future underwater transport technology.

In order to achieve high speeds at large

depths with good economy, the future designers of underwater devices will have to depart from the traditional scheme: body of fixed configuration - thermomechanical engines and steadily rotating (steady-flow) propellers -- and turn to bionic systems, simulating specific locomotor mechanisms peculiar to living inhabitants of the undersea world. The simulation of squid motion looks especially promising since this "live underwater missile" is similar in structure to modern engines and propellers.

What are the most likely operating principles of bionic underwater locomotor systems? They are as follows:

- cybernetic control of interaction between body and medium;
- pulsed operating conditions of locomotor organs;
- developed resistance-reduction mechanisms with local "regulation" of the physical properties of water.

We can assume that, in future high-speed hydrocraft, the flow acceleration function will be carried out by a working propeller. Various types of devices will be able to effect resistance reduction. The technical bases for the creation of such systems -- new energy sources, pulse engineering, synthetic materials, etc. -- are either available or "on the way in" from scientific theory to engineering. Over the last few years a strong trend has been observed in hydrodynamics towards the study of nonstationary regimes of interaction between bodies and continuous media in order to develop hydropulse devices, et al.

At the present time, the problem of pulse motion has only been fully resolved in the animal world, and most effectively in cephalopods or fishes. Research on this type of motion are

gradually bringing hydrobionic specialists to a more profound understanding of the mechanisms involved in the motion of marine dwellers, in particular to a solution of the mystery surrounding under-water flight and to the possible realization of its technical simulation.

The symbiosis of hydrobionic principles of motion and the latest technical advancements evidently makes it possible to design ultra high-speed underwater devices which attain speeds of about 300 km/hr and up. Furthermore, several major hydrobionic laboratories in Europe and the United States have already been working for a few years on the problems of underwater travel at speeds of up to 400 km/hr.

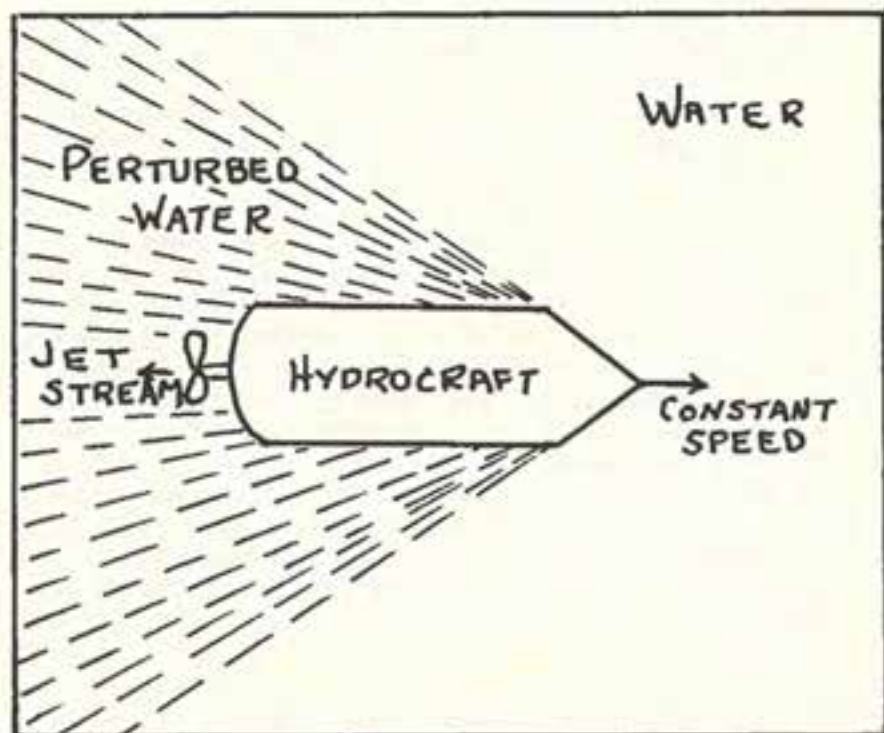


Figure 1
Motion of Hydrocraft

The perturbed volume of water is many times greater than the volume of the hydrocraft. The jet stream, creating a thrust, utilizes a negligible part of the volume of the perturbed medium. The stream has constant acceleration since it is ensured by the steady rotation of the screw propeller. The body does not take part in the creation of a jet stream, and has a fixed configuration. The hydrocraft moves at a constant speed. An energy-flow diagram for the "hydrocraft-perturbed medium" system is shown.

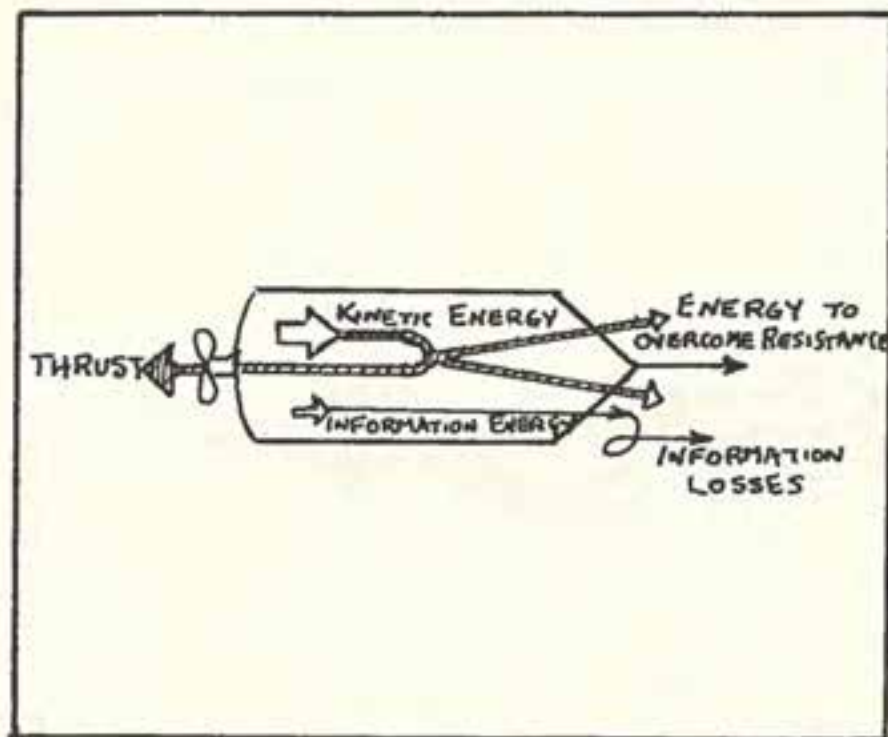


Figure 2.
Energy Model of Hydrocraft Motion

Kinetic and information energy enter the system from the side of the engine. The information processes are poorly developed and unilateral in nature. The processes involved in creating thrust and overcoming resistance occur separately. Most of the kinetic energy is spent on idle perturbation of the medium -- while part of it is converted into useful work for effecting hydrocraft motion. Some of the information energy, together with the energy of thermal and structural fields leaves the system in a form which creates irregularities in the surrounding medium. An increase in hydrocraft speed produces a sharp drop in the kinetic efficiency of the "hydrocraft-perturbed medium system."

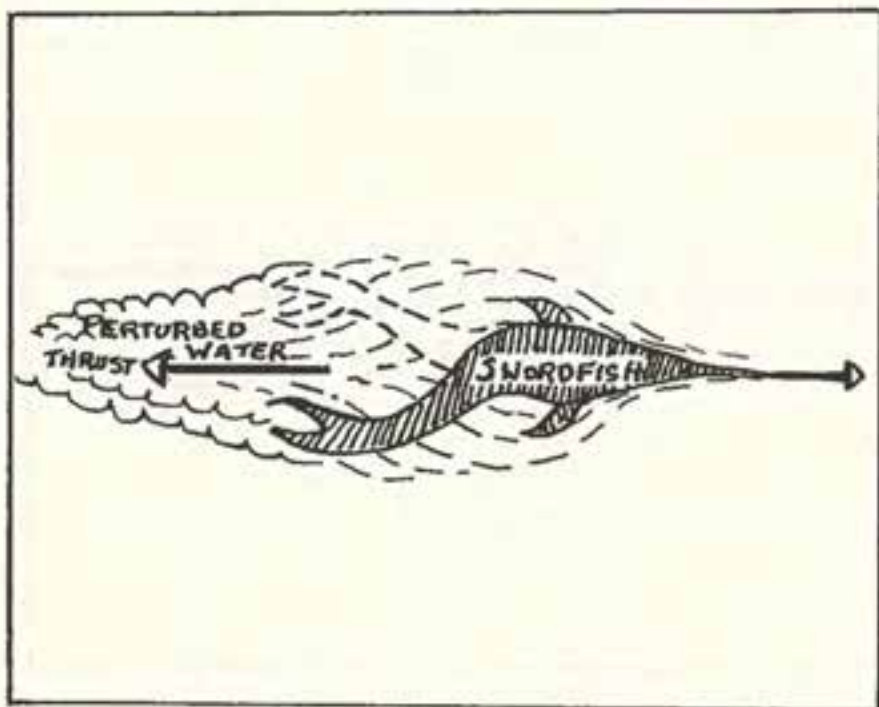


Figure 3.
Motion of Swordfish

The perturbed volume of water is of the same order of magnitude as the body volume of the hydrobiont. The jet stream utilizes most of the volume of perturbed medium. The acceleration of the stream is variable since it is ensured by vibratory body motion. A large portion of the length of the hydrobiont varies only slightly, whereas the width of its projection on a plane perpendicular to the direction of motion varies significantly. The hydrobiont moves at variable speed, and changes in the latter are determined by the discrete operation of its locomotor complex.

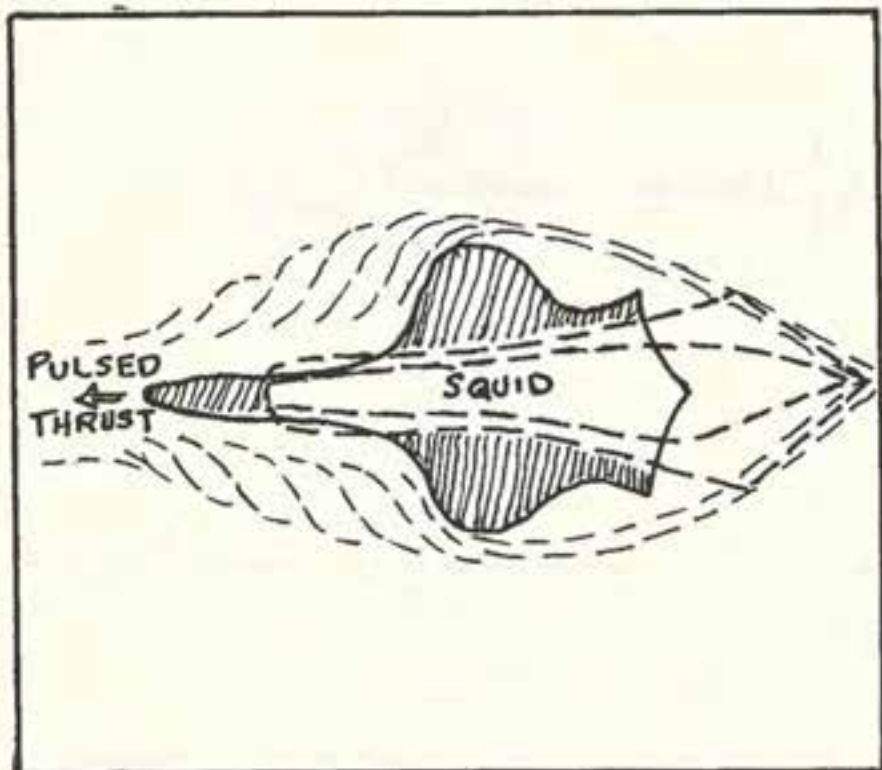


Figure 4.
Motion of a Squid

A large portion of the inner mantle surface of the hydrobiont takes part in the creation of a jet stream. Body configuration undergoes cyclic variation during motion. In other respects, the motion of squid is similar to that of swordfish.

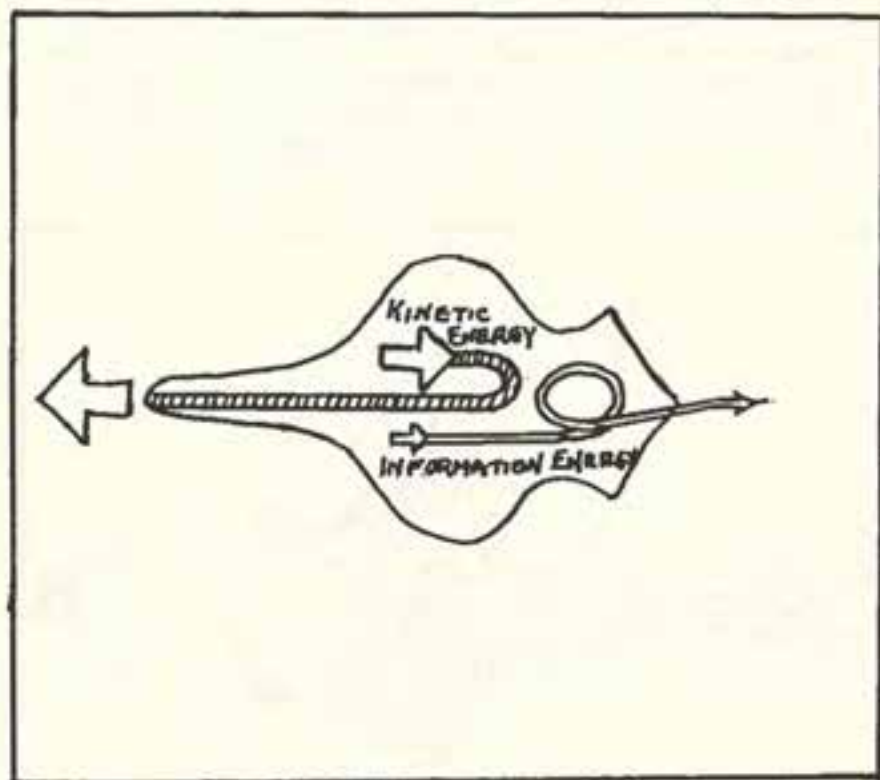


Figure 5.
Energy Model of Hydrobiont Motion

Bioenergetic and neuroreceptor processes ensure entry of both kinetic and information energy with developed feedback into the system. The creation of thrust and the overcoming of resistance exerted by the medium, form a single process. Information flow ensures the circulation

of kinetic energy between body and medium; hardly no kinetic losses are observed in the system. Total energy losses are represented as a fluctuation function, similar to Figure 2. Kinetic efficiency of the "hydrobiont-perturbed medium" system may also remain high at speeds which are unattainable by modern hydrocraft.

DISCUSSIONS

ENOUGH OF THIS "SILENT SERVICE" BUNK

It's a crying shame that our submarine navy got tagged with the term "Silent Service." If there was ever a valid reason for using such a term, that time has long since passed. "Silent Service" should be stamped out of the Navy's vocabulary. It is counter-productive to the creation and maintenance of one of the nation's greatest needs, a strong submarine force. In the first place, it undermines the sense of pride every submariner should have. Secondly, it prevents the submarine service from getting an adequate share of the national budget. Finally, it acts as a bar to the free exchange of tactical and technical information, without which we cannot develop the most modern and effective submarine service.

The Effect of a "Silent Service" on Pride

A first concern must be for the officers and men of the submarine service. As a World War II submariner, I know that true military power is achieved through the development of an efficient team. The crew is more important than the ship and all its equipment. The functioning of a submarine's crew can be likened in many ways to that of a top notch football team. Its effectiveness depends upon the capabilities and actions of each man. They need confidence in

their ability to meet and overwhelm the enemy; confidence in their team mates, confidence in their ship, and confidence in their submarine organization. With that confidence comes pride. Every submariner must be made PROUD to wear the submarine insignia. But how can anyone take pride in being a member of a "Silent Service"? Just to use the words makes one feel second rate. Do you think an aggressive fighter pilot would belong to an outfit labeled with that term? The high turnover rate for submariners since WW II bears out the fact that too few men want to select the submarine service as a career.

That feeling must be changed. Undoubtedly, the men of the submarine service have done things of national interest or importance within the past five years, but I can't recall hearing about them. Quite the contrary; I have been sorely dismayed to hear only of collisions and groundings. Such stories make one wonder at what seems to be an unprofessionalism of those in command of our submarines. Can a sense of pride in submarining be developed from such a base? Groundings, collisions and other similar humiliating events reflect poorly on all members of a submarine team -- from the commanding officer to the most junior man on board. What needs asking is: "Is this biased news reporting the result of the 'Silent Service' policy?" I think it is. Everything seems to be kept secret except those unfavorable events that can't be swept under the rug.

One cannot develop much pride without a public recognition of the good points. If others have pride in your organization, you will absorb it yourself. I was greatly impressed recently when a sportscaster at the Greater Hartford Open golf tournament interrupted his coverage of the game to don a Navy blue cap with the insignia "JFK CV-67." He then announced to the world that he had been aboard the JFK the previous week and the operations he had witnessed made him "proud to be

an American." How do you think that made the crew of the JFK feel? Mighty proud! The carrier Navy will never be saddled with the "Silent Service" appellation.

The Effect of a "Silent Service" on the Budget.

Let's face the facts. We live in a world in which all the tax supported organizations of the United States are competing for budget money. And, as Vice Admiral Griffiths also pointed out recently, when it becomes necessary to balance the budget, the Gramm-Rudman legislation "mandates equal percentage cuts down to the level of individual line items."

Decisions on Defense Department allocations should be based on improving the nation's combat capability. The navy's combat capability lies in its ability to utilize the vast ocean areas of the world -- to get within attack range of prime targets. To exploit this major operating area, the navy must buy the maximum combat capability it can get for its share of the national budget. This is where submarines should play a greater role. The submarine is the only type of naval combatant that has a reasonable chance of survival in an environment of an all-out, all-oceans war. In this age of satellite reconnaissance and communications, computerized command and control systems, long-range nuclear armed ballistic missiles, and other advanced weapons and delivery systems, our surface ships are not likely to survive long enough to be useful in a prolonged war.

Simply put, defensive measures are not likely to effectively protect our surface combatants in a major war. Despite all the ballyhoo about the 600-ship, mainly surface navy, the life expectancy in war of surface ships in today's world should probably be measured in minutes. Moreover, the Navy's "big stick" cannot be provided by surface

combatants but rather by ballistic missile launching submarines.

In addition, our Navy's ability to destroy enemy ballistic missile launching submarines -- the DELTAs and TYPHOONS -- on their stations cannot depend on our surface ships. What the navy needs is a stronger anti-submarine capability composed of ASW submarines. And there are other navy missions, that are best performed by submarines in areas close to enemy shores; for example, close-in intelligence collection.

In brief, under a "Silent Service" policy, the greater combat value of submarines as compared to surface combatants will not be recognized, and under Gramm-Rudman the situation will become even worse. If we don't tell people of the greater value of submarines they cannot be expected to recognize it, and submarines will not be adequately budgeted.

The Effect of a "Silent Service" on Open Communications.

When the U.S. entered World War II there was an inadequate knowledge of submarine tactics and equipment. It had been taken for granted that while being an externally silent service there would nevertheless be adequate dissemination of classified information -- internally. But the "Silent Service" consistently bred an environment of ignorance of things that needed to be known. This is illustrated by the two examples which follow. While these are examples from history, I assure you that similar cases exist today. Further, as more and more sophisticated equipment is placed aboard ships and aircraft, I predict that the situation will worsen.

Mariveles Bay -- a good stone's throw from Corregidor -- had been chosen early in December, 1941, as a dispersal site for some of the fleet

submarines of the Asiatic Fleet. During the night of December 7th-8th, my boat, the USS PIKE, lay at anchor in the Bay. About four in the morning on the eighth, the below-decks watch roused me, the Exec, from my sleep. The desk light was turned on and I was handed an ALNAV message reading "EXECUTE WPL-48 AGAINST JAPAN." PIKE did not hold, and I had no knowledge of WPL-48, but I knew that WPL stood for "War Plan" and that the designation "Japan", meant to go to war against Japan. I immediately ordered the General Alarm to be sounded to awaken all hands, and then ordered the ship to be rigged for dive. Shortly thereafter word of the Jap attack on Pearl Harbor was reported by radio stations around the world.

PIKE was well fueled and provisioned, except that she did not have a full load of torpedoes. The last six were held aboard a tender anchored nearby.

Shortly after dawn, COs and Torpedo officers from the submarines present were summoned to the tender. Soon after, our CO returned from the tender with orders to depart that evening for a war patrol off Hong Kong. About mid morning the Torpedo officer returned in a motor launch with the torpedoes which were quickly struck below without interference from the Japs.

An hour later the Torpedo officer came to the bridge. In a whisper he asked me to come to the forward torpedo room to look at something. When I asked about the nature of his problem, all I got was "Shh, just come with me." It was clear that something serious was troubling the Torpedo officer, so I followed him below. Shortly I saw a torpedo with war head attached, resting on a skid in the middle of the forward torpedo room. At first glance it looked like any other torpedo. But a closer look revealed what appeared to be a ten-inch section of curtain rod protruding from the nose of the warhead. "What's that?", I asked.

The Torpedo officer put his finger to his lips and again in a whisper said, "Shh." Then he continued in barely audible tones, "it's part of the magnetic exploder."

"What magnetic exploder?"

I was again hushed. "We were told on the tender that we are to replace the contact exploders with these," the Torpedo officer explained. "It's TOP SECRET!"

A closer inspection revealed that the rod protruding from the warhead was surrounded by an opening about an inch and a half in diameter. "Isn't sea water going to get in through that hole?" I queried the Torpedo officer.

"Yes, that's the problem. We have a plug to put in there, but we can't insert the plug with that rod sticking out."

"What's the purpose of the rod?" I asked. "What would happen if you got a hack saw and cut off enough of the rod so that you could put the plug in?"

"I don't know," replied the Torpedo officer.

Together we examined the base plate holding the exploder mechanism in the warhead and jiggled parts of it around. After a while we concluded that there was no way the entire device could be assembled so that the rod would not protrude through the hole in the nose.

"Reinstall it as a contact exploder," I directed. "We're leaving on patrol shortly and these torpedoes still have to be secured in the racks." And so, USS PIKE's torpedoes went on patrol for several months with contact exploders.

PIKE's problem with the magnetic exploder was

not the only problem with that exploder. However, it is not the purpose of this article to rehash the exploder problem. Its prime purpose is to point out that the end users of the exploder knew nothing about it until after the war had started and at a time when it would have been impossible to install it as received, even if it had worked properly.

A second example of "Silent Service" secrecy with its lack of disseminated information involves the initial installation of the SD radar, the device that in time became our best protection against Jap air attacks. In late February, 1942, I heard that SWORDFISH had had an SD radar installed. As both PIKE and SWORDFISH happened to be in port in Fremantle, Australia, at the same time, I made it a point to talk to the skipper about how his SD had performed. His answer, to the point, "it was no good." He told me that, for example, they had passed within two miles of a 5,000 ton freighter just off Perth and that the SD had failed to detect it. I didn't learn until months later, after the Battle of the Coral Sea, that the SD was an air search radar and was not effective against surface ships. I can only assume that whoever installed the SD in SWORDFISH knew nothing about its use, or if he did, there was no attempt to convey any information on the radar to the SWORDFISH personnel. I often wondered how long it took for the people on the SWORDFISH to find out that they had an air, and not a surface search radar. Failures of communication such as that in wartime can be disastrous.

Secrecy is counter-productive in this age of rapid technological advance. It is absolutely essential that new ideas be freely presented, discussed, rebutted or reinforced. At the turn of the century, the recommendation of Lieutenant Sims (later Admiral Sims) relative to the installation of telescopic sights on naval guns, is a case in point. His brash idea was rejected on the grounds

that the recoil of a gun on firing would drive the telescope through the pointer's eye.

Silence is not Golden.

The submarine force needs to have its capabilities advertised. Public interest in the submarine service needs to be generated. It won't be easy, but with these objectives, enough brains within and without the submarine community can make the public sit up and listen. This is not to deny that there are a few aspects of submarine warfare that must still be cloaked in secrecy. But as with the sportscaster, mentioned earlier, there were no secrets revealed when he announced that his trip aboard the JFK made him feel "proud to be an American." (Cannot the Submarine League sponsor trips on submarines for selected members of "the public?")

William P. Gruner

WHAT'S IN A NAME?

The SSN 21 "SEAWOLF" class of submarines will return to the past practice of submarines being named after fish, starting with the names of those submarines (also named after fish) which distinguished themselves in World War II.

It appears we will have gone a full circle -- but do we really want to?

Up until the inter-war period, submarines were simply designated by a letter prefix followed by a hull number, the last class being the S-boats. The decision was made in about 1922 to name new submarines after fish. This was based on their increased importance and a perceived need to give the ship more than just a number. Every other ship in the Navy had a name, so why shouldn't a submarine? Over 140 diesel submarines

were commissioned between 1924 and 1959, honoring numerous denizens of the deep from BARRACUDA to BONEFISH.

The dawning of the age of nuclear propulsion for submarines saw a continuation of the tradition of naming submarines after sea creatures, starting with the NAUTILUS (of 20,000 Leagues Under the Sea and diesel boat fame), SEAWOLF, the SKATE class, SKIPJACK class, THRESHER class, TULLIBEE, and the 637 or STURGEON class. The wedding of nuclear propulsion with ballistic missile technology inspired the naming of SSBNs after famous Americans, starting with George Washington (SSBN 598) and ending with Will Rogers (SSBN 659). Forty-one famous Americans were so honored, and a Navy public relations film was aptly named "Forty-one for Freedom."

Ichthyologists have identified over forty-thousand species of fish and sea creatures. Yet, after using only about 300 names, tradition was again interrupted in 1970 when an attack submarine, SSN 680, had its name changed from REDFISH to WILLIAM H. BATES during its construction period. Tradition was quickly restored with the BATFISH, TUNNY, PARCHE and CAVALLA.

Ship naming became more political after 1970, and the SSNs laid down in 1971 were named GLENARD P. LIPSCOMB, L. MENDEL RIVERS and RICHARD B. RUSSEL, honoring Congressmen who had been patrons of the Navy and Submarine Force.

The first of the 688 class SSNs laid down in 1972, were named after cities. LOS ANGELES was followed by BATON ROUGE, PHILADELPHIA, MEMPHIS, OMAHA, CINCINNATI, GROTON, BIRMINGHAM, NEW YORK CITY, etc. Congressmen liked the idea of being able to have their cities so honored.

When the first TRIDENT was laid down in 1976,

the decision was made to name these capital warships after states (similar to cruisers and battleships). OHIO was followed by MICHIGAN, FLORIDA, GEORGIA, HENRY M. JACKSON (ex RHODE ISLAND), ALABAMA, ALASKA and NEVADA. HENRY M. JACKSON (SSBN 730) and H.G. RICKOVER (SSN 709) are two exceptions to this new policy. They honor important Americans of recent fame.

One of the more noticeable achievements of the Reagan administration has been the resurgence of pride in America and in her military. The pendulum has swung away from the disdain for the military evident in the early 1970s. Hence military personnel now wear their uniforms with greater pride, and more frequently in public places. Also, most cities and states have turned out in a grand style to support the submarines named after them, and many cities continue an ongoing relationship with their namesake ship. Recruiters have been able to use ships, named after their cities and states, to help canvass the slowly dwindling manpower pool which demographers indicate will be getting even smaller as the twenty-first century is approached.

What constituency is there for a fish?

By comparison with the past, the city of Groton, Connecticut, has phenomenal relations with USS GROTON each year during GROTON Week. Patriots Day is a state holiday in Massachusetts. This year it was declared USS BOSTON Appreciation Day, and included a presentation to the ship by the Mayor of Boston of a silver Revere bowl inscribed "To the Patriots onboard USS BOSTON." Albuquerque, Dallas, Baltimore, the City of Corpus Christi (just to name a few) have turned out in grand style to support their ships. This is good community relations, good recruiting and positive feedback for those of us who still go down to the sea in ships.

The SSN 21 class is still several years away. There are 250 million Americans dwelling in 5500 cities and towns across the United States, over 100 of which have a population of over 150,000. Let's continue giving them a clear and easy way of identifying with the U.S. Navy and submarine force. Fish don't vote, enlist, or go down to the sea in ships -- but people do.

CDR Paul J. Ryan, USN
Executive Officer, USS BOSTON
FPO New York, NY 09565

NEW IDEAS

SABMIS -- SUBMERGED

In the early 1960s Rear Admiral George H. Miller's "Great Circle Group" was an ad hoc committee to study possible naval contributions to the strategy of "damage limitation," or ballistic-missile defense (BMD). One of the group's concepts was the Sea-Based Anti-Ballistic Missile Intercept Ship (SABMIS). This was to be a forward based surface ship system capable of intercepting ballistic missiles in their boost or mid-course phase. SABMIS would add sea power to continental defense, while avoiding the complications of land deployment of ABMs.

The system was to operate in the far north, be equipped with phased array radars to detect and track enemy missiles, and guide interceptor missiles at them. A weakness of the concept was the proposed use of the PHOENIX missile as an interceptor rather than an extremely high speed missile such as SPRINT, or a modification thereof.

The idea may have been "right" for U.S. national strategy, but was not a favorite in naval circles or in the U.S. defense community in

general. Traditionally, defensive systems have had few proponents, despite the fact many combat seasoned admirals, generals and sports coaches will say it's difficult, if not impossible, to win without a strong defense. Recognizing that all required technologies for SABMIS had yet to be proven, Admiral Tom Moorer contended that it was a complement to other defensive systems -- providing a better defense in depth. The concept was thus stillborn!

With today's "on the shelf" and "cutting edge" technologies, a new SABMIS may be possible in both the tactical and strategic arenas. Why not consider the "phased out" Polaris/Poseidon SSBNs for a strategic defensive role? Patrolling in the marginal ice zones, equipped with anti-ballistic missiles of modified Sprint design, or long-range I.R. homing missiles of Stinger type configuration appear possible. Real time target data could be provided from satellites, or perhaps from NORAD via satellite or a common-user communications and strategic information system.

On board computers could generate fire control solutions. If SABMIS SSBNs were attacked by the enemy before a preemptive strategic strike, then strategic surprise would be lost. In line with the SABMIS of the 1960s and 1970s, this new SABMIS system would be supportive of the strategic defense initiatives (SDI), not a replacement for them.

Tactically, the fire power possibilities of nuclear submarines suggests the converted SSBN as a candidate for fleet (battle-group) defense against cruise missile attack. Working with the Aegis or DDG-51 type guided missile ships for target acquisition and tracking, the converted SSBN might be equipped with sail or mast-mounted laser-beam, nuclear-powered X-ray beam or charged particle-beam weapons.

Also, the vertical launch tubes designed for Tomahawk in the SSN-688 class might be adapted for terminal defense weapons. Radical? Yes. Possible? Probably.

"Parochial" planners will argue that this is a waste of submarine assets, that NORAD might obtain operational control of the SSBMs, and that their conversion funds are needed for better naval purposes. The crux of the matter is, however, that submarine forces do not operate in isolation. What they do at sea can be related directly to gaining advantages ashore by affecting land operations. If sea-based damage limitation, as a supplement to SDI, serves the national interest, we should extend the traditional submarine "can-do" spirit into this "new" mission area.

If the "Silent Service" is no longer to be silent, then it can develop, by open discussions, new applications for submarine support of U.S. national objectives.

Dick Ackley

LETTERS

POST GRADUATE EDUCATION

Post graduate education has been a goal of most naval officers in recent years. This is in consonance with civilian society, where an advanced degree is desirable or even necessary for a wide variety of today's professional. Advanced education is a broadening experience at the same time that it leads to a Navy subspecialty. The wide base of knowledge required to support a specialization tends to produce a more flexible, adaptable individual.

In past years, relatively few submarine

officers were able to participate in post graduate programs. A rapidly growing force, inadequate accessions, and poor retention combined to require that submarine officers remain at sea. The good news is that improved accessions and retentions have resulted in a revised career path which provides a greater opportunity for post graduate education.

Reviewing the current status: there are now eighty-eight submarine officers either studying at post graduate schools or with orders to do so. At Monterey, previously hard-to-meet quotas have been met and exceeded with forty-four submarine officers assigned. Additionally, several officers are involved in special programs. Two are currently taking part in the Olmsted Foundation Scholarship Program which provides for two years study at overseas universities. Six 1120's are involved in the MIT/Woods Hole Joint Masters in Oceanography Program, which leads to designation as an oceanography subspecialist (xx49P). Three submarine officers are at Harvard, one at MIT, and one at the Defense Intelligence School. Submarine officers are also assigned to forty of the sixty-four Naval ROTC units as instructors. These officers are encouraged to pursue masters degrees while on campus.

Completion of a masters degree normally leads to designation as a subspecialist in any one of numerous fields such as operations analysis, national security affairs, strategic planning, organizational effectiveness, and weapons systems engineering. In all, there are forty-eight approved subspecialties, and FY-86 saw submariners studying in twenty of these curricula. Clearly, submarine officers are well-represented among the Navy's post graduate scholars.

Captain Edgar D. Hux, USN

HELP FOR ADMIRAL ECCLES' PAPERS

With support from the Naval War College Foundation, we are engaged in following up the work of our friend, the late RADM Henry E. Eccles, USN.

In view of Admiral Eccles' early specialization in submarines as this technology was developing during the 1920's and '30's, we thought you and your organization might be interested in knowing about the Eccles Papers Project.

In connection with our work on Admiral Eccles Papers, we would very much appreciate learning of surviving submariners who served with Admiral Eccles in the submarine phase of his career, which extended from shortly after he graduated from the Naval Academy in the same class as Admiral Rickover until the mid-1930's.

Scott A. Boorman
Paul R. Levitt
Dept. of Sociology
Yale University

THE THERMOPYLAE

In September, I and an old submarine pal, my ex-commander, will be holidaying in America. We will be touring with our wives through the southern states. One of our targets is to visit the ALAMO in San Antonio. We are hoping to take a photo of my pal and I holding a white ensign with the "ALAMO" behind it. The ensign is the one we flew in the World War II submarine "THERMOPYLAE" whose name refers to the Spartan warriors who defended the Pass of Thermopylae during the Greek wars against the Persian Hordes. What brought about our idea was a quotation by an American general at the time of the Alamo:

"Thermopylae had her messenger of a defeat --
the Alamo had none."

General Thomas Jefferson Green, 1841

The messenger referred to in the above quote was the 1st marathon runner who ran 26 miles from the Pass of Thermopylae to Athens to inform the Greek king of the Spartans great battle (300 Spartans against several thousand Persians.)

The motto of our submarine HMS/m THERMOPYLAE (P 355) was "Victory in Defeat." As history shows, the brave men who fought and died in this submarine, actually brought about final victory by their acts of heroism.

Les Hanks
Hants, UK

CLASSIFIED INFORMATION IN TOM CLANCY'S BOOKS?

I write in response to Jim Patton's letter in the July issue of the SUBMARINE REVIEW.

When I wrote THE HUNT for RED OCTOBER -- and RED STORM RISING -- at no time did I have access to sensitive information of any kind, unless you count what I read every morning in the Washington Post.

The Naval Institute submitted the original manuscript of my first novel to two active-duty submarine officers, one a former submarine CO, the other an officer qualified for command. Though one of these officers originally recommended against publication -- on the issue of security -- I demonstrated to him how I acquired all my technical information, and he withdrew his objection on the spot. I further offered to remove anything that he thought was somewhat sensitive, and received the following response: "I'm not going to tell you what to take out, you

dumbass, it's classified!" I have been told that I guessed right (and wrong) on a few things -- but nobody will tell me what I guessed right (or wrong) on, of course. This is rather frustrating, but entirely proper.

To the best of my knowledge I have never been exposed to sensitive information by anyone, and I have no desire to be. On the other hand, I am free to use anything I see in the open press, and there is no law against using one's imagination.

Tom Clanoy

IN THE NEWS

o Correction: USS FLASHER (SSN 613) was incorrectly identified in the last issue as an SSBN.

o One-star submarine Admirals, Dean Sackett, Guy Curtis, Guy Reynolds and Roger Bacon have been promoted to 2 stars.

o Rear Admiral Charles R. Larson, Superintendent of the U.S. Naval Academy, has taken command of the Second Fleet and is being promoted to the rank of Vice Admiral. Rear Admiral Ronald F. Marryott, the President of the Naval War College at Newport, takes over the duties of Superintendent of the Naval Academy.

o The New London Day of August 17, 1986, reports on the commissioning of the USS NEVADA at the Electric Boat Company on August 16th -- the eighth TRIDENT ballistic missile submarine to join the U.S. Fleet. Senator Paul Laxalt, in the main address at the commissioning said, "This magnificent vessel is not an instrument for war, it's an instrument for peace." Senator Laxalt also praised the TRIDENT submarine as the

virtually invulnerable leg of the U.S. defense triad of sea, land, and air-based missiles. He noted that "70% of our nuclear weapons are based at sea."

o Sea Power/June, 1986, quoting from Jane's Defense Weekly of 10 May, 1986, notes: "The United Kingdom has placed the contract for its first TRIDENT submarine with Vickers Shipbuilding and Engineering. It will be called HMS/m VANGUARD -- the first of a 4-vessel 'V-boat' force -- the others will be called VENGEANCE, VICTORIOUS and VENERABLE. Each boat will have 16 missile tubes and each missile will carry 8 UK-designed and produced warheads, dispensed from a U.S.-supplied MIRVed bus."

o Sub Notes of June, 1986, tells of the conventional O-type submarine NAUTILUS -- built in 1917 -- which was converted for Sir Hubert Wilkins' Arctic exploration, and which sank in a fjord outside of Bergen, Norway, in 1931, having been found in 350 meters of water. "MAX", a privately built RCV used by the Norwegian Underway Technology Center, made positive identification of the old diesel boat. The pictures taken showed NAUTILUS halfway buried in mud with all deck hatches open and with no major damage evident. The NAUTILUS developed engine trouble before Sir Hubert was able to attempt a polar under-ice run and she was scuttled before reaching port in Bergen.

o Aviation Week & Space Technology of 30 June, 1986, quotes Len Hopkins, opposition spokesman for the Liberal Party in Canada's parliament as saying: "West coast surveillance has been neglected, and now we're getting an equal number of visiting Soviet subs off both Atlantic and Pacific shores. Where you used to get one in the Pacific and three in the Atlantic, now you get three in each. We think they're doing a lot of mapping and if war ever comes, they'll have the

dope on our channels and currents.... Government interest in securing more naval weaponry is increasing. Possible purchases in the next 5-10 years include 8-12 submarines, with 3 or 4 in the first installment."

o Navy News & Undersea Technology of 20 June, 1986, reports that the Polish Navy may soon receive as many as four KIL0-class submarines from the Soviet Union -- replacing the 3 WHISKEY-class subs which the Poles have now. A Polish crew is presently training onboard the first KIL0 in the Baltio. All the boats will be based at Gdynia, according to a "well-placed" source. Such submarines, according to Michael McGwire of Brookings Institution, "are intended to provide area defense to the mainland in the Soviet concept of operations."

o Also in the same edition of Navy News & Undersea Technology, is a plan by the Israeli Navy -- which uses MK 37 torpedoes in its three GAL-class submarines -- to update their Westinghouse battery-powered, MK 37-type 1970 torpedoes with a Honeywell thermal-powered version. This latter version, the NT37E, would be built by Westinghouse teamed up with an Israeli firm, *Tadiran Ltd. Initial development work is expected to be done by Westinghouse in the United States but Tadiran Ltd. would do the rest of the work.

o The USS ALEXANDER HAMILTON (SSBN 617) has completed her 69th patrol -- the most ever made by a fleet ballistic missile submarine. During her 20-year career, the ALEXANDER HAMILTON operated from Rota, Spain and Holy Loch, Scotland, spending 13 years submerged in deterrent patrols and covering more than 700,000 nautical miles.

o On March 8, 1961, the SSBN PATRICK HENRY sailed up the Firth of Clyde and moored in Holy Loch. Twenty-five years later, on March 8, 1986, the U.S. Navy, in conjunction with the British

Royal Navy and the Argyll and Bute District Council, commemorated the 25th Anniversary of the American presence in the Holy Loch area. A cairn and heather garden were donated to the Argyll and Bute District Council by COMSUBRON 14. The cairn bore a plaque inscribed "Twenty-Five years of cooperation 1961-1986. In recognition of the men and women of the Royal Navy and the United States Navy who have sailed from the Clyde to maintain peace."

o Vice Admiral Kenneth M. Carr, USN(Ret.) will be nominated to a five-year term as a member of the Nuclear Regulatory Commission according to a White House announcement. Admiral Carr, a former Commander Submarine Force Atlantic Fleet, will succeed Nunzio Palladino on the Nuclear Regulatory Commission.

o Sea Power of July, 1986, notes that "Two Soviet-built ROMEO-class diesel electric submarines have joined the Syrian Navy, according to Israeli sources. The arrival of the two submarines restores a capability that was lost by the Syrian Navy in 1961. Though elderly, it is believed that these boats will be used for training purposes and could be followed by more sophisticated submarines like the KILO-class.

o Richard Halloran, writing in the New York Times, August 4, 1986, quotes Vice Admiral Chuck Griffiths, President of the Naval Submarine League: "The League is not a lobby. We have no paid lobbyists and we make no uninvited visits to Capitol Hill. Submarine programs did not need outside support in Admiral Rickover's days because he was a tremendous salesman. But later we recognized that Admiral Rickover's influence was eroding and it became apparent we were losing a lot of strength in Congress. So," said Admiral Griffiths, "the League is trying to fill the vacuum that opened up when the pervasive influence

of the late Admiral Hyman Rickover waned after 1981."

o An Associated Press release of 15 August, reports that "The Pentagon has agreed to spearhead a search off the Egyptian coast for an Israeli submarine that mysteriously disappeared more than 15 years ago. The DAKAR, a diesel-powered submarine with 69 men aboard disappeared in January, 1968, after leaving England on its maiden voyage bound for Israel. The search for DAKAR is expected to last 90 days and will be a joint project of the U.S., Israel and Egypt. Egyptian participation seems crucial since debris found over the years have convinced Israel that the sub went down within Egypt's 12 mile territorial limit.

o Armed Forces International, August, 1986, in an article by Robert King tells of the unveiling of the TIGERFISH Mark-24, Mod-2 quiet long-range heavyweight torpedo on 17 June. The new Mod-2 version retains only the hull and battery-driven propulsion unit of the old model. RADM Richard Heaslip, the British Royal Navy's Flag Officer Submarines, said, "My submarines now have an operational advantage over the Soviets in what we call the 'deep cold war'." TIGERFISH is wire-guided but contains its own sonar with computer for a homing, final approach to its target. The warhead is designed to explode beneath the target, tending to break its back. (When a torpedo explodes under a ship its warhead creates a gas bubble which hits the keel of the ship and lifts the ship bodily. As the ship settles back into the water, the bubble is contracted, then it expands again lifting the ship at least once more. Such a whipping action tends to break a ship in half.) The SPEARFISH torpedo is expected to be operational in two years. But, "the SPEARFISH will be noisier than the TIGERFISH because it is a thermal torpedo and faster -- the

two will be complementary ... TIGERFISH is our 'stealth' weapon."

o Defense Week of August 4, 1986, under the by-line of Paul Bedard, tells of a Navy project, "X-1312", which is a new listening sonar network for detecting the Red Navy's ever-quieter fleet of submarines. "The system will connect underwater listening devices -- placed about one mile apart -- with fiber-optic cable. The devices will be placed on the ocean's bottom in grid form, "allowing the Navy to hear more than can now be heard by the SOSUS system. Each listening device will have a range of about one mile. Thousands of devices spread throughout a listening area -- probably a choke point -- will make it extremely hard for an enemy sub to stay away from the listening devices. Design of this new system is expected to be finished by mid-1990s."

o Defense Week of August 11, 1986, tells of the use of trained seals, dolphins, porpoises and possibly whales to conduct anti-submarine warfare and mine sweeping jobs. The three major projects center on: uncovering how the mammals' biological sonar system works; training seals and dolphins to clear enemy mines from harbor areas; and development of a capability for the mammals to attach limpet mines or tracking beacons to Soviet submarines. "Seals, dolphins and porpoises are attractive because they are highly intelligent and enjoy playing games such as tag. The mammals are also very fast and can sprint at speeds up to 40 knots." A member of the Cousteau Society noted that there were reports that the Soviet Navy already has trained mammals to "blow things up." In a recent test, the article says' "that, relative to the clearing of mines in the Charleston, SC harbor, nearly 80% of the objects the mammals identified as mines were actually mines -- a substantially higher identification success rate than that experienced with mechanical devices."

o An article in The Washington Post, datelined 22 August, says that the Soviet Union has built new submarine bases on the fortified Kola Peninsula. This is based on photos of the Kola Peninsula taken by Landsat, a civilian U.S. satellite. Pictures from this satellite show that the Soviets have established major naval bases in every fjord between Pechenga on the Norwegian border and Murmansk -- about 80 miles east. It has been known that a submarine base was being built at Gremikhan. The peninsula houses 75% of Soviet strategic submarines, which can cruise for the most part undetected under the Arctic polar ice cap.

o The Washington Times of 30 June, notes that, "The persistent problem of foreign submarines penetrating the important port of Harsfjarden in Sweden is to be 'solved' when the Swedish Navy finishes construction of permanent steel nets and cables anchored on the ocean bottom which will seal off every channel leading to Harsfjarden. The nets can be lowered in place for the passage of ships."

o Navy News & Undersea Technology of 28 March, reports that the U.S. Navy has signed a memorandum of understanding (MOU) with the French Research Institute for the Exploitation of the Sea, that provides for the mutual rescue of each nation's deep submersible research submarines. The U.S. SEA CLIFF and the French NAUTILE are covered by the agreement. Both can operate down to 20,000 feet of depth. In case of an undersea accident, the Navy will transport the other submersible to an appropriate port, aboard a C-5. (The SEA CLIFF's HY-100 pressure sphere has been replaced with 2.8 inch titanium plating, and the old lead batteries have been replaced with silver zinc ones, giving SEA CLIFF about triple the battery power.)

o Defense Week of June 16th, in an article by Paul Bedard, describes the "huge strides" made by the Soviets in the quieting of their submarines. He quotes Admiral James Watkins, the former Chief of Naval Operations: "Of all Soviet Navy developments over the past decade, the improvements in their submarine force has been the most striking." With the appearance in 1978 of the VICTOR III -- much quieter than the VICTOR II -- it became apparent that the Soviets were integrating quieting technology in their new submarines. While the Soviets appear to be behind the U.S. in quieting technology, "the swiftness with which they have caught up has alarmed many ASW experts." Thus, with the recent deployment of ever quieter nuclear-powered attack submarines -- the AKULA, MIKE and SIERRA classes -- the U.S. quieting advantage is seen to be "disappearing." The AKULA (seemingly a scaled-up ALFA), it is estimated, "may be as quiet as some of the SSN-688s deployed in the late 1970s." Equally sobering is that the ALFA, a much smaller submarine than the VICTOR, "was able to keep the noise level steady with the VICTOR while reducing hull size by 22 percent." And, the AKULA, apparently a larger version of the ALFA and using the ALFA's quieting techniques is proving quieter than any sub ever deployed by the Red fleet. Thus, today's war games which use the traits of the new quiet Soviet submarines, show a trimming of the 3 to 1 exchange rates enjoyed by U.S. subs in years past. The acoustic advantage we've always enjoyed has eroded. "and that erosion is occurring much quicker than anticipated." said Representative Charles Bennett, Chairman of the Seapower Subcommittee of the House Armed Services Committee. It is concluded that, "The Navy's key weapon to combat the quiet Soviet submarines remains the SSN-21 submarine now under development."

o Defense Week of 25 August, reports that Gould Inc. will do the full-scale development work

on the Navy's SEA LANCE anti-submarine missile. The SEA LANCE, carried by Navy submarines, is a standoff weapon that will deliver a nuclear depth charge (as a replacement for SUBROC) or a conventional warhead torpedo. Boeing is the prime contractor for this weapon, but Gould will do work on the afterbody and fin actuators as well as on the equipment in the forward and aft capsule enclosures.

o After 10 year's production, the Navy has received its 474th and last TRIDENT I missile from Lockheed Missiles and Space Co., completing the Navy's inventory of TRIDENT I's. Eventually, TRIDENT II missiles will replace all TRIDENT I's on board OHIO-class submarines. The first 21 TRIDENT IIs are in production and are expected to be deployed in 1989 on board the ninth and succeeding TRIDENT submarines.

o Defense Week of 25 August, reports that in a first-of-a-kind move the Navy has Electric Boat Division of General Dynamics and Newport News Shipbuilding sharing in the design of the new SSN-21 (the SEAWOLF), -- a deviation from the competitive approach to major contracts stressed by the Secretary of the Navy. However, Newport News has been named as "the lead designer" but with no guarantee that it will build the lead ship of the class. Rear Admiral Platt, the Navy's competition advocate general, revealed that "each company will have an equal share in the design contract even though Newport News has been given the lead role." ... "The Navy has never before split the design contract award for a vessel." Newport News will design "the front end" and Electric Boat will design "the propulsion end."

o Armed Forces Journal International, August, 1986, notes that "a submarine from the Soviet's Pacific Fleet ripped a hole in its hull after striking a rock, according to a May 31st Red

Star report. The submarine was taken to an unspecified port for repairs."

o On 5 August, the Editor of the Submarine Review visited the NAUTILUS Memorial and Museum at the Submarine Base, Groton, Connecticut. We were warned the night before that if we arrived much later than 0900 -- the opening time -- we would be subjected to a long wait because of the vast number of tourists who are visiting this new, free, attraction each day. The NAUTILUS Memorial and Museum proved esthetically delightful, while its design's total completeness and overall layout's agreeableness could only be marveled at. The earphone descriptions for each compartment of NAUTILUS were superior and the displays inside and outside the Museum were hard to match anywhere for sheer spectator interest. It was an overwhelming experience even for an old submariner -- and seemed as well appreciated by the crowd of mostly non-submariners. This might easily be the best tourist attraction in the United States today. We salute Dave Bell and his team that made this all possible.

o Vice Admiral Daniel Cooper relieved Vice Admiral Bernard Kauderer as Commander, Submarine Force, U.S. Atlantic Fleet (COMSUBLANT) on board USS NORFOLK (SSN 714) in a change of command ceremony on August 1st.

Cooper, a graduate of the U.S. Naval Academy, became the 21st COMSUBLANT. Kauderer, who served 37 years in the Navy, retired from active duty following the ceremony.

o Rear Admiral H. G. Chiles, Jr., was assigned in June to Director, Strategic Submarine Division, OP-21, in the Office of the Chief of Naval Operations, relieving Rear Admiral Ted Lewin, who becomes Commander Naval Forces, Philippines.

o Approximately 1,200 people filled the Washington National Cathedral July 14, to pay their last respects to Admiral Hyman G. Rickover, the "Father of the Nuclear Navy." Rickover died July 8 at his home in Arlington, VA. He was 86.

During his 64 years in the Navy, Rickover served 13 Presidents and 26 Secretaries of the Navy. Also, he was awarded two Congressional Gold Medals, saw the commissioning of a nuclear attack submarine bearing his name and the dedication of Rickover Hall at the U.S. Naval Academy.

In his eulogy, Admiral James D. Watkins said Rickover did not seek awards. "It was the reward of knowing that he had done the right thing, that he was his own toughest critic, even pushing himself forward while frequently towing a reluctant Navy along astern." Watkins added "And, he returned to society every gram of the incredible potential God had given him."

Watkins called Rickover a "modern renaissance man" who pursued his dream of a nuclear navy with uncompromising zeal while maintaining safety and efficiency as his prime concerns.

Today more than 150 U.S. Naval combatant ships are nuclear-powered and have achieved an amazing safety record of more than 3,000 ship-years of accident-free operations.

Rickover was interred at Arlington National Cemetery July 10, in a private ceremony.

o The 32nd Annual Convention of the Submarine Veterans of World War II was held in Baltimore, August 27-31, 1986. The Veterans organization, with over 7,000 members, had 3,013 registered at the Convention. James Tobin was inducted as the new President at the Banquet on 30 August, relieving James T. Hayward, the past president. Captain Ned Beach, a veteran

submariner and the author of numerous submarine stories and books, was the main speaker at the banquet. He told of his own experiences in the War and emphasized the greatly increased potential of nuclear submarines in modern warfare. At the end of the banquet, all veterans rose to their feet and drank a toast to all submariners of the past and today -- and they drank this toast from water-filled glasses. Water? Submariners? Affirmative! The great spirit of camaraderie and friendship for old shipmates and submariners in general was everywhere. And the wives were happy because their men were happy -- to be together once again.

o Jane's Defense Weekly of 23 August, 1986, in an article on new propulsion systems, highlights the concept of adding a small nuclear reactor-driven auxiliary power plant as an atmosphere-independent power source ... The hybrid would be "a diesel-electric submarine with a small, low-power, low-cost nuclear power plant of intrinsically safe design, of negligible risk to personnel, and one which does not impose major demands on crew or support facilities." Such a sub "can keep the main battery at full charge during dived operations," and might use a low-cost, small nuclear reactor designed by Energy Conversion Systems Inc. of Ottawa, Canada -- who are presently engaged in the design and construction of a non-military small reactor to be completed in 1988. A military version of this reactor is thought to provide a "conversion for any one of several modern conventional submarine designs into an affordable and capable hybrid."

BOOK REVIEWS

SILENT WARRIORS and THE PHOENIX ODYSSEY

Both by Richard P. Henrick, Zebra Books

Kensington Publishing Corp.

475 Park Avenue S., New York, NY

The phenomenal success of Tom Clancy's THE HUNT FOR THE RED OCTOBER has caused the production of a considerable number of submarine novels -- two of which are included here for review. The public's great interest in submarine stories could hardly have been guessed at, prior to Clancy's book -- and that would include Ned Beach's series with Commander "Rich" Richardson as the skipper of a World War II diesel-boat in a sequence of adventures.

The charm and interest of today's submarine novels seem to come, not from submarine actions involving enemies of past wars but instead from conflict situations between an unproved as yet enemy -- the Soviets -- in plots which might evolve in the near future between, for the most part, the superpowers' naval units.

Richard Henrick's two novels reviewed here are wellplotted, fast-moving action stories like THE HUNT FOR THE RED OCTOBER and should make good reading, particularly for those with a genuine interest in submarines. However, these books lack the thorough wringing out of technological detail and practical tactics which are found in Clancy's book. Consequently they entertain, but appear fanciful and not exactly "the way it is." Too obviously, like men who are involved in highly hazardous occupations on TV -- private eyes or CIA agents -- the men in these books attract seductive, shapely, gorgeous (of course!) ready-willing-and-able women who provide an excuse for explicit sex which has little to do with what happens underseas in the subs. Yet, submariners might find the reading of these books a good test

of their submarine knowledge, because something will sound wrong (like all this easy sex for submariners) and bother you until someone's experience is dredged up or you've done some research to confirm or deny Henrick's material. For example: an SSBN's use of a thermocline in trying to evade Soviet surface ASW ships seemed questionable. Should the submarine lie in a layer, operate above it or well below it to avoid active sonar detection? How about for passive detection? I had to relearn some lessons about thermal layers I'd learned in World War II -- the hard way. At any rate, I decided that the SSBN should operate in the layer rather than above it -- or not deep below it. Then the author indicated that Soviet SSBNs had relatively small crews, about half of what our ballistic missile submarines carry, and that they were highly automated. (A report on the new ALFA nuclear attack submarine of the Soviets said that it was so well automated that it had been designed to be operated by only 17 men -- 16 of which were officers.) The automation and the high proportion of officers sounds like the Russians' solution for their crews, a great part of which are 2-year conscripts. Then, a good deal of the plot depended upon Russian ships rolling and pitching heavily in very heavy seas. But is that true of Russian ships? My own experience with Soviet warships close by, steaming into heavy seas, was that they were far more stable than our ships and pitched little and rolled less because unlike our ships, they had roll stabilizers to keep them steady.

The two books thus proved a good drill for refreshing one's memory on details of "submarining." But some of the details are so evidently wrong, like the skipper of an SSBN studying a Soviet surface ship through the periscope with the ship 40 miles away -- and then in "high power", recognizing a Soviet officer on the ship's bridge. One could only wish that

Henrick had the contacts Clancy undoubtedly used to ensure not making such mistakes. The novels would have been so much more of a fun-experience for submariners if their credibility had been increased.

SILENT-WARRIORS centers around a planned first strike by Russian ballistic missile submarines against strategic targets in the United States. It's the massive strategic nuclear assault at the start of a war to destroy the United States' ability to develop "Star Wars", and to return the Soviet Union to a position of preeminence or at least equality with the U.S.. A Soviet nuclear attack submarine skipper is given the job of using his boat to prepare the way for the Russian Fleet -- including a lot of SSBNs -- to exit through the GI-UK gap, to reach firing positions in the Atlantic. The conflicts inside this SSN are mainly between her Captain and her zampolit (political officer) who, perhaps not zealously, tries to control the action.

There is a good attempt by Henrick to give the reader a feel for the day to day life aboard a nuclear sub in peace and in war. And perhaps he does a good job of this, but one would have to serve on board such a boat to be able to judge how well the author succeeds.

Again, as in Clancy's book, one cannot help but speculate how the events depicted might actually play-out in a real world scenario. More specifically, could one expect a seventy nine year old General Secretary of the Politburo to be flown -- on a stormy night -- to the pitching deck of the carrier KIEV? But this does, in the book, solve real-time communication problems to satisfactorily climax the story. And those familiar with ASW tactics might have trouble accepting the Soviet nuclear submarine's escape and attack maneuvers.

THE PHOENIX ODYSSEY is the other side of the coin -- an American SSBN involved at the start of a conflict situation with Soviet ASW forces (and even U.S. ones) trying to eliminate it so that there won't be a blind discharge of ballistic missiles which would really trigger off a massive exchange of strategic missiles. The U.S.'s PHOENIX chooses to operate in the area of a mid-Pacific "deep trench" -- an area also of severe volcanic action. But one immediately wonders whether a deep-trench area is the place to operate covertly. Think about it. And what are the best tactics for the PHOENIX to avoid a horde of Soviet ASW vessels which are converging on her from all sides? But more importantly, is a wait-4 hours-and-shoot doctrine practical for strategic war? And perhaps even more importantly should our submarine skippers, today, be rigorously selected and trained to be non-deviationists from doctrine, when -- as in the olden days of operations far away from home-base and handicapped by very poor and greatly delayed communications -- the skipper of U.S. vessels had to use their best judgement to carry out U.S. interests.

What particularly worried me about this PHOENIX situation was that readers might be led to believe that a Soviet ALFA submarine was able to successfully hold a trail on the PHOENIX for many days -- after she left her base at Bangor. A public which comes to believe that our SSBNs are unable to shake a trail will stop believing in their invulnerability in war and therefore stop support of SSBN construction -- with U.S. deterrence emasculated thereby.

These submarine books can play an important role in public understanding of the importance of submarines in our national security -- and in gaining public support for them! Certainly if the authors of today's submarine stories want to "get it straight", members of the Submarine League are available to lend their knowledge and assistance

wherever possible.

Bill Kellum and W. J. Ruhe

"RED STORM RISING"

by Tom Clancy

652 pp Published by G. P. Putnam's Sons, New York,
1986.

As improbable as it may seem, Tom Clancy's RED STORM RISING surpasses his first best-seller novel, THE HUNT FOR RED OCTOBER.

I'll not be the one to lessen your suspense here. It is a gripping story of the Soviet Union's attack against NATO in preparation for seizure of the oil fields of the Persian Gulf -- in order to replace the petroleum assets destroyed in the Gulf's largest refinery by Muslim fanatics. Tactics of disinformation, a mobilization, and a clever SPETZNAZ invasion of ICELAND are prelude to intense air-land-tank battles in Western Europe along with intense war at sea to prevent convoy logistic support of NATO. About every form of modern warfare is depicted with great and accurate realism and suspense. Realistically chemical, biological, and nuclear warfare are deterred -- but just barely. Internal Kremlin politics put the reader right on the scene and involved. Dialogue and terminology are remarkably well done. The author has not pandered to the sleazy contemporary demand for illicit sex among his characters, but there is a poignant story of romance under great stress.

Professional officers will be attracted not only by the fine portrayal of professionals at war in a great plot but by a series of succinct, evocative scenarios so realistic as to raise real questions as to our weapons systems designs, our tactics, and our war plans. The breadth of

coverage is illustrated by the following list of some of the systems whose use is portrayed: SURTASS, RORSAT, VECTAC, WILD WEASEL, ELF, LOFAR, AEGIS, TAGOS, AWACS, PHOENIX, as well as Soviet systems.

These and other Hi-Tech devices of war; and their uses, electronic "trickery," even wargaming; demonstrate that this is clearly a 'Corporate Novel' in which the author masterminded the knowledge of many consultants, and visited many operating units.

This remarkable ability is similarly displayed by Stuart Woods in his remarkable "DEEP LIE." He consulted with officials of four nations which he visited. Such depth and breadth of preparation seems to be a new phenomenon in literature. It makes the novel a much more valuable experience for the professional.

The strategy adopted by the leaders of the USSR and that adopted by the Allied leaders are, of course, the framework of the novel. One may wonder about the wisdom of attacking NATO as a prelude to seizing the Persian Gulf where the balance of forces more clearly favors the USSR. The U.S. seems obtuse in not recognizing earlier the key importance of petroleum in the Soviet plan. Inactivity in the Pacific is also to be wondered at. Yet, to think about changes in strategy is simply to think about another book just as to think about changes in the rules of baseball is to think about another game.

This novel, as have a number of others, treat as weaknesses the political instability of the Warsaw Pact Alliance and the Soviet experience seems to show that this vulnerability is at least as strong in the U.S. and its allies. But, this too, is another book.

The wide variety of tactical scenarios can

evoke some useful thinking. With the thought that most professionals will read this book, let me offer some thoughts relative to submarine matters that came to me. Others more up-to-date and of different backgrounds may get better ideas:

- Submarine launched cruise missiles against ships in port could have been important against forming convoys and task forces.
- Seaplane resupply of submarine weapons could be vital.
- Submariners will need an on-demand SITREP from a satellite after secure interrogation following lengthy submerged engagement. A spurt dump would be required.
- Submarine support of air operations could provide such services as radar jamming from a towed jammer, advance detection of air raids by ECM, sonar and IR, refueling of seaplanes and WIGs, recovery of downed aviators (not mentioned in this story), submarine trailing of suspicious surface contacts by A/C (e.g. the Iceland bound SEABEE), submarines might launch cruise missiles designed to emulate air raids or carry jammers, submarines might launch reconnaissance missiles designed to report to an approaching air group both distribution of defensive A/C and location of HARM targets, launching cruise missiles carrying airstrip cratering munitions and HARM missiles.
- The retaking of ICELAND might have been expedited by use of submarine launched commandos and missiles.
- The lost SOSUS systems might have been replaced by submarine laid hydrophones and glassfiber cables back to held territory; this is a possible use of an ex-Polaris boat.
- As enemy submarines get too quiet for passive detection at useful ranges, it may be important that submarines lay powerful ensonifiers for active detection by other units e.g. submarines, sonobuoys, surface ships, weapons; the analogy of a searchlight.
- The need for improved tactical coordination of

submarines in submarine vs submarine encounters is pointed out in the story. Anti-collision and IFF devices could make prewar practice feasible.

- The increasing importance of various satellites combined with the proven ability of submarines to accurately launch large solid fueled rockets may indicate that we should be thinking of anti-satellite weapons from submarines.

- Submarines lack the positioning flexibility of the F-15 used in the story, but they could be positioned relative to important convoys and battle groups.

- A fine discussion of the effects of modern chemical warfare on populations raises the question as to the relative invulnerability of nuclear submarines to exterior chemical attack. Could this be used against amphibious forces? Ships? Ports? A new fact is that whereas in the past the submarine was vulnerable to internal leaks etc., the modern binary weapons renew that vulnerability.

- Not to be forgotten was our WW II penetration of the primitive minefield of Tsushima Strait. The graphic portrayal of CHICAGO's close approach to a minefield makes me hope we're now adequately equipped.

- The small number of submarine mines laid in WW II were remarkably effective. Some might have been effective here.

- Increasing effectiveness of ASW aircraft may soon make necessary submarine anti-air missiles or beam weapons.

- Wartime control of a submarine campaign will require feedback to the commander of what happened to his non-returning boats -- electronics of some kind such as the bouy used by a Soviet boat?

- The recent Walker espionage case raises questions as to the possible catastrophic effects of loss of crypto security.

- How would we know if the enemy had an ULTRA advantage? Could he issue false reports and orders? What changes must be made in our security precautions?

- In the story SPETZNAZ attacks staged from submarines were effective against German ports. Protection against such actions in the U.S. will surely be vital, but doesn't our lack of immigration control make the U.S. weak in this regard?

For many readers, RED STORM RISING would have been vastly improved by inclusion of good maps and charts and of glossaries of terms and characters. Since these would increase costs, perhaps they could be sold separately. Preparation of these might be a good research project for a student at the Naval War College or the PG School.

It seems to me that this novel may have a deterrent effect on decision makers in the way it demonstrates the uncertainties of war. Its effect on citizens can change the apathy and complacency we now see too often.

I think this story will justify a major Hollywood effort; perhaps a TV Movie series like that done on Hermann Wouk's "WINDS OF WAR" and the soon to come "WAR AND REMEMBRANCE."

It's intriguing to think of what a follow-on sequel might include. Perhaps the story of a world containing a Soviet Union run by Tom's new government which adopts new and much more human and effective policies for a better world. Why not show them what to do, Tom Clancy?

Dick Laning

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MEMBERSHIP STATUS

Current - Last REVIEW - Year ago

Active Duty	778	728	586
Others	2279	2094	1904
Life	65	62	47
Student	12	11	7
Foreign	19	20	20

Total	3153	2915	2564
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Non-Renewal Total -- 466

HAVE YOU GOTTEN 2 NEW MEMBERS FOR 1986?

Circulation of this issue exceeds 5,100

Dear members,

In addition to our regular 16 MM films and the BBC mini-series "SUBMARINE" on VHS tape, we now have available for loan to our members another VHS tape called "HELL AT FORTY FATHOMS." This tape includes "THE GROWLER STORY" and "SILENT SERVICE." They will be available through your local Chapters, as well as through the National Headquarters. Call me at (703) 256-0891, or write to Naval Submarine League, Box 1146, Annandale, Va 22003.

The response to our offer of free colored photographs of nuclear submarines was indeed positive! Our supply was depleted rapidly. We have just received another batch, and this time we have some excellent pictures of missile shots, as well as SSBNs. They are all 16x20 in size. Once again, the primary intent of this program is to judiciously distribute the photographs to locations where they will have a reasonably large viewing or to give them to individuals or organizations in return for their expressions of support for the Naval Submarine League.

We are continuing to have a demand for the back issues of the SUBMARINE REVIEW, so I am once again offering this order form for those of you who want to complete your library.

Sincerely,



Pat Lewis

BACK ISSUE ORDER FORM

Many of our members have requested copies of previous issues of THE SUBMARINE REVIEW. We have made arrangements with our publisher to reprint back issues, minimum run of 50 copies per issue. Unfortunately, the cost is high \$10.00 per copy, but these books are unique, and very much in demand. The first run of back issues has been delivered to our office, and a few are still available for purchase. If you are interested in completing your library with all issues of THE SUBMARINE REVIEW to date, please indicate the issues desired, and remit \$10.00 for each copy.

__ Apr. 1983	__ Jan. 1984	__ Jan. 1985	__ Jan. 1986
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IN REMEMBRANCE

CDR THOMAS P. CHEESMAN, USN(RET.)

NAVAL SUBMARINE LEAGUE
Balance Sheet
at March 31, 1986

Assets:

Cash	\$68,359.90
Furniture/equipment/software (net of depreciation)	23,543.47
Prepaid expenses	<u>2,062.07</u>
 Total assets	 <u>\$93,965.44</u>

Liabilities & Fund Balance

Current liabilities:

Accounts payable	\$ 2,173.11
Deferred mbr. dues	<u>19,868.30</u>

Total current liabilities	\$22,041.41
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Long term liabilities:

Deferred mbr. dues	<u>18,811.50</u>
Total liabilities	\$40,852.91

Fund balance	<u>\$53,112.53</u>
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Total liabilities and fund balance	<u>\$93,965.44</u>
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Statement of Activity and Changes in Fund Balance

<u>Total revenues:</u>	\$151,799.21
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<u>Total expenses:</u>	<u>148,493.41</u>
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Excess of revenues over expenses	3,305.80
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Fund balance, beginning of year	<u>49,806.73</u>
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Fund balance, end of year	<u>\$ 53,112.53</u>
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Financial statements for the year ending March 31, 1986, were audited. Copies of the audit statements are available upon request.

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THE SUBMARINE REVIEW is a quarterly publication of the 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 \$50.00 stipend will be paid for each major article published. Although this is not a large amount, it will help offset the authors cost for paper, pen and typing. Annually, three articles are selected for special recognition and an honorarium of up to \$400.00 will be awarded to the authors.

Articles should be submitted to the Editor, W. J. Ruhe, 1310 MacBeth Street, McLean, VA 22102. Discussion of ideas for articles are encouraged, phone: (703) 356-3503, after office hours.

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.

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