THE SUBMARINE REVIEW

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FROM THE PRESIDENT

As the Naval Submarine League enters into its fourth year and with the success of the Third Annual Symposium behind us, I feel the League has finished its organizational phase and has entered its growth and character building (image) phase. Lest we not lose sight of our objectives, I intend to discuss each of them periodically in this forum.

Our lead objective is "To stimulate and promote an awareness, by all elements of American Society, of the need for a strong submarine arm of the U.S. Navy."

Unfortunately this objective presents us with a tremendous challenge at a particular time in our nation's history -- when the media has shaped a public image of the Defense Establishment which equates such abuses as the $640 toilet seats and the $660 ash trays as ineptness along with financial irresponsibility. The growing threat of the Soviet submarine fleet to our vital sea lines of communications, however, is not only great today but will be even more devastating in another decade. While the most effective force which the United States and her Allies have to contain this threat is our submarine forces, we need to improve these forces as a matter of highest priority.

Just how well then is the Submarine League responding to our number one objective? We are making some progress in the following ways:

(1) The existence and content of the SUBMARINE REVIEW has fulfilled, in a first class manner, the need for a professional forum to educate our members, recent SOBIC and SOAC students, midshipmen and a growing group of influential complimentary members.

(2) Our film-loan program has been of assistance for those addressing select small groups.

(3) The discussion sessions accompanying the local NSL Chapter meetings are having a positive effect and feed back.

(4) The speaking opportunities afforded our Board Members and President as a part of other travel has had a good response.

(5) The annual Corporate Benefactor Recognition Day agenda has focused on methods to stimulate and promote awareness of the need for a strong submarine force.

(6) Finally, the annual Symposium has partially fulfilled this objective.

In sum, we have started the more obvious initiatives. The question for our membership and chapters is, at this stage of organizational maturity, what ideas should be nurtured and implemented? What mix of initiatives is necessary so the talents of all members can be employed?

Please give this question serious consideration and send me an informal note with your ideas. The Naval Submarine League must be, as the submarine service is, a team effort.

Chuck

THE SUBMARINE FORCE TODAY

The U.S. Submarine force plays a vital role in our maritime strategy. Our SSBNs because of their survivability are becoming even more important in the strategic TRIAD, while our attack submarines have the unique capability to operate

effectively in the forwardmost ocean areas of naval interest.

Strategic Submarines

Our strategic submarine force provides a secure retaliatory force which supports the primary national security objective -- the deterrence of war. Over the last 24 years, our SSBNs have completed over 2300 strategic deterrence patrols. With the buildup of TRIDENT submarines and the introduction of the D-5 missile in 1989, the undersea leg of the TRIAD is ensured as a convincing, viable deterrent force well into the next century.

Despite claims of the oceans becoming "transparent" as a result of developing technology, we have an SSBN security program to keep ahead of any technologies which could conceivably be relevant to the future survivability of our SSBNs. Consequently, as a result of this program's efforts we have the authorative assurance that there is no foreseeable technological capability by which the Soviets could significantly diminish the strategic effectiveness of the U.S. force.

The TRIDENT program is running smoothly, with new units continuing to be delivered ahead of schedule. Five are presently operating in the Fleet; four are conducting deterrence patrols from their base at Bangor, Washington, with 18 patrols already completed; while the fifth, the USS HENRY JACKSON, joins the other four this summer. The sixth TRIDENT, the USS ALABAMA, should be delivered to the Navy by late spring. The FY 1986 Budget requests authorization for the 13th TRIDENT and advance procurement for the 14th and 15th submarines. Plans call for the procurement of one TRIDENT per year which will support an all TRIDENT force of about 20 units by the end of the century

-- with the ultimate number of TRIDENTS not yet determined.

The bulk of our SSBN force today consists of 31 POSEIDON submarines. These submarines average 20 years of age. Nineteen are equipped with the C-3 missile of about 2500-mile range, and 12 have the C-4 missile of 4,000-mile range. The present TRIDENTS also carry this missile. The longer range of the C-4 missile significantly increases the patrol area available to submarines and allows target coverage soon after leaving U.S. ports.

FY 86 funding for improved strategic communications and noise quieting modifications is being requested to modernize our older submarines -- in order to assure the survivability of our entire SSBN force.

The C-4 missiles are in 12 POSEIDON submarines and are or will be in 8 TRIDENTS. Contrary to news reports, this missile is highly reliable, with no failure in more than 20 consecutive operational test flights -- since August, 1983.

In order to meet the National Strategic Policy requirement for strategic weapons which have the survivable retaliatory capability to attack all classes of targets, development and deployment of the TRIDENT II (D-5) missile is planned for by December, 1989. To date this program is proceeding well.

Eventually all TRIDENT submarines will be configured to carry the D-5 missile, with the first 8, which initially have the C-4, due to receive the D-5 during their first overhaul beginning in the early 1990s.

The D-5 offers the improved accuracy and flexibility necessary to be targeted against all classes of targets, soft and hard. It will also

be capable of carrying the new Mk 5 high-yield warhead currently being developed. With these warheads, the D-5 missile will have a range comparable to the TRIDENT I (C-4) missile. But with a full payload of the lower-yield warheads now carried on the C-4, the D-5 will produce a substantial increase in range -- allowing even larger patrol areas in the future.

As we evolve to a totally TRIDENT force, we will gradually phase out the operations at Holy Loch and Charleston, with all TRIDENTs operating from Kings Bay, Georgia, and Bangor, Washington.

A new strategic submarine support system maximizes the period that the TRIDENTs spend at sea. Extended overhaul cycles and shorter refit times are the result. The Base at Bangor is providing 25-day refits compared to the 30 days for the POSEIDON submarines, while the logistical support system allows the TRIDENTs to spend approximately 66% of their life cycle at sea on patrol, compared to about 55% for Poseidon submarines.

Kings Bay, Georgia will be the home of the first D-5 capable TRIDENT submarines. The TRIDENT facilities being built there are modeled on the successful designs and lessons learned at the Bangor Base.

Attack Submarines

Our multi-mission nuclear powered attack force is uniquely capable -- singly or in concert with other forces -- to deter Soviet maritime adventurism. However, the Soviet attack submarine force of nearly 300 units indicates a Soviet determination to wrest undersea superiority from the United States. The Soviet new construction efforts enable them to add 8 to 10 new attack submarines annually. At the same time the Soviet Union has an estimated 35 submarines in various

stages of construction. By the 1990s, these new generation, quieter, more capable submarines will form the backbone of the Soviet submarine fleet.

Last year Congress approved the construction of 4 improved 688-Class submarines. These submarines will be fully twice as capable in warfighting qualities as the LOS ANGELES Class of submarines in the Fleet today. Starting with the 688s authorized last year, modernization improvements should double the combat effectiveness of these and future submarines by drawing heavily on the R & D programs focussed on the new design SSN-21 class. The improved 688s will be much quieter than today's 688s, embodying new propulsors of advanced design, special hull coatings, machinery quieting as well as quieter reactor plant equipment. Additionally, these submarines will have an advanced combat system (SUBACS) which includes new passive and active sonar systems, as well as highly effective electronic surveillance and navigation systems. Also the improved 688s will have a TOMAHAWK vertical launch system which increases the firepower of the 688s by about 50% and provides flexible strike options never before possible. The 688s will have a full mining capability and the necessary modifications to permit operations in the Arctic theater. Modernization improvements to the earlier 688s and the 637 STURGEON class, particularly in sound silencing, are being made and are essential to meet the improving quality of the Soviet threat.

The SSN-21

The conceptual design of the SSN-21, our new attack class submarine with the required characteristics to meet the Soviet threat of the year 2000 and beyond -- and to be authorized in 1989 -- has proved after a year of technical review to be the same as presented a year ago. Furthermore, this design has proved within cost

limits and at a manageable level of technical risk to achieve the 1989 planning goal. The R & D funds requested in the FY '86 Budget will insure that the SSN-21 can be brought into the Fleet by 1995.

Submarine R & D

The submarine R & D effort includes specific emphasis on advanced construction techniques, new hull materials, hull coatings, drag reduction techniques and improved sensor systems.

Weapons

Today's submarine-launched weapons consist of the MK 48 torpedo, the SUBROC antisubmarine missile, HARPOON and the TOMAHAWK cruise missile. The MK 48 torpedo has a reliability improvement program with the last MK 48 torpedo in inventory completing this upgrade process by mid 1985. Since these improved torpedoes have been returned to the fleet, there has been a 100% success rate in 20 torpedo service weapon test firings.

Because the Soviets are continuing to improve their submarines as to high speed and deep diving capability, as well as our need to attack their surface warships in all environments, an advanced capability (ADCAP) MK 48 is being developed with IOC in 1987 -- to meet these threats. The ADCAP's performance in the most stressing environments has been superb.

The aging SUBROC will be replaced by the ASW STANDOFF weapon (ASW/SOW), when this new weapon is successfully developed. This weapon -- with either a nuclear or conventional warhead -- is essential for sinking enemy submarines outside the enemy's detection range. The HARPOON and TOMAHAWK cruise missiles provide our submarines with long range weapons for engaging surface ships or shore targets. The TOMAHAWK anti-ship and nuclear land

attack missiles have been introduced into the submarine force, and provide a new flexibility for submarines to respond to the varied tactical situations which might now confront them in a war at sea. But, increased inventories of torpedoes and missiles are needed.

Deep Submergence Program

Recent statements of policy on oceanography by the Secretary of the Navy and the CNO have reinvigorated the Navy's efforts in oceanography and related activities. Manned untethered submersibles, deep submergence submarines, unmanned search systems and recovery platforms, air/mixed gas diving systems and related support ships now provide a limited capability to conduct manned and unmanned operations to a depth of 20,000 feet. Recovery of lost U.S. objects of intrinsic or strategic value from the sea floor is a major task which is being increased in emphasis. Similarly, the search and rescue program is increasing in scope with bilateral agreements with many of our allies in effect for the contingency rescue of personnel. Since many of the U.S. assets are in need of modernization and some are lacking, to ensure both deep ocean search and exploration, as well as quick and efficient response for emergencies, continued support of this austerely funded program is requested.

Personnel

Our submariners are doing a superb job. They work hard and are required to be separated from their families for long periods. The personnel picture for the enlisted submariners is encouraging. Although accession goals for the past 3 years have not been met, improved retention has ensured enough men to meet today's needs. The supervisor level -- the top 4 grades -- have been nearly 100% throughout '84. Strong congressional legislation providing proper compensation has

turned around the 72% manning level of five years ago. But negative trends in enlisted retention may result from lost entitlements which compensate for the heavy demands placed on our enlisted men.

Accession of nuclear submarine officers has declined since FY '83. Also, the retention of 46% of the officers in FY '83, although projected to show a slight improvement in FY '85, has actually seen a sharp increase in resignations in the first third of this year. Overall there are the correct number of officers in the submarine community, but shortages in the mid-grade officers, Lt. Comdr to Captain, indicate a 17% shortfall of these experienced nuclear qualified officers, with a shortfall growing to 22% by 1990 unless action is taken to reverse this trend. Some essential shore billets have been gapped and there have been limited opportunities for serving in billets outside the submarine force, in order to fill all critical billets at sea. This mid-grade officer shortage calls for FY '86 initiatives, including a nuclear officer incentive pay package providing for increased bonus levels, improved management flexibility and an elimination of the decrease in submarine pay upon completion of 18 years of service and then again when a submariner is promoted to Captain.

Summary

Although we have undersea superiority today, we must set a course to retain this supremacy in the face of an aggressive Soviet challenge. The submarine programs which are in place will assure our future superiority in this critical arena of underseas warfare.

Digested from the Statement of VADM N. R. Thunman, USN, to the Seapower Subcommittee of the Senate Armed Services Committee on Submarine Warfare, 5 March, 1985

THINKING ABOUT TACTICAL SURPRISE

The implications and importance of the "tactical surprise" that can be generated by a nuclear submarine, needs to be recognized and emphasized. Surprise in attack has been the hallmark of the submarine since its inception. But until the nuclear submarine arrived on the scene, the opportunities for a surprise ambushing of enemy targets were severely limited by the low submerged mobility of a submarine.

In World War II, the diesel-electric submarine, with good handling, could usually be submerged before discovery by air or surface forces. It could then covertly prosecute attacks against surface targets. Yet the chances of getting into a good ambushing position -- where destruction of unalerted targets appeared to be assured -- were low. This necessitated salvos of three or more torpedoes against a single ship, while the chances of hitting were lowered by the possible sighting of the periscope or the wakes of the torpedoes -- with enemy evasive action then taken. The element of surprise was too often compromised by the limited submerged speed of the submarine, the scarcely adequate fire control system in use, and the overtness of the torpedoes used. Since mobility seemed more important to attack success than "surprise," the diesel boats went to night surface attacks against merchant shipping. This sacrificed the good probability of catching an enemy target unaware, but by attacking in a rapid fashion this form of attack usually denied the enemy sufficient time to adequately respond to the submarine's attack. It should be noted that this also constituted a kind of "tactical surprise," but its effects were less predictable because they depended more on a general unpreparedness of the enemy's defensive systems.

Traditionally, the submarine could conduct its attacks with a good deal of surprise because of its ubiquitous quality -- i.e. giving the illusion that the sub might be anywhere or everywhere at the same time. This quality has caused the enemy to cry "wolf" so often when a submarine's presence seems possible, that the enemy's alertness to react to an attack has usually been greatly degraded. Not only has the submarine's ubiquitousness improved its chances of doing the unexpected, but it has also tended to inhibit the movements of surface ships -- by creating a fear of the consequences if a submarine happened to be actually close at hand.

In WW I, at the Battle of Jutland, the fear that German U-boats were in the path of the main battle line of the British Grand Fleet, caused Admiral Jellicoe to order a course change away from the German High Seas Fleet. This saved Admiral Scheer's forces from a costly defeat. In the reconstruction of this battle, it was evident that no German subs were in positions to attack the British battleships -- had they stayed on course towards the German's battle line. But the psychological effect of the U-boats' possible presence during the battle was apparently enough to prevent a decisive action in this major sea battle.

The two best qualities of submarines in WW II, their ability to attack with surprise and the psychological effect they produced because of their ubiquitous quality, are so greatly improved by nuclear attack submarines as to produce a whole new dimension of "tactical surprise" by attack submarines. As might be observed, the improvements appear to be revolutionary in character. The nuclear sub can now move to an optimum position -- in any possible underwater location within the oceans of the world where everywhere is a good hiding place to lie in wait for enemy targets. Significantly, the oceans

comprise about 72% of the earth's surface. So the vastness of the ocean areas make excellent hiding places which virtually assure surprise -- if the opaqueness of the oceans is properly capitalized on. The nuclear sub's great endurance and mobility not only permit this virtually absolute ambushing capability, but also ensure a credible ubiquitous effect in the total areas of the world's oceans. It is not like the German surface raider which, during WW I operated in the Indian Ocean -- the raider EMDEN. It seemed to threaten shipping in large areas of the ocean, causing a significant dislocation of merchant ship traffic. But, its ubiquitous quality developed only from the time it had sunk a merchant ship, when its position was broadcast along with the merchant ship's SOS -- until the raider's location was once more determined by another engagement or a replenishment stop at some island in the Indian Ocean. There were then no aircraft to locate the EMDEN and she could easily remain clear of searching warships. And communications were poor.

How then, basically, has the nuclear attack submarine affected the element of tactical surprise? First, it has produced a capability to develop a deliberate and optimum ambush position for most of its attacks. (Recognize that a submarine moves covertly to an ambush position where it opens fire -- unlike a party of concealed guerrillas that lie quietly and motionless in wait for an enemy force to come by.) Then, if using a stealthy weapon, which compliments its own platform stealth, it can catch an enemy totally unaware. Because of an enemy's increasingly probable use of electronic counter-measures which have almost instant activation, it seems far more necessary than in the past to have weapons which in themselves create a high element of surprise -- so as not to give the enemy a chance to effectively respond to the weapon's attack. The attack submarine also retains the option of not having to make an attack from its ambush position,

particularly if a more decisive action, later, is suggested by developments on the surface of the ocean. Delay in attack might be seen as being more profitable. Re-setting the ambush in some other location should then be readily feasible.

"Surprise," for a nuclear submarine, is an inherent capability and can be exercised to a degree unmatched by any other type of naval system -- other than, perhaps, the mine. But the mine tends to be a one-time thing, limited in area of threat and producing an unexpected result only on a first-target which encounters a minefield. Similarly, the mine is ubiquitous, but this quality is exerted over a considerably smaller area of the world's oceans -- the shallow water areas which comprise only a fraction of the 72% ocean areas cited earlier. With the advent of mines like Captor, the ocean areas of mine threat increase somewhat, but not significantly.

The facility to produce "surprise" gives the submarine the advantage of going into an attack with a minimum of uncertainty about how the attack is likely to develop. At the same time, the actions taken after the ambush is sprung, can be preplanned with a high probability of their being carried out. Moreover, the enemy is likely to be confused in his counteractions, tending to lose the timing necessary for his countermeasures to produce an effective response. Psychologically, the submariners involved in such a surprise attack do not tend to be resigned to their fate when going into action -- as is the case in most military engagements. This is not a situation where individuals are likely to feel, fatalistically, that "this is it -- come what may." ("And the torpedoes be damned," in the words of Admiral Farragut.) Although the fear-generating, adrenalin-pumping effect of going into an action where there are many unknowns has, at times, produced resounding success, it has also, all too frequently, caused mistakes and confusion

as the attack was played out. But most importantly in such actions, the possibilities for achieving a decisive result have been left too much to chance. Thus, the submarine of the past has rarely been directly responsible for decisive naval action except in an incremental way over a long period of time. Yet today with the mobility and covertness of the submarine weapon system and with its support by a highly capable computer-aided fire control system, a well planned attack can now produce decisive action with a high order of predictability of success. Lethal attacks and reattacks on a grouping of high value ships now become likely rather than remote. And the possibility of surprise massing of weapon power against key objectives by only one or a few submarines should become a fundamental strategy for the use of the nuclear attack submarine.

The high degree of an attack submarine's capability to generate "tactical surprise" when combined with the principle of "massing" while using an "economy of force" against a clearly defined "objective" -- is a high probability route to decisive naval action. Admiral Gorshkov, Head of the Soviet Navy, pictures this decisive use of submarines in a "first salvo" strategy. In effect, he sees a few widely-dispersed submarines making a coordinated surprise, massive missile attack against key elements of an enemy's navy -- with numerous high explosive weapons arriving at their targets near-simultaneously, causing enemy defenses to be overwhelmed and creating such havoc as to make mop-up operations with torpedoes possible. This then is expected to produce an overall decisive action. For many, this strategy is only considered to be wishful thinking since it is felt that the communications and coordination required are considered to be too difficult for submarines to employ practically. Yet with today's excellent navigation systems aboard submarines as well as the capability to receive long-range, low-frequency radio broadcasts at

considerable depths in the ocean, a commander, remote from the scene of action might effect this sort of strategy.

What might be inferred from this possible combining of the four principles of war in submarine attack situations, is that this capability for effecting total surprise should also be used with sufficient power to create decisive actions. The addition of big warhead missiles to the strike power of submarines and the addition of more launch tubes as well as bigger magazines for many weapons, are steps in the right direction to realize the power necessary for decisiveness in attack.

In anti-submarine warfare, with enemy submarines becoming more quiet and with a dependence on acoustics for locating the enemy, it becomes increasingly probable that disclosure of an enemy submarine might be so sudden and at such close range that the submarine with the noise advantage is likely to have only a few moments to assess the situation. The quieter sub should still be able to exert a measure of tactical surprise. But the attack can only be planned for in a doctrinal manner -- with reaction to the enemy's countering actions even more doctrine-oriented in the tactics used and as produced by a computer. The more an ASW engagement tends to result in a melee, the less advantage is seemingly gained by using tactical surprise.

In summary, the nuclear attack submarine holds tactical advantages at sea -- mainly through its capability to attack with surprise -- that should be given more emphasis through the development of naval strategies which capitalize on the offensive potential for producing decisive results in sea warfare.

Phoenix

SUBMARINE TECHNOLOGY TRANSFER AND CONSTRUCTION OF DIESEL SUBMARINES IN U.S. SHIPYARDS

The U.S. Navy's continued lead in submarine warfare has not been maintained by chance; rather, it is the result of long-standing and determined enforcement of special procedures to protect submarine technology. Examples of the unique restrictions the Navy has implemented to limit the transfer of U.S.-developed technology include:

- The CNO or VCNO must personally approve embarking any foreign national in submarines underway. They must similarly approve visits by foreign nationals to shipyards engaged in the repair or construction of nuclear submarines.

- The DCNO (Submarine Warfare) has placed specific restrictions on the operations of U.S. submarines in exercises with our allies to limit the disclosure of a submarine's acoustic signature.

- General visiting of submarines is not permitted. Access by U.S. citizens is carefully controlled.

- All submarine crews are thoroughly indoctrinated in security procedures and are debriefed prior to transfer.

- Special Navy policy and security restrictions have been developed to limit submarine information released through professional journals and symposia.

- Access to submarines by civilian and military journalists and photographers is strictly regulated. All film and photographs are carefully screened prior to release.

- The distribution and dissemination of submarine design drawings, blueprints, training and operating manuals, and other such technical data are closely controlled.

- The Navy has resisted exchanging submarine technical data with even our closest allies except in rare cases approved by the CNO.

In spite of such determined efforts, the Navy has been unable to stem completely the flow of submarine technology to our potential adversaries. There is little doubt that the shrinking margin of superiority in submarine performance is due in large measure to the Soviet Union's success in obtaining Western submarine and sensor technology through a variety of channels -- legal and illegal. Nonetheless, operational experience at sea against a wide spectrum of foreign submarines and visits to allied submarines clearly indicate that the U.S, Navy still retains a substantial technological margin due to our design and construction program practices and procedural safeguards.

In considering the procedures developed by the Navy to limit access to submarine technology, it is important to understand that the submarine design and construction industry is unique in that there is no civilian counterpart. Consequently, the submarine business does not experience the relatively free flow of information and technology between the civilian and military branches that exists in the aircraft industry. This is a basic reason why, on an individual platform basis, the margin of submarine superiority over the Soviets is considerably greater than in military aviation; it is a function of technology transfer.

CONSTRUCTION ALTERNATIVES FOR FOREIGN SUBMARINES

There are two existing alternatives for a foreign government to use to contract with U.S.

industry to build diesel-electric submarines of a foreign design: direct commercial sales and foreign military sales.

Direct Commercial Sales require a foreign government to contract directly with the selected U.S. manufacturer after receiving approval from the Departments of State and Commerce with concurrence from the Department of Defense. Prior to authorization, the Department of Defense is required to provide procedures and guidance concerning the protection of U.S. submarine technology. However, due to the uniqueness of submarines and their construction, and since no project of this kind has ever been conducted, no procedures have been developed to attempt control over the transfer of U.S. submarine technology if a foreign government were permitted to have diesel-electric submarines built in U.S. shipyards.

Foreign Military Sales directly involve the Department of Defense and the Department of the Navy. In this program, the foreign government requests the United States government to act as its procuring agent in the United States for weapons systems that the navy is already building. For a U.S.-sponsored diesel-electric submarine program, the Department of the Navy would have to assume the responsibility for the project as if it were a U.S. warship under construction. This would include responsibility for contractual matters, the review of the foreign design, safety, quality assurance, acceptance tests, and trials, etc. This could only be done with a dedicated Program Manager and necessary U.S. engineering and management personnel to assure construction and delivery of satisfactory ships. Since the Navy is not building diesel-electric submarines, it is likely that a separate logistics support program would also be necessary to provide technical and repair part support for the life of the submarines built. For good reasons such as these, it has

been the policy of the Department of the Navy not to enter into FMS agreements for warships that are not already being built in U.S. shipyards for the United States Navy.

TECHNOLOGY TRANSFER

A review of the unique nature of submarine construction indicates that building diesel-electric submarines in U.S. shipyards for export would inevitably result in serious erosion of the extensive technology transfer safeguards that the Navy has enforced for many years. Factors leading to that are:

- Submarine construction is totally unlike commercial shipbuilding and considerably different from building surface warships.

- A non-submarine-experienced shipyard could not construct a safe and effective submarine without the participation of considerable numbers of submarine-construction experts.

- A non-submarine-experienced shipyard would have to hire the necessary talent from the U.S. submarine construction and repair base and such a workforce would inherently bring with it specific submarine knowledge, technology, and techniques.

- The implementation of foreign design plans would incorporate the experience and knowledge of these men.

- Much of submarine design and construction technology is common to diesel-electric and nuclear submarines.

- U.S. quality control standards and practices ensure that the best U.S. technology and construction techniques would be employed.

- The end result would assuredly be a diesel-electric submarine that embodies much of today's U.S. nuclear submarine know-how and technology.

While there are some procedures in existence that control the transfer of U.S. technology to other countries, they do not cover a proposal of this kind. The U.S. Government export control system is designed to control technology through controlling export of components. This normally involves review of each component to determine what technology is involved in the component and then deciding on the level of control. In this case, the significant technology involved is in the method of constructing submarines. The technology resides in the details of welding, pipefitting, non-destructive testing, quality assurance, system inspection and test. Foreign navies recognize that better construction techniques could improve the performance and capability of their submarines, but they are unable to achieve the necessary degree of construction expertise and attention to detail from their shipbuilders. Thus, technological supremacy would be diminished at the construction site as the submarine was built in cooperation with foreign representatives. Further erosion would follow as the submarine itself was transferred to the foreign government.

EFFECT ON U.S. NUCLEAR SUBMARINE WORK FORCE

While technology transfer is certainly our foremost concern, we cannot overlook the certain impact of such a program on the very limited pool of submarine-qualified design, construction, and repair personnel. Although there are large numbers of commercial shipbuilders without jobs, nuclear submarine construction and repair shipyards are today having to hire designers, test engineers, welders, pipefitters, and quality assurance personnel who are qualified to do

submarine work. There is a shortage of such personnel, not an excess.

The U.S. technology and management base for submarine design and construction is limited. It resides solely in the Naval Sea Systems Command, several supporting laboratories, field activities, and contractors; the two submarine construction shipyards, Newport News and Electric Boat; and six Naval Shipyards (three East Coast and three West Coast). No shipyards other than Electric boat and Newport News have constructed a nuclear submarine since 1974, and no U.S. shipyard has constructed a diesel-electric submarine since 1959. Thus, any U.S. shipyard embarking on construction of diesel-electric submarines would necessarily seek to hire the required talent and experience from the small base of highly skilled people experienced in the various specialized aspects of the submarine program.

Due to the competitive environment and relatively constant pace of the Navy's submarine construction and repair programs, U.S. shipbuilders maintain their workforces at a level that just supports the ongoing U.S. submarine effort. Likewise, the Navy does not have excess civilian and military personnel assigned to nuclear submarine programs. Any lost from the pool cannot be easily or quickly replaced. The design of the new SSN-21, the ongoing program for 688s and TRIDENT submarines, and the overhaul and modernization of earlier classes of submarines fully tax available U.S. submarine technical resources. Any recruitment of existing submarine management and technical personnel would have a negative impact on the Navy's capability to build and maintain quality submarines.

RESPONSIBILITY FOR CONSTRUCTION OF SAFE AND EFFECTIVE SUBMARINES

If the United States government were to

permit commercial construction of diesel-electric submarines in U.S. shipyards not involved in U.S. Navy nuclear submarine construction or repair, the government would assume some responsibility for the delivery of a safe and effective finished product. For a ship of foreign design and built with foreign equipment, this could not be done without a full scale design review. This review would likely reach the conclusion that some changes were necessary based on fundamental U.S. construction and safety standards, and thus another path for infusion of U.S. technology would be opened.

If a foreign design were used by a shipyard which lacked the necessary expertise, the risk is very real that such a program would flounder and U.S. submarine technological and management resources would have to be applied to get the job done. In either case, the United States government would assume a moral guarantee for the completion, effectiveness, and safety of a submarine not constructed to U.S. design and standards.

(Ed. Note: This Navy rationale for why foreign-designed diesel submarines should not be built in the U.S. is digested from an excerpt sent to the Congress in response to their request for an expanded explanation of the Navy position established last year.)

THE SUBMARINE GAMESMAN

Frequently, submarine tacticians have favorably influenced the outcome of engagements by means of creative, unexpected tactics. These tactical tricks (or "ploys") can often be credited to a submariner's approach to his trade of submarining as a great, complex "game." And his skill at this "game" is derived in part from his

long and enthusiastic participation in all sorts of games (including parchesi). It might seem irreverent for a submariner to regard warfare as a "game" -- in which a "ploy" previously tried in a football game, for example, lends itself to some tactical variation -- but that's the sort of experience which many of our successful submariners have drawn on.

Submarining is an "art". And, the use of "gamesmanship"* as part of this art can be developed through a knowledge of "ploys" used in the past, along with an appreciation of how they can be adapted to the present employment of submarines. The "Sneak Attack on Puget Sound" story in April's Submarine Review illustrated how a number of "ploys" used by submariners in WW I and WW II were considered for the tactical problem posed for SEADEVIL, and then creatively mutated to meet the special circumstances involved. Disguising the conning tower of a sub to look like a fishing boat was used by U-9 in WW I so that it could operate in the midst of the Grand Banks fishing fleet under conditions of low visibility -- without arousing suspicion. SEADEVIL, on the other hand, used a fishing dory -- lashed to its periscope -- to allay the suspicion of the patrolling ASW vessels. Another German sub in WW I used a bird on the top of its periscope for disguise. SEADEVIL had to reject the bird idea in favor of hiding the periscope from the eyes of searching destroyers by means of a man's body or hand. Gunther Prien's submerged boat, in WW II followed under a merchant ship entering Scapa Flow, the screws of the merchant ship drowning out the noise of Prien's boat's propellers. SEADEVIL did the same sort of thing, following under an outboard-driven dory -- with the sound of the outboard masking the SEADEVIL's screws.

* "Gamesmanship" is defined by Potter in his book of the same name, as "the art of winning games without actually cheating."

The remembrance of things past had suggested creative solutions to SEADEVIL's penetration of the defenses protecting Puget Sound Bay!

Thus a review of some of the "ploys" used by submariners in war or in peacetime tactical problems, should be useful for today's gamesmen when trying to create their own tactical variations which would be applicable to the present circumstances.

A considerable bag of "ploys" have come from violating the principle of being a "silent service". CREVALLE, for example, having expended all of its torpedoes, nevertheless followed a Japanese convoy to the entrance of a bay where the ships had sought refuge. CREVALLE, then hoping to get another U.S. submarine into position to attack the convoy when it eventually sortied from its haven, broadcast the situation to Headquarters in Perth, Australia. Later this message was repeated from another position off the entrance to the Bay where the convoy lay at anchor. The convoy's escorts which protectively patrolled the entrance to the Bay, on DFing CREVALLE's transmissions, called for help because they said they were "being blockaded by enemy submarines". Thus the convoy remained immobile for at least a day, and until CREVALLE ascertained that no U.S. subs would be diverted from their patrol areas to take over.

A commander of a 3-submarine wolfpack had instructed his boats not to hesitate to use voice communications if they found themselves out in left field after an attempted attack. Such radio broadcasts, he felt, would assure that the convoy was zigged away from the DF'd submarine and towards one of the other two boats. When ANGLER found herself out of the area of action after an aborted attack on a Japanese convoy, she opened up with her transmitter with a situation report to the wolf pack commander. As predicted, the large

formation of merchantmen zigged back towards the other two boats -- putting them into position to go in for submerged attacks.

Similarly, FLASHER's skipper, the wolf pack commander, advised that his boats should not hesitate to use their radios when in contact with an enemy convoy. "It will scare the hell out of the opposition" he reasoned, "and they'll think that there are more than our three boats to deal with. That way they won't be peeling off escorts to work us over and stay with us after an attack." They didn't.

CREVALLE, on another occasion, was racing on the surface -- on a bright sunny afternoon -- to work her way ahead of a large convoy of ships. From time to time one of the planes would head out towards CREVALLE, who was running at top speed about fourteen miles from the mass of merchant ships. It looked like the plane was investigating a suspicious surface contact out in our direction, but each time would eventually peel off and head back over the convoy.

Finally, a plane appeared to have zeroed in on CREVALLE and kept closing. Knowing that a submarine is difficult for a plane to recognize, visually, CREVALLE's skipper delayed his command to "dive". At a range of four miles to the oncoming plane, Captain Walker switched on the signal lamp and began blinking it randomly as though sending a message to the plane. That seemed to convince the plane commander that his contact couldn't be a sub -- because what submarine would ever stay on the surface sending a message to a plane -- so the plane was winged over and headed back for the convoy. An hour later CREVALLE was ahead of the convoy and submerged for an attack.

HADDO was up off Truk on lifeguard duty as U.S. carrier planes attacked the naval

installations on that Pacific stronghold. HADDO was monitoring the attack planes' quack quack, with the loudspeaker on the bridge broadcasting the pilots' comments as they dropped their bombs, dodged the anti-air flak, and then headed back to their carriers. Throughout the raid, there were Japanese voices on the circuit, trying to jam the pilots' transmissions by flooding the circuit with almost unintelligible noise. In obviously flavored Japanese accents, the Japs tried to imitate Brooklynese comments about baseball games or American slang about "the boys and girls". At one point, a U.S. pilot was heard. His "May Day" transmission called for help, but where he was ditching was being blanked out by the Japanese voices on the circuit. Frustrated and realizing that something had to be dome, HADDO's skipper, Frank Lynch, got on the circuit and yelled, "Shut up! This is important!." The circuit went momentarily quiet and free of the Japanese quack quack. At this the downed pilot was able to get through his position in the water. HADDO was then headed over to the position and pulled the pilot out of the water as shells from the shore guns on Truk tried to prevent the rescue.

Peacetime exercises are no less satisfying when a good ploy is used. STURGEON was practicing torpedo approaches on an escorted merchant ship. After firing a torpedo, set deep to go under the target, the escorting destroyer headed over towards the general location where the torpedo had been fired from. A quick look through STURGEON's periscope showed that the destroyer would pass too far away for a shot at him. The Captain thus told the sound man to send over the sonar, "Zig left, you coward." As expected, the skipper on the destroyer on receiving the message, heeled his "can" over to starboard -- presenting an excellent torpedo target as she passed ahead at under 1000 yards in torpedo range.

A communication-deception ploy, as is readily perceived, depends very much on guaging how the enemy thinks and is likely to react. "Know your enemy" is a well recognized dictum for the gamesman. Though this is easy to do in peacetime and with the penalties for wrong guesses of little import, in wartime the whole business is a lot more deadly and the opponent's way of thinking a lot harder to assess. Thus, peacetime exercises are the place to develop the art of gamesmanship. The risk is low relative to a submariner's potential career.

An exercise is recalled -- an operational readiness exercise for a patrol plane squadron based at Whidbey Island. The exercise called for a submarine to start 300 miles from the coast of the state of Washington and close the coast undetected in order to make a simulated guided missile attack against the air base at Whidbey Island. The VP squadron's assignment was to prevent such an attack by keeping at least two planes close to where the transiting sub might be at all times. This seemed like an easy job for VP's -- holding a diesel sub down until her batteries were exhausted, far short of the missile launch point. After forty hours of trying to get to the surface for a few minutes of charge and to purify the air in the boat, the skipper of the sub realized that his boat was about exhausted while there were still some 120 miles to go for his missile launch. Recognizing that the VPs were probably tuned in to the umpire's circuit (though that was illegal), the skipper brought his sub to the surface in the dark of night and headed it away from the coast. The old, "know your enemy" principle was applicable here. Then he had the running lights turned on to make his sub look like a fishing boat and reported on the umpire's circuit, "Surfaced". Shortly thereafter he sent the message "Diving", but stayed on the surface. He guessed that the VPs would take it for granted that the sub had resubmerged because of their

close proximity. The skipper didn't risk a radar sweep because he was sure the planes were close by -- somewhere out in the blackness. A battery charge was started. Everyone on the bridge listened intently for the noise of a patrol plane, closing to investigate "the fishing boat." As expected, the roar of aircraft engines were soon heard close aboard. But no searchlight was turned on by the investigating aircraft to verify its "ship" contact. After circling the sub, the plane flew away to scan another part of the ocean. A second plane was heard. But she also quickly turned away, searching for the sub somewhere else. Both pilots had evidently concluded that their radar contacts were from a lighted fishing boat which they had neglected to plot on their charts. From there on in to the coast and finally simulating a missile attack proved routine -- because the VPs were looking for an exhausted diesel boat some 100 miles farther out to sea.

Use of missiles by submarines is a new capability which can seemingly be assured by some new kinds of ploys.

As observer at the Tactical Wargame Center at Norfolk, I watched two days of nuclear submarines unsuccessfully trying to penetrate the then modern ASW defenses around a large convoy. The enemy submarines were theoretically armed with 60-mile cruise missiles (like HARPOON) but no use was being made of them in the submarines' attacks against the simulated convoy. The game instructions called for the submarines to optimize their kill of high value ships in the convoy, so they tried to penetrate the ASW screens to get into the convoy and get off their torpedoes. On the last day of the wargame, it was emphasized that the best way to get the important ships might be by first destroying the protective forces which were preventing penetrations into the convoy. To this end, all three of the enemy subs in the game stalked the destroyers they found in line with

their planned attack on the convoy. Using convergence zone information, all three got into good positions for their missile-firing. The sub to the south launched a missile attack against a destroyer he judged to be 29 miles off -- based on loss of contact when the destroyer moved out of the convergence zone. The attack was assessed as a "kill" of the destroyer. Did the submarine's skipper then hurry through the hole he'd created in the convoy's defenses? No, he hurried his boat to the spot of the sinking and then came to periscope depth to ascertain whether there were any aircraft nearby. There weren't, so he surfaced his sub and quickly launched a rubber life boat with two men in it -- armed with Stingers -- and resubmerged. (Won't all of today's subs carry STINGERS, the way Gene Fluckey and others lashed on to BAZOOKAS in WW II?) This simulated ploy was played out to its bitter end. Eventually a P-3 was assessed as spotting the men in the life boat. Cautiously it closed the boat to find out if the "survivors" needed immediate help. At which, the men in the boat shouldered their Stinger launching tubes and let fly a couple of the heat-seeking missiles. The P-3 was declared "killed" and on went the submarine into the convoy for a cleanup.

Consider what a missile fired at some shore target like a tank farm could do in the way of diverting enemy coastal efforts -- if the shelling of an oil tank by a Japanese submarine off Santa Barbara during WW II is any criteria. Perhaps all it takes is an RPV, launched from a sub, that looks like a missile, to cause the same level of concern. Another ploy to be considered?

Today's complex electronic gadgets also suggest a whole new bag of ploys. A buoy loudly broadcasting the screw noises of a carrier is a means for diverting submarines from the real carrier's operating area. Why not use such a buoy as a submarine ploy to galvanize a quiet, enemy

sub, lying doggo, into some high speed movement -- to close the faked target. This should make the enemy submarine far more susceptible to detection by our own patrolling submarines. Enemy ferret satellites should prove just as susceptible to a submarine launched buoy which broadcast a recognizable radar signature of, for example, a carrier's beacon for its planes to home on. Such an enemy satellite-detected contact should shortly get nearby enemy submarines moving rapidly towards the ferret-located radar emanation. Also, torpedo-like decoys generating submarine screw noises -- already in use -- may provide a tactical ploy for breaking contact with pursuing ASW forces.

Another group of ploys involve non-electronic ways of breaking contact with unfriendly ASW forces. Submarines in extremis in WW II ejected all sorts of clothing, bedding, crates etc. from their torpedo tubes to make the enemy think that the sub was fatally damaged. Some boats let go a large amount of oil for the same purpose. One skipper put a big bubble of air in a ballast tank and then suddenly vented the tank. When the bubble hit the surface, the hovering ASW forces apparently believed that it represented the air from a collapsed compartment -- and broke off their depth charge attacks. Today's submariners are likely to use the ploy of a discharged noisy bubble-cloud astern of their submarine to escape behind.

But there are some ploys that have enjoyed a vogue of much use which should probably be discarded. The old, "dummy periscope" is one of them. Discharged from the signal tube, these wooden replicas with a metal radar-reflector on top are old hat. As Dick Laning described his use of this ploy, "I put a few out as decoys, but stayed too close to them, so they picked up my periscope while they were investigating the phony ones". His experience makes this tactical trick

sound like a real loser.

Perhaps the most useful ploys, today, stem from the covert, ubiquitous quality of submarines. A few scattered sightings or contacts on a single submarine can be easily magnified by the enemy into a "force" of submarines -- constraining enemy actions. When HARDER in WW II sank four destroyers outside of Tawi Tawi Bay, the Japanese Fleet Commander decided to pull his force out of the Bay because, as he radioed, he was being "blockaded" by a considerable force of submarines. Submarines are like the Scarlet Pimpernel, "they see them here, they see them there, they see them everywhere". And a good skipper fosters that illusion.

There is one final "ploy" that continues to sober my judgement of enemy submarine capability. We expect to play the torpedo-shooting game. But in a Strikeback exercise, with the sortie time set at 0500, I, as skipper, on returning to my boat at 2300 began having the uneasy feeling that it would be wise to get out of port -- right away. There were submarines on the other side, as well. So we got underway at 0100, despite our sortie orders -- and commenced a patrol off the harbor entrance. At about 0300, my sound man reported the sound of submarine screws approaching the exit-channel's sea buoy. Closing the port we'd just vacated with bottom laid mines, didn't seem cricket, but oh how clever! Luckily a sense of gamesmanship had saved me the great embarrassment of being out of action at the start of the exercise.

W. J. Ruhe

A SOVIET SSBN "BASTION" STRATEGY?

It is important to periodically stand back and review accepted wisdom about Soviet military purposes and capabilities. One such "given" is

the widely accepted notion that the primary rationale for the Soviet Navy is the protection and defense of the Soviet Union's SSBN force -- YANKEES, DELTAS, and TYPHOONS -- in near-home waters, the so-called SSBN "sanctuaries" or "bastions." This essay proposes that caution may be warranted in accepting and planning for the "reality" of a Soviet bastion strategy, especially in light of certain, seemingly anomalous features of the recently-deployed TYPHOON class SSBN.

The Soviet SSBN bastion concept has formally been sanctioned by the U.S. intelligence community as an authoritative estimate of Soviet peace and wartime SSBN deployment strategy, yet Soviet literature has little acknowledged either a "bastion" policy or the related idea of an SSBN strategic witholding posture. Although the bastion concept, as elaborated by Western, primarily U.S., analysts of Soviet naval affairs, offers a persuasive and logical explanation for Soviet SSBN deployment practices -- so different from the U.S. Navy's POSEIDON and TRIDENT fleet -- it should be recognized nevertheless that "proof" depends heavily on logical inference and circumstantial evidence. A particularly disturbing anomaly in this pattern of bastion thinking is the TYPHOON class submarine. Its characteristics are such as to place a question mark on its role in an alleged "bastion" strategy, and warrant consideration of alternative options. What needs asking is why the Soviets would build a ballistic missile submarine almost three times the size of the DELTA class, yet increase its armament by only four missiles.

The process whereby Western analysts of Soviet naval affairs have arrived at the conclusion that the Soviets have fallen back on a bastion strategy needs review.

Early in the 1970's, the Soviet Union deployed a new class of SSBNs, designated the

DELTA class. Armed with the SS-N-8, a 4,500 nautical mile range missile, these boats are capable of striking continental U.S. targets from operating areas near the Soviet landmass. This capability, plus the estimated vulnerability of Soviet submarines to Western surveillance -- SOSUS in particular -- contributed to the conclusion that the DELTA/SS-N-8 deployment reflected a deliberate Soviet decision to henceforth safeguard the Soviet SSBN fleet from Western antisubmarine forces by limiting their operating areas to the seas within easy reach of protective "pro-SSBN" surface and subsurface forces. Admiral of the Soviet Fleet Sergei G. Gorshkov's literary references to the value of a fleet-in-being as a tool for late war bargaining were interpreted by some Western analysts as further evidence of a Soviet decision to "conserve" the YANKEES and DELTAS in home waters as a "strategic reserve force." Additional "proof" of a Soviet bastion strategy came by way of the proposition by some analysts that keeping the SSBNs close to home was congenial to the Russian psyche and traditional Czarist/Soviet naval policy -- based on a continental geography, naval inferiority, caution, and a cultural dislike of the open seas.

Against this background of developed logic it is important to recognize apparent flaws and inconsistencies. While it is granted that the intercontinental range of the SS-N-8 permits the DELTAS to empty their launch tubes near or even inside their home ports, and that staying within easy reach of friendly "pro-SSBN" general purpose forces offers an added degree of protection, it does not necessarily follow that the development and deployment of the DELTA/SS-N-8 combination reflects a deliberate Soviet bastion strategy, or that such a choice was forced by the acclaimed effectiveness of Western antisubmarine measures. The latter argument contains perhaps a touch of wishful thinking -- a presumption that the Soviets have acknowledged the West's superior

antisubmarine warfare capabilities. Moreover, the recent trend in Soviet warship design toward greater endurance, larger displacements and larger weapon magazines could as readily be explained by a possible Soviet requirement to guard the Deltas through a protracted period of hostilities, not in home waters, but in greatly expanded and far removed ocean areas of the world.

Perhaps one of the most troublesome questions, however, is why the Soviets have gone to the trouble and expense of building fast and very large nuclear SSBNs. If the DELTAS and TYPHOONS, particularly the TYPHOON class, are destined to spend their wartime patrols in local areas, it makes little obvious sense to invest in speed, endurance and great size. Rear Admiral Sumner Shapiro, then the Director of Naval Intelligence, informed a Congressional committee of the TYPHOON as follows in 1981: "We never dreamed that the thing would be that big. It is a monster... it can probably carry extra people, extra equipment... It can probably stay out for long periods."

The TYPHOON is reportedly far quieter than previous Soviet SSBNs. Its large size and evident large reserve buoyancy indicate that the boat's double-hulled construction with a wide separation between the outer and inner hulls, affords considerable protection against contemporary Western antisubmarine weapons. Moreover, a displacement of 25,000 tons prompts speculation about the presence of an array of active defenses -- perhaps as a mother ship -- to permit independent operations in remote areas of the ocean.

As to the alleged vulnerability of Soviet SSBNs to Western surveillance and detection, concentrating the YANKEES, DELTAS, and TYPHOONS inside geographically well-defined and limited sea areas might actually ease the Western detection

and localization problem. If, as has been reported, the Soviets have made important strides in reducing the radiated noise of their submarines (Dr. Robert Cooper, Assistant Secretary of Defense for Research and Technology told an audience in 1984 that Soviet submarines now "are as quiet as our (own)"), it seems inappropriate to help solve the opponent's antisubmarine warfare problem in this fashion. Since the DELTAS are also reportedly being "quieted," the Soviet rationale for bastion deployment becomes even less convincing. The survivability of the "pro-SSBN" surface forces that would presumably guard the Soviet SSBNs in their bastion areas is probably not very high under conditions of nuclear war. Yet, nuclear war is the contingency that the alleged role of the SSBNs as a "witheld reserve" implies.

The tempo of Soviet SSBN deployments is much lower than that of the U.S. POSEIDON/TRIDENT force, suggesting a possibly lower state of readiness. This pattern is not exclusive to the seabased strategic portion of the Soviet fleet; its surface component similarly deploys only a fraction of the time theoretically available. It has also been reported that the Soviet Union's land-based ballistic missile force is generally kept in a lower state of readiness than is routine for its U.S. counterpart. The contrast between U.S. and Soviet strategic readiness postures may be a reflection of different estimates of the likelihood of a strategic surprise attack. The threat of a "nuclear Pearl Harbor" has pervaded U.S. defense thinking since the end of the Second World War. The Soviets do not share this concern to the same degree and evidently expect that a nuclear exchange will be preceded by a period of escalating tensions, giving them time to raise readiness levels. Thus keeping the bulk of the fleet, including the SSBNs, in port and home waters during peacetime makes good economic sense.

In conclusion, the evidence is not enough to reject the Soviet bastion theses; neither is it sufficient to asses its validity. Clear, however, is that the totality of facts and "hunches" about Soviet naval activities, strategic thinking, and operational behavior leaves enough room for divergent interpretations of why the Soviets are doing what they are doing. Although the Western navies are in almost daily contact with their potential opponent, and the basic characteristics and operating routines of Soviet Navy platforms and weapons are reasonably well known, our understanding of Soviet operating doctrine and potential wartime strategies remains quite limited. The Soviets themselves publish a wealth of literature on military matters, but unfortunately, most of the information tends to be highly theoretical or couched in the most general terms. Western analysts are hence forced to decipher the significance of Soviet hardware and operating routines by reading-between-the-lines. This interpretive effort is absolutely necessary and has produced valuable insights. It is equally important, in the words of Alberta Wohlstetter, the author of Pearl Harbor: Warning and Decision, "to play with material from different angles and in the context of unpopular as well as popular hypotheses -- whether the end is the solution of a crime or an intelligence estimate."

This article is a condensed version of an essay, entitled "The Soviet Navy's SSBN Bastions: Evidence, Inference, and Alternative Scenarios," that first appeared in the March 1985 issue of the Journal of the Royal United Services Institute. (RUSI).

Jan S. Breemer

U-BOAT CRYPTO SECURITY, OCTOBER, 1941

In September, 1942, British interrogators recorded the following exchange between two German prisoners of war, on the security of the Navy codes:

U-Boat radioman: We have often cracked the British code, during the Norwegian campaign, for example. But they will never crack the code we have in the Navy. It's absolutely impossible to crack.

Nazi commando: Everyone says that of their own code.

U-Boat radioman: What? They can't crack it.

Nazi commando: Oh, that's just one of those silly ideas people have.

U-Boat radioman: No!

Historical research has confirmed that the U-Boat radioman's staunch faith in his code mirrored that of the German Navy High Command -- a confidence as misplaced as it was unshakable.

The recent declassification of extensive intelligence materials has opened a new dimension to the study of the Battle of the Atlantic by underscoring the role of Allied signal intelligence in the defeat of German submarines.

The German Navy's tested but reaffirmed faith in its codes, based on the "Enigma-M" machine, therefore commands particular attention.

"Our ciphers were checked and rechecked to make sure they were unbreakable, and each time they were voted as impossible for the enemy to decipher," recalled Admiral Karl Doenitz, the WW II Commander in Chief of Submarines.

Such a determination was made by the Radio Renaissance Section of the German Navy Communications Service. Employing between 5,000 and 6,000 personnel during the war, this section monitored Allied signals and attacked the Allies naval codes. Yet it was a much smaller staff within this section which was concerned with the protection of German naval codes and whose assessments may have been more important for the war's outcome. One such assessment made in October, 1941 appears to have been most critical.

Doenitz, sensitive to his dependence on radio communication to direct his "wolf packs", had worried in April, apparently needlessly, that his ciphers might have been compromised. His fears were premature. But on 9 May, with the seizure of an "Enigma M-3" encoding machine when the U-110 was boarded by the British, along with the capture of cipher documents from German weather ships, the British were able by September to achieve a decode of German submarine messages 41 hours after their transmission. By October this was improved to 26 hours.

Aware that Allied convoys were beginning to elude his U-boat patrol lines, Doenitz in early September broached the possibility of having a compromised code to the Naval War Staff. The War Staff reassured Doenitz on 19 September that "a penetration of our cipher does not come into question." However, "additional security measures were authorized and full investigation into cipher security was begun."

The investigation assumed a great urgency when Doenitz on 28 September, learned that a British submarine had surprised U-67 and U-111 at a refueling rendezvous off the Cape Verde Islands. Doenitz told the Naval War Staff "that either our ciphers have been compromised or treason is involved."

On 24 October the investigation was completed and a Report sent to Doenitz. In this Report the Staff first collected the evidence which indicated a possible British reading of the German naval codes. Then each instance was examined to determine the most probable intelligence source that produced it. Four cases were selected as the basis for the examination:

o First was an intercepted British message of 6 September 1941 which had a "surprising representation" of U-boats deployed in southern Atlantic waters, when the subs were still in transit and had not broken radio silence. In analyzing this case, other British summaries of U-boat dispositions for several other dates, were compared. These summaries were attributable to allied radio direction-finding and to sightings by ships and aircraft of the Allies. And, since the three U-boats involved had radioed their positions when west of Spain and one had sunk a Dutch tanker enroute, it appeared reasonable that the British had enough information to reveal their presence and indicate their movement -- without a deciphering of the German code.

o Second was the unexpected appearance of a British submarine at the U-boat refueling rendezvous -- far from nowhere -- on 27 September. The War Staff felt that the use of a single British sub against a planned refueling rendezvous, for all three boats headed into the South Atlantic, hardly indicated a "trap." More likely, the Staff felt the British sub was on a reconnaissance of potential resupply points for U-boats headed south. The investigators did note that U-111 had sent a message arranging the rendezvous and in it mentioned the site of the refueling -- Tarafo Bay in the Cape Verde Islands. In passing, the staff mentioned that far too many naval commands enjoyed access to "Triton," the new cipher just coming into use for the Atlantic U-

boats, and proposed removing most of the offices getting U-boat radio traffic.

o Third, with the capture of the German supply ship GEDANIA and a British claim to have captured a U-boat (the U-570) intact, implying its coding machine and related documents as well, the Germans were faced with the possibility of British possession of an Enigma machine -- permitting them a "theoretical" simultaneous reading of encoded German messages. But the cryptographers stressed that in both cases the radio personnel had the time to destroy at least the most important code books before capture. Without these, and with the daily changes in key words, it was concluded, the cipher should still be safe. Doenitz was apprised of the U-570's capture by intercepts of messages from the British aircraft and armed trawler that brought the boat into Iceland. The submarine had been surrendered by an inexperienced captain and a demoralized crew with only two months of training. British press accounts indicated that the U-boat's crew had sufficient time to destroy the most important materials. In any case, the code table on board U-570 extended only through the end of October 1941. Thus, the staff concluded that if only one of the principle elements of the coding system was not seized intact, "decryption by the enemy would only be possible at considerable cost of trial-and-error, with little probability of success." But the capture of the U-570, the Staff felt, rendered more urgent the planned changeover to a new cipher system -- Triton. Still, transmissions of German messages in the old code, despite the Staff's optimism that it hadn't been cracked, were readable in London by the next afternoon. Moreover, Doenitz had some concrete evidence of this, as all the 15 allied convoys in October successfully evaded U-boat patrol lines. (The captured U-570 posed a dual problem for the British -- how to exploit the intelligence opportunity to the utmost while somehow persuading the Germans that a U-boat's surrender had not

compromised their codes. Doenitz on 21 December, 1941, in a telegram to the Naval War Staff said that a "special source" had confirmed the destruction of U-570's cipher material prior to capture. This information might have come from U-boat prisoners of war in letters sent home -- in prearranged codes. The possibility, however, cannot be discounted that British intelligence allowed this information to pass or even provided it to allay German fears of compromised ciphers.)

o Fourth, a decode of a British directive of 17 September, regulating the flow of shipping on either side of St. Paul Rocks at the junction of the North and South Atlantic, seemed to indicate a knowledge of German submarine patrol patterns. But, it was felt, British knowledge of U-boat dispositions could be traced to such conventional intelligence sources as sighting reports by the Allies and neutral shipping, aerial reconnaissance of the departure and arrival routes used by German submarines, and the "excellent efficiency of British radio direction-finding," all combined with the "most exacting and businesslike staff work" of the British. Yet the German circle with access to the codes was far too large "to preclude the possibility of betrayal."

The Naval War Staff were, moreover, influenced in their evaluation by the known activities of the widespread Allied espionage networks. Even while their Report on the cryptographic situation was being prepared, there was a great increase of monitored radio traffic of Allied agents, whenever a German warship passed through the Kattegat. Allied espionage, moreover, was being facilitated by serious security leaks within the Wehrmacht command and communications centers. Thus, with the wide dispersion of German naval stations throughout occupied Europe, together with the unconvincing evidence that the British were actually decrypting submarine traffic, the Naval War Staff's lessened concern with physical compromise of their Enigma

system becomes more plausible.

Confidence in the new "Triton" cipher -- operational on some vessels by 5 October -- plus restricting access to "Triton" to only eight naval commands plus six U-boat flotillas paid off. "Triton" restored German cryptographic security and defied solution by Allied code breakers for the next year. But with "Triton's" cracking in mid-December of 1942, the Allies regained the lasting advantage in the naval intercept war.

In early February, 1943, Doenitz again suspected a compromising of his codes and once more the Naval War Staff judged the ciphers to be safe -- focussing instead on the immediate problem of coping with Allied radar. With the U-boats' spectacular success against Allied convoys in March, 1943, Doenitz felt certain that submarine messages were secure. But this time there was no cipher system available to safeguard against a miscalculation. Thus, with the shattering defeat suffered by his U-boats in May, 1943, Doenitz withdrew most of his subs from the North Atlantic and focussed on countering Allied radar, not calling into question the security of his "Triton" cipher. The constant rumor of compromised codes was felt to represent an orchestrated Allied propaganda campaign against the "morale" of U-boat crews.

By contrast the Allies examined their own naval cipher in the wake of their March defeat of Allied convoys, and accurately diagnosed it as compromised and revised it in June, 1943.

Stripped of communications security and denied cryptographic intelligence, the U-boats waged an increasingly hopeless struggle against Allied technical and material superiority in ships and aircraft.

By June, 1943 the Allies' ULTRA intelligence could finally be applied in an offensive role as the British and Americans seized the offensive in the Atlantic.

In March, 1944, the use of signal intelligence in attacking a U-boat refueling rendezvous, worried some Allied officers that the secret of their decrypting of the Triton cipher could no longer be concealed. But again Doenitz' fears were assuaged by the explanation of Allied radio direction-finding -- and no basic changes in U-boat ciphers were introduced. The Naval War Staff's investigation in October, 1941, had established a pattern of misjudgment of radio security that the German Navy never overcame.

This article is a digest of Dr. Timothy Mulligan's THE GERMAN NAVY EVALUATES ITS CRYPTOGRAPHIC SECURITY, October, 1941.

EPISODE IN THE JAVA SEA

(Ed. Note: Some of the happenings in submarines are better retold fictitiously. This actual emergency on a war patrol, for example, serves to show the problems and drama of such unforeseen events -- without taxing the credibility of an incident recalled 40 years later.)

In the forward torpedo room Len Turner, Torpedoman First Class, began testing the firing circuits on the torpedo tubes. He had performed the routine tests hundreds of times during his ten-year career. But this time he had a mental

lapse. He pressed the plunger to test the firing circuit on #1 Tube, but he had failed to disconnect the circuit from the tube before he did so.

Inside the tube was a live torpedo with a warhead on its nose that held enough Torpex explosive to blow off the forward end of the submarine. The trigger was a magnetic exploder that could touch off that devastating power by sensing a change in the earth's magnetic field.

When Turner pressed the firing plunger, high-pressure air blasted into the tube behind the torpedo. Ordinarily, that would have shot the weapon out of the forward end of the tube into the ocean, where it would start its run toward the target. But, since this was a routine test, the outer door of the tube was shut. The weapon, a ton-and-a-half of steel, high-explosive and alcohol fuel, crashed at the forward door. It broke the door open and jammed itself between the smashed door and the tube. More than five feet of the torpedo, including the entire warhead and part of the steel cylinder that contained high-pressure air, protruded into the water ahead of the tube. The engine of the torpedo, driven by the steam from burning alcohol and air, began running inside the tube. The twin propellers furiously churned like a giant high-speed mixmaster.

The captain raced from the forward battery compartment to the control room. Then, shot up the ladder to the conning tower.

"Surface!"

MAKO surfaced to reduce the sea pressure on the inner door of the torpedo tube. If this pressure blew the inner door open, water pouring through the open tube would quickly sink the ship.

Then, Turner put on a shallow-water diving

mask and went over the side to examine the forward end of the torpedo and the damaged tube. He reported that the steel shutter that faired the tube to the hull of the ship had jammed shut so he could neither see nor touch the torpedo from outside the ship.

Even with the submarine on the surface, the tube was under-water. Therefore, opening the inner door would still lead to disaster. MAKO was trapped in enemy waters, afraid to move because her motion might turn the paddle-wheel impeller on the exploder, causing it to arm. Once armed, it would set off the warhead by any movement that cut the earth's magnetic field.

The captain went below, leaving Lieutenant Rhett with the watch on the bridge, along with the three best lookouts. In the conning tower Quartermaster Van Dyke stood by, alert for commands from the bridge. Lemos, the man with the golden ears, searched around continuously with the listening sonar.

A series of "What if's?" raced through the OOD's mind.

What if a lookout sights an aircraft approaching? ("Standing dive. No forward motion. Hold the ship with trim tanks.")

What if a torpedo is fired at MAKO? ("Turn toward... Then stop...Make a standing dive.")

A few minutes later, Lemos shouted from the conning tower so he could be heard on the bridge, "High-speed screws bearing zero-six-zero. Torpedo!"

"All ahead full. Right full rudder!" The OOD ordered on reflex.

As MAKO began to turn, the captain pulled himself onto the bridge. "All back full!"

When MAKO ceased moving, he ordered, "All stop."

The submarine lay motionless on the surface while Lemos searched around with the sound gear. Nothing was heard.

"What happened?" the captain asked the OOD.

"Sound reported a torpedo on the starboard bow. I turned toward it, Captain."

"We can't take a chance on arming that exploder. Don't kick ahead again."

"Aye Aye, sir."

Showing his confidence in the OOD, the captain went back to the wardroom.

After dark, the captain activated his plan to extricate MAKO from her desperate situation. Two things were going for him. First, the surface of the sea was without a ripple. Second, the jammed torpedo was in #1 tube, in the uppermost of three rows of tubes. Therefore, it might be possible to trim the ship so as to get the outer door above the surface of the ocean.

Lieutenant Rhett calculated the odds as one-in-twenty <u>both</u> conditions were in their favor.

The first step of the Captain's plan required the boat to be trimmed "down" aft and "up" forward. To do this, the diving officer flooded after trim and had the water blown out of all forward tanks. Still the outer door of the #1 tube was under water.

"Ask the chief of the boat to come to the bridge," the captain called down the hatch.

Shortly Whiteford, chief of the boat, was standing on the bridge, facing the captain expectantly.

"Chief, take the five strongest men on the ship to the forward room. Send all the other men to the after room. When I give you the word, open that inner door and attach a tackle to the tail of the jammed torpedo. Pull it back quickly into the ship and then shut the inner door."

"Aye aye, sir."

Whiteford disappeared down the hatch. Below, selected five bulls: Chief Engineman Barnes, Steward's Mate Crawford, Cook Matucci, Gunner's Mate Hines, and Torpedoman Len Turner. They went to the forward torpedo room as "All hands lay aft to the torpedo room," was broadcast through the boat.

Quickly, without question, sixty-six men hurried aft. There, men lodged themselves between torpedo tubes, on top of torpedoes, outboard of skids, on the deck, -- anywhere their bodies would fit.

They waited.

Now MAKO lay helpless, unable to dive. Like a wounded sea monster crouched on her haunches, she lifted her broken tooth above the surface of the ocean.

"Open the inner door on Tube Number One," the Chief ordered.

Whiteford rotated the heavy bronze door disengaging the lugs that held it shut. The door swung open on its hinges and water poured into the

torpedo room. But quickly the stream subsided even though the torpedo hadn't moved.

Turner crawled into the empty rear of the tube behind the torpedo and hooked the block of a heavy tackle to its tail. He edged back out and attached the tackle's other block to the bulkhead of the torpedo room.

Ten strong hands grabbed the tail of the tackle. Legs were braced while five broad backs pulled with all their might. Still the torpedo did not move.

Whiteford grasped the torpedo tail ahead of the other five men and called out, "All right...One...Two...Three...HEAVE!"

Twelve strong arms hauled in unison. Neck cords stood out. Muscles strained like stretched cables.

The torpedo moved a fraction of an inch.

Again they heaved. Another small bit of movement.

For two hours, sweat streaming down their straining bodies, inch-by-inch they " horsed" the damaged torpedo out of the tube, finally sliding it onto a skid in the room.

When Turner shut the inner door of the tube, Whiteford went to the bridge.

"Captain, the torpedo's secured in a skid and the inner door's shut, sir," he reported.

"Very well. Good work. All hands return to stations. Rig for dive."

"Aye aye, sir."

The men in the after torpedo room moved back forward to their stations and the diving officer retrimmed MAKO for diving.

Attempts to close the outer door of the damaged tube failed. It was irreparably jammed -- and fully open to sea pressure.

"We can't move that outer door, Captain," Whiteford reported.

"We can live with that," the Captain felt, "but not with that exploder in the warhead. It may be armed. Can you remove it without blowing all of us up?"

"Yes, sir."

"Very well. Keep the door to the forward room shut while you work on it -- and nobody else in that room except those you need to help with the job. After you remove the exploder, bring it topside and throw it over the side."

"Aye aye, sir."

Whiteford returned to the forward room.

"Turner", he said, "stay with me while I get this exploder out....Everybody else lay aft to the crew's mess and have a cup of coffee.. Crawford, dog down that watertight door behind you as you go aft and stand by it. Don't let anybody open it."

"Right, Chief." Crawford grinned, showing his gleaming ivories.

Turner handed Whiteford a wrench to turn the exploder's screws. Whiteford moved it carefully -- slowly removing the first screw.

"Whew." Like a man removing the fangs from a cobra, he extracted the remaining screws.

"Turner, you take the for'ard side and I'll take the aft. Let's lift it out real slow and easy," Whiteford advised.

Slowly they raised the exploder from its cavity in the warhead.

"All right. Lemme have it," and Whiteford wrapped both arms around the exploder holding it against his chest.

"Open the upper hatch," he said. Turner responded quickly.

"I'm going up. Stay close behind me and don't let me fall," Whiteford told Turner as he clenched the exploder to his body with his right arm while reaching up his left hand to grasp a rung of the ladder. As he climbed, Turner pushed him from behind. When Whiteford reached the upper hatch, he leaned his back against it for support -- resting there for a minute. Then he leaned his shoulders forward and placed his elbows on the deck. With both hands he set the exploder gently down. Taking care not to touch the exploder with his feet, he climbed out and stood on the main deck.

Then with both hands, he picked up the exploder. Walking slowly to the edge of the deck he heaved it over the side.

It did not explode.

Only then did Chief Whiteford and his shipmates breathe normally.

Nimrod

TACTICS VS STRATEGY

Even though Sun Tzu's ART OF WAR was written about 500 BC, it is still sort of a bible in both the Chinese and Russian military studies.

In Chapter 3 Sun Tzu discussed ATTACK by STRATAGEM. In it he says "In the practical art of war the best thing of all is to take the enemy's country whole and intact; to shatter and destroy it is not so profitable .... Hence to fight and conquer in all your battles is not supreme excellence; supreme excellence consists in breaking the enemy's resistance without fighting".

"To fight and conquer" can be thought of as tactics. "Breaking the enemy's resistance without fighting" is strategy.

Later Sun Tzu puts the art of war in a nutshell "... the general is skillful in attack when his opponent does not know what to defend; and he is skillful in defense when his opponent does not know what to attack." Applying skill in attack and defense is the art of tactics. But to cause the enemy not to know what he should attack nor what he should defend is the art of strategy.

"Numerical weakness comes from having to prepare against possible attacks, numerical strength from compelling the enemy to make these preparations against us". From this Sun Tzu described his strategy as that of pitting one against ten and his tactics as that of pitting ten against one.

It is a mistake to think of strategy as the art of surprise. Surprise is an emotion and it might prove to be a disadvantage. Strategy is more productively thought of as the art of causing an enemy to be unprepared. As such, all strategy

must be based on deception. Sun Tzu puts it in this manner "All men can see the tactics whereby I conquer, but what none can see is the strategy out of which victory is evolved."

Of all weapons the submarine has the best qualities to engender deception. Its design and use should make the most profit of that virtue.

Frank C. Lynch, Jr.

THE 25/75 % SOLUTION

In the introductory editorial, last issue (THOUGHTS ON SUBMARINE ASW, April, 1985) it was speculated on what might have inhibited the 75% of submarine skippers who collectively sank only 25% of the merchant ships. I contend that no special reasons are required to explain the fact that most of the ships were sunk by a small fraction of the submarine crews; this seems to be a typical distribution of performance for all human efforts.

"One-tenth of the people involved in a given endeavor produce at least one-third of the output, and increasing the number of participants merely serves to reduce the average performance."

That quote comes from Norman Augustine, a former Under Secretary of the Army, and Chairman of the Defense Science Board in a book Augustine's Laws and Major System Development Programs. In his chapter "On Striving to be Average," Mr. Augustine shows a graph of "percent of total output" plotted against "percent of total contributors" for: authors of scientific papers, patents in an industrial firm, arrests by Washington D.C. police, air to air victories of the RAF in WW II, and staff actions in the JCS. The points all lie quite close to the line suggested by the above law. He points out that the results on the graph are understated since his

data base considers only those who made at least some contribution.

On careful examination (three seconds with a navigator's three-by-five card) we find that the number quoted above for merchant ship sinkings also closely fits the plotted line. (Well, almost; a few more data points would be useful.) It is instructive to think about the submarine skippers you have known. There is a great range of variability in their performances as measured on any scale you might desire to use; reenlistments, Legions of Merit, ORSES passed, number of groundings, whatever. The issue should be what can be done to raise tha average performance level, not what causes some of us to be less than average. Augustine notes, "It must, in fairness, be pointed out that a very small fraction of the population also produces a very large fraction of the problems." The variability will always be there, and we should not seek to prove things by its existence; rather we should cultivate the high performers, and seek ways to raise the average performance.

Some years ago the Air Force conducted a set of instrumented tests called AIMVAL/ACEVAL (to those in the Air Force who know what these acronyms stand for, or even how they are actually spelled, my apologies.) These pitted the top-of-the-line fighter, F-15, against the smaller and considerably less sophisticated F-5. The results are still being debated, for, given the special ground-rules of the test, there is a great deal of room for argument about which aircraft did the best. The F-5s generally shot down more F-15s, but the F-15s were not allowed to shoot until they had visually identified the target even if they had radar contact at longer ranges, and the F-5s were smaller and less smoky planes. The F-15s had far better radar.

There is one unambiguous result, however; the

pilots of the F-5s learned to use their aircraft effectively much faster than did those of the F-15s. All the pilots were experienced before they were assigned to AIMCAL/ACEVAL, but the learning curve in this almost-combat situation was much steeper for the smaller aircraft. (Carping about even this finding is possible, since the learning came from thinking about incidents of being 'shot down;' something which, in war, one frequently does not have the luxury of reviewing.)

The point of this meandering example is that, although there will always be a great variability in the wartime performance of submarine crews, there are probably ways to raise the average performance of the force. Moreover, one should also look for ways for those ten percent who are really outstanding (not just on fitreps, but in reality) to be supported by those of us who are just average. We should decide what are the characteristics that make a good peacetime skipper, and what are those that make a good wartime skipper. Experience has shown that both sets of characteristics are not usually found in the same person. We must then decide how to keep our ships in shape and our crews trained with those who excel in peacetime, and how to keep those with the other set of traits around for when the war starts.

CDR Ralph Chatham, USN

ABOUT FORTY FIVE YEARS AGO

The 1940 edition of the Bluejackets Manual, a bible of sorts for new Naval Recruits, established priorities on Navy matters. Chapter 57 of 58 Chapters, under an inauspicious title "Miscellaneous," presented the Submarine Service and all its enticements for new seamen. The chapter was shared with other "high priority" topics of a peacetime Navy, including Naval

Reserve, Naval Training Courses, Duties of a Petty Officer and not least of all Disposition of Effects of Deserters, Deceased Men and Men going on Leave.

The Submarine Service was described:

"The modern type submarines, which are now named after fishes, are about 310 feet in length, displace 1,500 tons when on the surface, and carry a crew of 5 officers and 55 men. They are equipped with torpedo tubes on both the bow and stern, and mount a 3-inch gun which may be used against either surface targets or aircraft. Their maximum speed on the surface is about 21 knots, using Diesel engine-electric drive, and about 8 knots submerged, using storage batteries and motors.

"They are attached to certain units of the fleet, and also operate from submarine bases located at Coco Solo, C.Z., and Pearl Harbor, T.H.

"For training the men in this service there is a submarine school at New London, Conn., which offers special instruction in submarines, including courses in Diesel engines, radio, electricity and sound.

"Enlisted men assigned to duty aboard submarines receive pay in addition to the pay and allowances of their rating and service as follows:

"a) When regularly attached to submarines in commission based at shore submarine bases:

1. Unqualified men, $5.00 per month.
2. Qualified men, $20.00 per month.
3. Chief Petty officers and petty

officers, first class, after one year from date of qualification, $25.00 fer month.

"b) When regularly attached to submarines in commission, not based at shore submarine bases and when attached to submarines under construction for the Navy from the time the builder's trials commence:

1. Unqualified men, $10.00 per month.
2. Qualified men, $25.00 per month.
3. Chief petty officers and petty officers, first class, after one year from date of qualification, $30.00 per month.

"To qualify as a "submarine man," certain requirements must be fulfilled. He must have served at least six months on submarines. Before presenting himself for examination, the candidate must submit a notebook. This book must contain all data specified by "Submarine Instructions." The examination is an oral and practical one. It consists in going through the boat and operating all apparatus in the boat and answering any questions pertaining to the same. A commissioned officer conducts the examination.

"On a submarine, a wonderful opportunity is offered for getting much practical knowledge of electricity, particularly in regard to storage batteries. These batteries are the largest of their kind found anywhere today. Nearly all apparatus are electrically operated, including the main motors for under-water propulsion, steering and diving rudders, gyrocompass, pumps, galley range, and anchor gear. A submarine also is the best place in the Navy for obtaining valuable experience with Diesel engines, which are

used for its motive power on the surface. This type of internal-combustion engine is becoming prevalent in the merchant marine service and many of our shore radio stations.

A 1940, peacetime submarine force at the end of a long and non-combatant period emphasized propulsion, communications and sonar. Monetary remuneration was described in detail and opportunities to gain skills in fields related closely to non-military preoccupations were punched hard to the new recruit.

In 1985, the same emphasis continues in vogue. Note that the 1940 total submarine combat suite was given but a single line in the text. No mention was made of the torpedo that would later prove so totally inadequate at the onset of war. No stress was given to the importance of "combat readiness" in the sense of having to shoot or be shot at. The article's tone rings uncomfortably familiar.

It can be concluded in view of the esteem with which today's Navy holds its submarine force, that things have indeed changed. Or is it, as a long forgotten cynic once wrote, "The more things change, the more they stay the same."

CAPT Don Ulmer, USN(Ret.)

NEW IDEAS

REVIVING THOUGHTS ABOUT SUBMARINE WEAPONS

In 1951, after an absence from submarines of about 5 years, I was delighted to find myself in command of TRUTTA (SS-421) which we had recently recommissioned from the reserve fleet.

To those of us with WW II experience, the sub operations we were involved with looked like fun

but were a bit elementary and routine. SubDevGroup II was working on detection, while Guppy conversions seemed designed to investigate future hulls and propulsion. Thus we in TRUTTA decided to concentrate our thoughts on weapons and their control.

We arranged many torpedo firings of Mk 14s, 16s, 28s, 27s, 37s and of the mobile Mk 27 mine. We found that the Mk 14 had been changed in a most embarrassing way which meant that the warhead didn't detonate. Needless to say the Alt which produced this effect was changed. The other weapons did what they were supposed to do and little beyond that. We recommended that the enormous energy of the Mk 16 be used in a 60 knot version -- a firing mode for use in dog fights against ASW surface ships. And that it be equipped with a settable zig-zag program for use against convoys or task forces. In general, future weapons, we felt, should be wakeless, quiet, be longer range, have passive and active homing, be wire guided, have a high attack speed, be able to search in depth for submarines, and we should be able to carry many more weapons and reload them much faster. Launching of the weapons should be without bubble and be quieter. The TDC would also need improvement to provide faster rate control solutions, with active sonar used in the close-in antisubmarine dogfight situation -- and there had to be better bearings-only solutions.

Our letters on these subjects sparked little bureau interest. So most of our ideas were communicated in conferences. Whether or not we had any unique effect on the future of weapons, at least we knew how to handle what we had!

About this time I read that in WW II, submarine laid mines had had a hit probability about equal to torpedoes. This was a surprise to me who had considered mining a strictly secondary mission. So we decided to learn about mines and

made about 20 plants using Mk 10 mines. These plants were dangerous and arduous, but they started a train of thought which follows.

The effective width of a mine is perhaps its most critical characteristic. Our mines, both suspended and bottom laid, had only a small radius of destruction and they were limited to relatively shallow water. The best way around this was to make them mobile and homing to produce a contact hit. Propulsion, we figured, could be provided by buoyancy or by a torpedo-like system. Such a weapon could be stored in a fluid which would preserve it in a pressure equalized canister on the bottom of the ocean or on a line tethered to the bottom. The canister would release the mobile mine on a sensing of a proper target signal. Such a system would be more effective than what we had in WW II, but would still be limited by our inability to carry more than about 50 per trip.

This limitation might be reduced if we could carry the mines outside the submarine. To avoid the need for special designing an attack submarine, we envisioned detachable racks hung from each side of the submarine in which about 500 mines could be carried -- to be launched by gravity. Torpedoes could still be carried inside. The racks could be detached by explosive bolts on completion of a mine plant and a normal patrol be conducted. Design of the racks to withstand hydraulic forces seemed to be much easier for boats which would make an entire mission submerged -- either snorkeling or on nuclear power.

Buoyancy considerations meant that whatever was detachable outside the submarine must provide its own neutral buoyancy until released. This could be achieved by use of tanks of positively buoyant fluid both integral to the racks and to each weapon to be released. To release either would require opening a latching mechanism then opening the top of the fluid tank. Gravity would

do the rest. The bouyant fluid, an alcohol for example, would provide the best environment for the weapon in transit.

Pleased by a concept that could provide covertly laid mine fields of much greater effective width per mine and with numbers of mines about 20 times as great per mission -- while being usable in deeper waters making them more difficult to sweep by the use of the usual counters -- we moved on to strategic considerations. But perhaps we should have done this first.

Reading about past mining efforts showed that a real weakness had often been early discovery of the mine field by the enemy. The result had been a race of clearing versus laying -- instead of the paralyzing effect of saturation. To achieve saturation seemed to require dormancy of the mine field until there had been a sufficient build-up of laid mines. Modern electronics could supply the answer in the form of a listening device on each dormant mine which might be activated by a coded sonar signal which might be repeated from mine to neighboring mine. Thus, once the field had been laid, an aircraft or submarine could be sent out to lay sonobuoys which transmitted coded activation signals -- the submarine's sonobuoys projected to the field by an RPV. The result would be the activation of the field in an exponential way at about the speed of sound. This kind of electronic capability offered the further possibilities of temporary inactivation by IFF for own forces, or for the permanent inactivation of the mine field at the end of hostilities.

At this point, we were satisfied that we knew where mine warfare should go, and were convinced that such systems could have a profound, even victory determining, effect. Imagine how an enemy would feel, for example, to discover his fleet bottled up on the first day of hostilities. On

the other hand, suppose we found ourselves so bottled up!

These ideas were sent on their way to some form of bureaucratic swamp out of which, many years later, came the CAPTOR mine, incorporating, perhaps, some of our concepts.

Thoughts about exterior carriage of mines led us to consider this application to torpedoes. Why should a fleet-sized submarine be limited to 20 to 30 torpedoes? Or why should a submarine have to be large enough to carry torpedoes inside? The CNO, Admiral Arleigh Burke, was distressed that our largest nuclear attack submarines carried a payload less than that of the B-36 and seemed open to our ideas for carrying more weapons per submarine. In the process of a series of meetings with BuOrd people on these possibilities, we were put in touch with Tom Robertson of Vitro Labs. His response to some of our ideas, and many more of his own, was called the HI-DENT torpedo. It was a truly streamlined torpedo, more dense than water, with small wings, would be exterior-carried in light, pressure-equalized tanks containing the right quantity of buoyant fluid, to be released at the same time as the HI-DENT, in a gravity powered, quiet launch -- by the hundreds -- and from droppable racks.

Does any of this make sense for today's environment of possible antisubmarine melees, an enemy with 3 times as many attack submarines, his probable great use of shallow waters and his construction of "hard-to-sink" submarines? At least, if the future calls for smaller submarines or for the use of more numerous weapons, these old ideas might prove useful as "new ideas."

CAPT R. B. Laning, USN(Ret.)

NAVAL INTEGRATED ATTACK PLAN?

The U.S. Navy, in preparing to defend the nation from attack, has focused on combat capability as epitomized in readiness, sustainability, modernization and force structure. Two of these elements are particularly time-sensitive when it comes to warfighting with existing forces. Readiness is oriented toward a quick-reaction capability, with people and equipment; sustainability addresses "staying power" for prolonged combat. The more critical of these elements is readiness which contains no more of a mandate than to be ready "to fight" in some largely undefined way. The lack of clear-cut objectives and preplanned options to be pursued at the onset of war is the Achilles heel of our readiness posture for general purpose forces.

The U.S. Navy's most probable adversary, should deterrence fail, is the Soviet Union. The documented strategy of the Soviet Navy is surprise attack with massed, coordinated forces aimed at winning Gorshkov's "battle of the first salvo." They do not plan to allow the U.S. Navy time for coordinated reaction, nor do they envision prolonged combat other than mop-up operations. Their ships and particularly their submarines are built to support this strategy and it is practiced in their fleet exercises.

The asymmetry between the Soviet Navy and the U.S. Navy in planning for hostilities (i.e., massed, coordinated, surprise attack versus following rules of engagement and waiting for orders) acts to lower the deterrence threshold. Any perceived weakness in U.S. capabilities to either preempt attack or to counter the Soviet surprise first strike strategy would presumably increase the probabilities of its use.

The answer to this problem, then, is the implementation of a real-time Navy planning system

to establish a peacetime posture of readiness to attack pre-selected enemy naval targets at the onset of hostilities. Such planning has been hampered in the past by technical limitations. Today, however, advances in surveillance, intelligence collection, information processing, communications, and weapons technology make it possible.

A dynamic computer-based planning system, the Naval Integrated Attack Plan, has been developed for this purpose, but still needs to be incorporated in the Navy Command and Control System. The concept provides for consolidating the various information elements pertaining to targets, U.S. weapon launch platforms, weapons, and attack parameters in an information management program supported by a computer -- with communication links to other command node computers.

Targets in the data base include potential enemy naval forces including ships in port and shore facilities which are candidates for immediate attack at the onset of hostilities. U.S. Navy attack assets, and others as made available, are assigned by Fleet Commanders in Chief to selected targets. Existing procedures for weaponeering and other tasks required for effective weapons employment are utilized, with the results input to the Attack Plan data base. Provisions can be incorporated to enable frequent updating of plans on the basis of current intelligence, surveillance, and reconnaissance information.

For the Submarine Force, an increment in this Attack Plan could be the inputs for over-the-horizon missile targetting systems as exemplified by the early Outlaw Shark System for targetting enemy surface forces, particularly during periods of tension.

Flexibility in executing attacks would be provided by structured options for attacking various subsets of a target list. Basic attack options can be supplemented by special options planned to meet contingencies as they arise. All targets and pre-planned attack options would be approved in advance by the controlling command authority. For evaluating the expected outcome of pre-planned attacks or investigating shortfalls in the capabilities of deployed forces to execute any attack option, comprehensive assessment procedures are included. Forces out of target range could be repositioned as defense readiness conditions warrant.

Demonstration of this Naval Integrated Attack Plan in a desk-type computer should be pursued.

D. A. Paolucci
W. M. Georgen

SOVIET ARCTIC UNDERWATER HABITAT

[Ed. note: With submarines operating with increasing frequency under the Polar ice cap, a means for monitoring the environment below the ice cover seems appropriate.]

The Soviets have had a long and sustained interest in research and exploratory activities on and underneath the Arctic icepack. Soviet "ice research stations" have been established on the Arctic ice floe since the early 1930s with their "Northpole" series of "scientific expeditions."

An article in a recent issue of the East German paramilitary journal, Poseidon, offered an interesting description of a newly-designed Soviet "suspended" underwater station, intended to extend the capability of people to remain underneath the icepack. The station, named "Antipod," the magazine reports, was tested successfully as part

of the Soviet "Northpole 22" ice-floe expedition in 1980.

The article, authored by V. Grischtschenko, prefaces its description of the "Antipod" station with a summary of the scientific value of polar oceanic research and of the difficulties that are unique to establishing underwater habitats below the ice floe. The Soviet Academy of Sciences was evidently tasked some years ago with the design and construction of a portable under-ice research station. The Academy first came up with a design known as "Sprut." Sprut was an inflatable structure that, when in place, was secured to the ocean floor by some sort of anchoring system. It turned out to be a failure. The Soviet's next attempt was the "Antipod," shown in Figure 1.

"Antipod," like "Sprut," is an inflatable design that reputedly weighs only "a few kilograms." The station in a deflated condition is lowered by divers through the ice entry point. It is then moved to the desired location for its buoyant attachment against the overhead ice. The attaching "mechanism" is a rubberized flotation collar that also serves as a buoyancy reserve in case of a leak in the station`s jacket. Once emplaced, compressed air is piped into the jacket via a hose connected to the research station established on the ice floe.

Depending on the intended use of the station, i.e. as a temporary shelter for divers or as a "long-term" scientific observation post, the jacket is inflated to a volume that can vary from a "few" to "several dozen" cubic meters; the distribution of the internal air pressure is maintained proportional to the heighth of the station between the bottom entrance hatch and the buoyancy collar. Tanks of compressed air are stored inside the station in case of an emergency. Figure 2 depicts "Antipod" as fully deployed.

J. S. B.

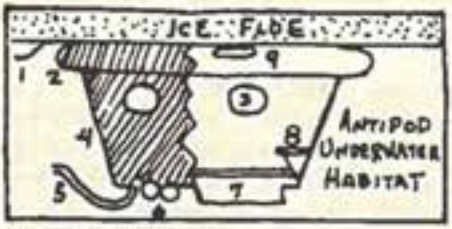

FIG. 1 THE HABITAT

1. SAFETY CABLE, 2. FLOTATION COLLAR, 3. PORT-HOLES, 4. JACKET, 5. AIR HOSE, 6. COMPRESSED AIR, 7. HATCH, 8. BOOK SHELVES, 9. SPOTLIGHT.

FIG. 2. UNDERWATER HABITAT UNDER THE ICE

1. DIVER, 3. HABITAT, 4. SPOTLIGHT, 5. AIR AND COMMUNICATION LINKS, 6. COMPRESSED AIR, 7. HEATED TENT OVER ICE ENTRY

TRIDENT

As a non-professional but greatly interested member of the Naval Submarine League, I was heartened by Admiral Miller's excellent letter (January '85 issue). What especially clobbered my attention was his explicit recognition of the superior survivability of the SLBM over the ICBM.

The Navy's TRIDENT system is demonstrably the finest deterrent we have going for us -- even now before it gets the D-5 missile operational. I said so in a letter to the Scowcroft Commission, when they were struggling to justify the MX. One of my points about land-based missiles was, succinctly, "If it ain't moving, it's dead." I concede an interim role for the old, slow, but still moving B-52s, as standoff cruise missile platforms. But, I'd like to see the Navy push for more of a good thing -- more TRIDENT subs and missiles rather than the silo-based delivery systems that improved technology has checkmated.

I know it's tough to speak out about controversial matters while under the constraints of career active-duty service. And the issue of which legs of the TRIAD have grown dangerously less reliable <u>is</u> highly politicized and studded with service prejudices and inter-service rivalries. But above all that, stands duty to country -- to survival.

Let those of us who are convinced that TRIDENT should be our <u>main</u> deterrent system start telling it like it is.

Sincerely,

Dick Key

OVERCOMMITTING SSN's

In regards to recent articles by Phoenix, I fear that in trying to realize more and more potential from submarines we are making the mistake of putting too varied a capability on a single weapon platform. We may be putting too many eggs in a single basket, thus endangering the other eggs and the basket.

The current program to put the TOMAHAWK Land Attack Missile into SSN-688 class submarines is my example. These missiles in their nuclear or conventional modes have the advantage of being able to reach targets hundreds of miles inland quickly, from a concealed site. These missiles could be launched from aircraft, surface ships, and from ground mobile launchers also, but nowhere are they more concealed nor can they be more surreptitiously deployed than on a submarine.

But look at what a fine, expensive weapon system we have just turned into a launch pad. We took our fastest, quietest, best listening, most heavily armed anti-submarine and anti-ship submarine and gave it another mission. While I will not argue against deploying a new and capable weapon system, if only because of the headaches it will give planners on the other side, I think the implications of this new mission should be better considered.

To what operational commander do the "Land-Attack" missiles belong and how will he communicate with the submarine? It is not difficult to envision, as Phoenix or Jerry Miller did, a theater commander having an SSN drop a half dozen or so land-attack missiles on a BACKFIRE base before an aircraft attack to completely disable it. This is probably a darned good one-two punch. But if we're in a hot, non-nuclear war, that SSN should be out scouring the ocean for enemy ships and submarines as it was

designed to be. There is real waste if a theater commander uses a weapon system of such great offensive potential in a secondary mission role so fraught with risk. What will the sub have to do to be ready to fire? He'll have to remain in near continuous communications to ensure that the attack is still "on." He'll have to remain undetected within a box that constitutes his firing area. He'll have to come up and fire on-time because he is a vital part of the overall attack. He'll probably have to report his weapons away, too. This sounds a lot like a strategic deterrent mission and yet the employment of nuclear "Land-Attack" missiles and their specific release procedures has not even been included.

This mission could have taken several important days in a short war. That Commanding Officer, while remaining undetected, may have had to pass up targets of opportunity that were more valuable than those few missiles. That C.O. may be staring at a room full of Mk-48's and HARPOONS and listening to the KIEV battle group steam by! All because a few of his weapons have been committed to another operational commander.

This specific scenario may be flawed or implausible, but the idea that we should take an $800,000,000.00 offensive platform and saddle it with a dozen or so inexpensive missiles, the proper employment of which may keep the submarine from performing its primary mission and put its survival at great risk, deserves rethinking. One of the submariner's greatest advantages has been his ability to choose when to shoot. Having someone else choose is a clear decision that the mission is more important than the survival of the submarine. I submit that these land-attack missiles and their missions may not be that important.

While I would never propose diesel submarines as substitutes for the open-ocean submarines of

our navy, perhaps the mission of slinking and lurking before launching could be well and inexpensively performed by an SSG. Maybe our aged SSBN's or SSN's would do well in the role, though I think that those who propose this give too little thought to the cost and radiation exposure required to refuel and recertify these reactor plants for another core life.

I've mentioned the communications, launch timing, and patrol area limitations which may arise, but what about other factors that may need to be different if the land-attack Tomahawk is to make a "Theater-Strategic" weapon carrier out of an attack submarine. In time of tension, will the theater commander demand, and get, two or three of these for his operational control? Will they have to be put on some kind of a patrol cycle from advanced sites? Will they require two crews? Will certain targets become so choice that they require continuous coverage? Will Navy targeters have to trade this off with Army and Allied missile batteries? Will these attack submarines get Pri-1 treatment from the supply system?

The attack submarine commanding officer may be America's most capable warrior today. His weapon system is awesome in its potential and flexibility. He leads a honed team of our finest officers and men. He traditionally chooses how and when to attack whatever targets he can find. Should we risk wasting all that investment and capability on this type of mission at the expense of the true mission of the attack submarine?

LCDR H. M. Holland, USN

THE MERCHANT SHIP TORPEDO

o There are reports that the Navy is pursuing a concept for an anti-merchant ship, straight-running torpedo -- "under $100,000 in

cost." Again it seems likely that a very fast torpedo for this job will be sought. But based on my WW II experience, plus the evident utility of the old MK VIII British straight-running torpedo used by the British nuclear submarine CONQUEROR in sinking the Argentine cruiser Belgrano, there are certain anti-shipping torpedo characteristics which should be seriously considered before the Navy rushes off with its high-tech answer.

WW II experience, and my knowledge of present-day ASW capabilities emphasize the need for a wakeless torpedo. That, plus a submarine launching system that doesn't leave a scar on the ocean or which won't make a clearly heard ejection noise. What a pity it would be to shoot at a merchant ship, with others nearby and good targets to boot, only to be rapidly counter-attacked after the initial firing of torpedoes because the enemy was able to spot the launch point or the trail of the torpedo. A wakeless torpedo, plus the high mobility of the nuclear firing platform should allow successive attacks against other merchant ships while minimizing the chances of ASW forces zeroing in on the firing submarine. In fact, having a wakeless torpedo -- plus the mobility of the nuclear submarine-- virtually eliminates the usefulness of merchant ships taking evasive actions after one is hit. Significantly, a wakeless torpedo which is also "quiet" would not require excessive speed to insure hits.

In WW II it didn't matter whether a torpedo was quiet in its attack because sonars were easily confused by the noise made by the merchant ships. But today, ASW sonars are far more discriminating. Hence a noisy launch of a torpedo and its noisy movement through the water can be as alerting as the wake-making MK 14s of WW II. A single salvo if using a noisy torpedo can now result in the elimination of further attacks. Since today's battery-powered torpedoes are fundamentally "quiet" and relatively fast, the few more knots

gained by a "noisy" torpedo seem to make little sense. What need is there for additional torpedo speed when the nuclear sub can readily maneuver quietly into shooting ranges under 1,000 yards -- against a merchant ship. With a torpedo in the water for only about 30 seconds, there is literally no merchant ship maneuver that will markedly reduce hit probability. Significantly, the quietness of the torpedo should complement the firing submarine's quietness to maintain an element of surprise in subsequent attacks and to not give away the firing position of the submarine.

Finally, the merchant ship torpedo should be a straight-runner in order to keep the cost down. CONQUEROR's high mobility in the Falkland Island's War more than compensated for the simple straight-running torpedoes used.

To stay under $1,000,000 means that it also has to be kept simple. The tendency, for example, to have torpedos which can explode "under the keel" -- to maximize weapon effect -- must be kept in check. It costs a great deal to have this capability and WW II experience attests to the great difficulty in estimating the drafts of ships and hence the critical depth at which the torpedo should be set to explode. Simple exploder mechanisms and bigger warheads seem to be the low-cost answer while ensuring destructability.

The promised 30-inch torpedo tubes on the SSN-21 and her large weapon load, make possible a quiet swim-out launch and the use of a distinctly different weapon for shipping than the present ASW torpedo. Big torpedoes can have a laminar flow shape and have the far larger warhead which responds to the increased size of merchant ships in today's merchant fleets.

If the torpedo is focused on its use against merchant ships, leaving the ASW warships to be

handled by far more sophisticated torpedoes like the MK 48, a practical low-cost weapon becomes possible.

D.E.K.

THE TYPE VII U-BOAT'S DISPLACEMENT

Let it be clear that it isn't my intention to review a review. I only want to avoid members getting peculiar ideas about the VII U-boat. Indeed, it is stated (page 74, April, 1985 SUBMARINE REVIEW) that: "The Type VIIC displaced 719 tons on the surface and 1070 tons fully submerged."

The relation surfaced against submerged displacement is very much out of proportion (and whether or not the boat is "fully loaded" doesn't matter...)

The "U-Bootskunde fur U-Boote Bauart VIIC", corrected up to 15.07.1940, gives as
surfaced displacement: 761 m^3
submerged displacement: 865 m^3

The use of cubic metres (German practice) does not distract from the fact that these values are more acceptable as displacement figures; their proportion that is. Values vary a little upon sources consulted but the proportion, the relation between surfaced and submerged displacements remains practically unchanged.

1070 tons, mentioned in the REVIEW, is probably meant to be the <u>form</u> displacement of the Type VIIC.

It is of course possible that "fully loaded submerged displacement" is a term used in the USN for what I know as form displacement or "Formverdrangung" (German). I have become a

member of the Naval Submarine League to learn something more about U.S. practices regarding submarines, including definitions.

Walter Cloots, Ing.
Belgium

IN THE NEWS

o The Senate Armed Services Committee notes in their Report on the FY 1986 Authorization Act that: "The Committee is advised of the operational necessity for submarines which are superior to those of the Soviet Union, but would also like to state its concern about the projected cost of the planned New Design SSN (the SSN-21). This is a particular concern since the unified commanders indicated requirements for more nuclear powered submarines than the Navy plans to fund."

Last year the Navy indicated a cost ceiling for the SSN-21. The lead ship would not exceed $1.6 billion while the fifth and follow-on ships would not exceed $1.0 billion, measured in 1985 dollars. For comparison, the cost of an SSN-688 in FY 1985, when four were funded, is $626.5 million.

The committee is concerned that the cost of these submarines may preclude the procurement of enough submarines of this class (SSN-21s) to meet over-all requirements which are derived from the threat posed by potential adversaries.

$28.5 million was recommended for continued R & D of submarine laser communications. "The specific pay offs of this technology would be for providing messages to SSBNs at depth, without compromising the submarines' covertness and increased survivability of the command control and communications into the post attack period .... a

satellite-based laser transmitter has been chosen as the baseline system approach."

In this Report, Senator Gary Hart provides "additional views." He notes .. "we continue to buy inadequate numbers of very expensive weapons especially in critical categories such as attack submarines." He also says, in discussing "seapower," that Aegis ships will absorb a great amount of defense spending and that these ships "do nothing but defend a few aircraft carriers from air attack," while this use of Aegis ships only means "continued weakness in capital ships -- that is, submarines. The submarine, not the aircraft carrier is today's capital ship." And he notes that, because of the high cost of the SSN-21, "our already inadequate submarine force will probably grow smaller."

o The House Armed Services Committee in their markup of the 1986 Defense Bill recommended a cancellation of the Navy's $205 million SUBACS submarine advanced combat system R & D program, supplementing it with an "SSN-21 combat system" development effort funded at $190 Million. The new effort stems from problems with IBM's system, causing the Navy to scrap part of IBM's SUBACS which doesn't work and salvaging the rest. The key part being eliminated is the fiber optics computer system that can digest and produce information on several enemy targets at once.

o Aerospace Daily of May 13, 1985, reports that the Soviet Union is developing a Type 65 torpedo which indicates a greatly improved anti-ship torpedo technology. With considerable improvement in propulsion, this Soviet torpedo can be fired at great stand-off ranges at NATO shipping, with a speed double that of most NATO equivalent antiship torpedoes.

o In early March, the evening "news" on TV reported a North Korean submarine having gone down

in the Yellow Sea. The picture shown on TV appeared to be that of a Romeo (possibly an ex-Chinese) type of diesel-electric submarine -- of which the North Koreans have about 12 such boats in addition to their 4 ex-Soviet Whiskey class submarines.

o The Washington Post of March 22, 1985, reported that "A Navy oceanographer who traveled into space on a shuttle flight last fall brought back some fantastically important information that will make it easier for U.S. submarines to hide in the world's oceans" -- according to the Chief of Naval Operations, Adm. James D. Watkins. The oceanographer, Paul D. Scully-Power, found large eddies and unknown currents in the oceans during his shuttle observations. According to Adm. Watkins, "He found important new phenomenology that will be vital to us in trying to understand the oceans' depths ... When people ask, 'Aren't the oceans getting more transparent?' we say 'No way, they're getting more opaque' ... because we're learning more about them all the time. How to employ them in a stealthy sense."

o Navy News and Undersea Technology of May 10, 1985, reports that the Navy is exploring the practicality of developing a "dumb", low-cost torpedo like those used in WW II. The submarine-launched MK 48 at $4 million a copy, if used against surface ships would, it is believed, constitute an "overkill" that can't be afforded. One Navy source is quoted as saying: "Surface ships are no harder to hit today than they were in 1942." Thus, instead of using "smart" torpedoes like the MK-48, the Navy is preparing a blueprint for the use of "dumb" torpedos that are fire-and forget and swim straight at a target, and do this at a cost well below $100,000 -- and which are used against merchant ships. (It is assumed that against ASW warships the MK-48 is more likely to be used.) However, the article quotes one source as saying that there has been a longtime Navy

policy of reducing the number of and standardizing of weapons carried in a sub. "Submarine warfare officials," according to this article, complained that submarines can carry only a handful of torpedos and they are not willing to give up smart weapons for dumb ones. Also, since the adversary has advanced his anti-torpedo defenses, a dumb weapon would be harmless. (ED Note: The electronic, complex torpedo might be more easily countered by countermeasures or decoys used by merchant ships -- than a straight-runner fired from an optimum position, as was done by the British nuclear sub CONQUEROR using old MK-VIII's against the Argentine cruiser BELGRANO.)

o Sub Notes of March, 1985, reports: "True to its word to do something about 'foreign' subs operating in its waters with impunity, Sweden has bought two Mini-Subs from Yugoslavia, for almost $700,000 to spike up its subsea defenses. These two-man craft will add to the growing anti-submarine armory which also includes six new mine hunters with high frequency sonar and seven sub-killer helicopters."

o Navy News and Undersea Technology, 29 March, 1985, tells of a Navy proposal to develop an oceanographic satellite that will search for safe spots in the ocean where U.S. submarines can hide. This proposal was fueled by findings of a Navy oceanographer that, "the ocean holds more hiding spots that subs would fit into than ever before known." Melvyn Paisley, assistant Navy secretary for research, engineering and systems, in recent Congressional testimony, said, "Knowledge of the ocean environment is critical to our naval tactical and strategic force employment ... The Navy will boost break-throughs in oceanography this year." Part of this program will be to increase support of the Navy Remote Ocean Sensing Systems Satellite and an increase in the number of oceanographic research vessels. The task to better study the oceans has been assigned

to the Institute of Naval Oceanography, by Navy Secretary John Lehman.

o The New London Day, on March 17, 1985, contained an article by Linda Rancourt on a study of the effects of lack of sun on submariners. The author develops most of her tentative information on work being done at the Naval Medical Research Laboratory at the Submarine Base, New London. Although a "definitive study on vitamin D sunlight/metabolism/calcium, has not been done," says CDR Kenneth D. Biondi, a research scientist, "we've been hitting aspects of it." Another scientist notes that "levels of Vitamin D drop during three-month deployments ... the levels go down from the beginning of the patrol to the end much as a 70-day stretch away from sunlight is not yet determined. It still is uncertain whether these deficiencies affect performance." Sunlight triggers production of Vitamin D in the skin. The human body needs Vitamin D to absorb bone-building calcium, and the Vitamin can be supplied through supplements, fortified milk, eggs, and fish oil. Other vitamin levels drop during a patrol, including B-6, and this could be because of stress. However, a research scientist noted that: "Sailors become more depressed just before a patrol, but this lessens as the sub gets closer to home and seems related to separation from home rather than nutrition." The author notes that when a crew sets out for sea, work schedules lengthen, social life nearly halts, exercise and physical activity drop off, and the air in the closed submarine has higher levels of carbon dioxide. Overall, these changes may have an effect on performance, but as yet the scientists have not backed this premise with fact.

o An article in The Washington Post of 8 May by Sally Squires says that a Navy financed independent research group -- The American Institute of Biological Sciences -- has determined that the extremely low frequency communication

system (ELF) poses no danger to the public health or the environment. Their study concludes: "It is unlikely that exposure of living systems to ELF Communications Systems can lead to adverse public health effects or to adverse effects on plants and animals." Critics state that : "Scientific evidence clearly shows the potential risk and potential health hazard of ELF," but then conclude this with ... "the magnitude of which is unknown." Identified possible biological effects from ELF waves are changes in the way calcium enters and leaves brain cells, the perception of flickering lights within the visual field and certain behavioral changes. An increased suicide rate from exposure to ELF waves is, for example, suggested. The Research Group examined such reservations and recommended monitoring of these areas and responding to any significant new information introduced. Meanwhile, ELF has a go-ahead for construction on a 56-mile tract in Michigan's Upper Peninsula and a tie-in with a 28 mile Wisconsin portion, successfully completed March 15. ELF is used to send radio signals to deeply submerged submarines.

o In testimony before the Senate Armed Services Committee's Seapower and Force Projection subcommittee on March 19, according to Melissa Healy, writing in Navy News and Undersea Technology, March 1, Secretary of the Navy John Lehman described the U.S. Navy's new maritime strategy. "We have to go on the offensive early" he emphasized. "We have to control the Norwegian Sea and force them back into the defensive, further north under the ice... To ready American naval forces to seize the initiative early in a war, the service has moved to land U.S. Marines in Norway, 30 days before the outbreak of hostilities -- to beat the sea and air-lift shortfalls." American ships and submarines would put to sea on an accelerated "surge" schedule 10 to 30 days before the onset of war. American attack submarines would be sent well north of the GI-UK

gap during the earliest phases of the war, and peacetime stocks would be filled, particularly on the carriers, so ships could go on alert faster, "Our submarines have to go and nullify the Soviet submarine force before we can send any surface ships, and before we send Marines up there in amphibious craft -- to land and secure airbases in Norway." Lehman is further reported: "Once Soviet attack subs have been neutralized, we have to be able to provide later air support to the forces there, so they can do those tasks that are necessary to secure Norway." Admiral Watkins in later testimony said, "Our unified Commanders see it as a very carefully planned and coordinated roll-back operation with SSN-to-SSN combat in the upper Norwegian Sea." In more recent statements, Secretary Lehman is quoted as saying that the Navy intends to sink the Soviet's SSBN's in the first phases of conventional war in Europe. He sees the American attack subs going after the enemy ballistic missile submarines "in the first five minutes of the war" and chasing the Soviet SSBN's under the ice of the Barents Sea and picking them off one by one.

o Time magazine of March 11 discusses various ideas for the President's Strategic Defense Initiatives. One concept describes a submarine-launched, laser-generating weapon. It is noted that all laser beams have trouble cutting through the atmosphere to destroy missiles in their boost phase, and would probably be used for post-boost or mid-course interception. But then, it is warned, the enemy warheads (which may have separated from their missiles) are hardest to find because they'd be hidden amongst a swarm of decoys. This is a form of "pop-up defense." The submarine's nuclear device generates laser beams as it explodes. In a microsecond, rods projecting from the device direct laser beams against missiles.

o The Washington Post of May 23, 1985, reports that Chief Warrant Officer John A. Walker Jr., who is accused of passing secrets to the Soviet Union, and who was arrested after he had allegedly left a paper shopping bag with 129 classified Navy documents at a drop site near Poolesville, Maryland, "attended submarine school and served aboard two submarines and several ships." The article also noted: "Officials said they believed the alleged espionage operation had been under way for at least 18 years and covered at least some of the time that Walker served in the Navy." In later issues of the Post, John Walker was identified as having handled top-secret coded communications on the nuclear submarine SIMON BOLIVAR from 1965 to 1967 as a radio officer. Later he was a communications officer for the Submarine Force, and that he held a "top secret crypto" clearance before he retired. Also, his brother Arthur who served on many submarines during a 20-year career from 1953 to 1973, has been arrested for supplying classified information to John Walker and subsequently to the Soviets.

o NAUTILUS, the world's first nuclear submarine -- on her final voyage -- left Mare Island under tow on 28 May and should arrive at the SubBase New London, by 6 July. There she will become a permanent display for the public. NAUTILUS was commissioned September 30, 1954, and decommissioned March 3, 1980, at Mare Island -- where her propulsion system was defueled and inactivated. She was towed to the Panama Canal by QUAPAW (ATF 110) and from there to New London by the RECOVERY (ARS 430).

o The Secretary of the Navy, John Lehman, has established a program for developing a cadre of Material Professionals well versed in the business management of systems acquisition. This action stems from an observed need to have better and more permanent program managers for the development of major new systems. Of the 60 flag

officers selected for this purpose, five are submariners: VADM Albert Baciocco, Jr.; RADM John Mooney, Jr.; COMO Charles Brickell, Jr.; COMO Guy Curtis III; and COMO Thomas Evans.

o ALABAMA (SSBN 731) was commissioned on 25 May. She is the sixth TRIDENT submarine to become operational and after a six-months work up will join the other TRIDENT submarines at their Bangor base in the State of Washington. ALASKA (SSBN 732), which was launched at Electric Boat Division of General Dynamics on 12 January, should be commissioned in the fall. At that time she will pose a SALT problem by possibly causing an exceeding of the SALT strategic weapon limits by 14 warheads.

BOOK REVIEWS

SUBMARINE U-137

Edward Topol, published by Quartet Books Limited, London, 1983.

Everyone knows about the Soviet submarine U-137, they just know it by a different name, "WHISKEY ON THE ROCKS", the submarine that went aground off Karlskrona, Sweden. That is what SUBMARINE U-137 is all about -- why the submarine was there -- why it went aground -- why this information must get to the western world -- and why the CIA got involved. The plan for helping the informer get asylum in the West in exchange for this secret information is the story line.

SUBMARINE U-137 should not be read as a submarine novel. There is little of it devoted to submarining. It seemingly should be read to try to understand how Soviets think and, just possibly, what they might be up to.

It is an easy book to read.

The author, Edward Topol, grew up in Russia, was educated, worked as a writer and was a faculty member of the ALL UNION STATE INSTITUTE OF CINEMATOGRAPHY. Several of his scripts received awards. Much of his writing was published and some was censored. Then he emigrated to the United States in 1978, at the age of 40. This is germane because we are reading what an emigre thinks of his own people and how his own people think. Here is a writer who can flavor his novel with a first-hand knowledge of the Soviet mind-set. It is a cultural approach to their culture complex -- political nationalism and world hegemony.

Most of us read about the Soviets without giving due consideration to the background of the writer or the writer's sources. However, we should temper our views consistent with the level in which their society is observed -- the hierarchy under consideration with which we are dealing. Most very senior level U.S. officials that deal with their counterparts in the Soviet hierarchy will describe them as non-imaginative, pragmatic, unyielding. The lower levels of the hierarchy are described as meticulous, disciplined, inflexible, much like their nuclear-trained Code 08 U.S. counterparts who find there is little room for, or reward given, for improvisation. At the intermediate levels, there is some room for individuals to maneuver in order to handle various situations as they arise.

They, like us, have their "losers" and their "winners"; but their "average" as indicated by the author have a far better chance of being rewarded for just plain competence than our "average" probably have. This can be seen in the characterization of, and the perks given to the Generals, Colonels, Majors, political officers, and civilians described in "U-137." The Soviet

reward system complements its centralized system of government and party. The "winners" rise quickly to play roles in the higher level staffs. This allows them to direct the work of those in subordinate levels. However, attaining the very highest positions requires patience -- until there is room at the top. Incidentally, formal education is not necessarily a pre-requisite for reward and high position. Street smarts, ideology, and party loyalty count for as much, or more -- witness the political officer in U-137.

Another important manifestation of the "winner/loser/reward" system can be seen in the Soviet's employment of assets. Why do we see them using one machine or one man more often than others? Because the machine is better than others of its class? Possibly. Because the man, a leader, is better than his contemporaries? Probably. Is this much different than our system? Not much. So, why bring this up? Because it is necessary to explain "winner/loser/reward" and its interplay with mind-sets, described by the author as inflexible, unyielding, pragmatic etc.. The use of an analogy may be the best way to explain this system.

The Politburo builds and approves a 5-year plan. To get a deviation in this plan after its approval is almost impossible, but a change in a sub-element of the plan is permitted. As an example, suppose the 5-year plan calls for building 10,000 tanks per year. Some of these new, modern tanks are exported to a client state. A war or firefight takes place between the client state and its neighbor, and the Soviet tanks are devastated. Is the production of the tanks discontinued? Never. That would be a major deviation. However, at a lower level of government a decision to modify the tank armor, firepower, propulsion etc., is made and the production continues at the approved level contained in the 5-year plan. In the eyes of the

Party hierarchy, changing the 5-year plan would mark the leaders as losers. Modification of the sub-element (even though it is now essentially a new tank design) is quite understandable and reward for meeting the 5-year plan is possible.

The Sovietologist D.F.B. Jameson writes in "Strategic Review", about U-137; "... its most valuable aspect is the insight it opens into the Soviet military mind. A collective attitude so thoroughgoingly predatory is, I am afraid, beyond the limits of comprehension for most American officials, politicians, professors and journalists. We can accept the validity of the portrayal of the caricature Nazis of contemporary film and literature, but the patient determination of the Soviet leadership cadre to press every inch of advantage with every available means seems to be beyond understanding."

"Patient determination to press every inch of advantage with every available means" -- is little understood, but nevertheless a historical Soviet practice. The Soviet leadership came into power through conspiracy and propaganda, and ever since they have used the ploy of deception and manipulation to solve their problems. The leaders even resort to handling their shortcomings by saying they don't exist. This may limit their effectiveness, but it certainly explains the need for centralization and why they need dividing walls between the intra-societal organizations of intelligence, military, science, journalism, the arts, etc., in order to maintain Party control.

This is the environment in which Soviet military officers are brought up and it is inbred into their thinking. It is an environment where the cumbersome make-up and inertia of the bureaucracy is likely to impede needed innovation. Actually, very little is known about individual Soviet officers except for those rare occasions where one has written an article made accessible

to the West, or when a resume of a Soviet officer is made available for some obscure reason. We need to know more about their military commanders and study their characteristics, stability and quirks -- like Rommel and Patton studied each other prior to WW II. The "incidents at sea" involving Soviet and U.S. ships -- witness the Crazy Ivan tactics -- would seem to say that, and given that Soviet officers are not stupid, they certainly seem determined and gutsy in these encounters.

In U-137, the submarine skipper was very proud of himself for refusing to allow the Swedish officials to enter the forward part of his boat, even though he was under arrest. He was also proud that he lied about running aground due to navigational errors. For this, his reward was to retain his command, while the Soviet Navy merely changed the hull number of his submarine.

The Soviets are determined; they are gutsy; they are deceptive; they are manipulative; and, they do not hesitate to lie. In the context of this book, these are not the attributes we desire in our military officers. But, they certainly fit the mold of the officers described by Topol in SUBMARINE U-137. Perhaps this is why we have emigres and defectors; it was the reason given by the characters in this novel.

Bert Findly

ANTI-SUBMARINE WARFARE

Rear Admiral J. R. Hill,
Annapolis, MD: U.S. Naval Institute, 1985

Admiral Hill, RN, specialized in neither submarining nor anti-submarining, but is experienced in both and hence feels he is biased in favor of neither. Nor does he feel "a need to

choke back a desire to deploy overmuch technical knowledge." His book therefore aims at the average reader. Well-written and profusely illustrated, it has much to offer as an introductory to a complex subject.

Admiral Hill believes that, "If you plan any major NATO campaign without use of the sea, you are planning to lose." He sees four major maritime concerns for the Western Alliance preservation of the submarine launched nuclear deterrent, posing some threat to the Soviet submarine missile force, control of the flanks and vital sea areas, and protection of sea replenishment and supplies. Anti-submarine warfare is vital to each. If NATO plans to use the sea it needs a sophisticated ASW capability. Preservation of the SLBM force is required primarily on departure to the patrol area to prevent Soviet surface ship or submarine surveillance and attempts to trail. The mirror image role of threatening the Soviet SLBM force aims, first, to demonstrate that an attack against a U.S. missile submarine would bring much more damaging retribution against their own; second, to ensure the preoccupation of a large portion of the Soviet ASW in protecting their missile force. In the early stages of a war, the admiral believes that by mutual consent, both sides may avoid attacks on the other's missile launching submarines, so as to preserve the stability of deterrence. For a number of reasons, political, geographical, and operational, however, such an agreement seems both unlikely and unenforceable.

The third mission, control of the immensely important flanks and vital sea areas of NATO, is not only immensely important but extremely complicated. The battle for the Norwegian sea, for example, could be one of the major engagements of World War III. Do we visualize amphibious landings to land reinforcements in Norway prior to hostilities? Multiple offensive and defensive

missions may call for widely dispersed, freely maneuvering surface and subsurface units, calling for anti-submarine neutralization of areas within 300 miles of carrier battle groups. With land based air, surface and subsurface units of both sides involved, command, control and communications are critical factors -- "it is absolutely necessary to confuse the enemy more than one confuses oneself."

The fourth mission, control of shipping, will be primarily a UK task in the Eastern Atlantic (where Britain provides 70% of NATO's ready forces), otherwise its a U.S. responsibility. Estimated requirements are 200-300 shiploads of dry cargo monthly and 50 nominal 20,000 ton oilers, plus an immediate requirement at or before hostilities of a million men and 10 million tons of equipment. This, of course, is added to 1,000 cargoes monthly for normal European economic needs. Staggering as anti-submarine protection may be for our impoverished and often poorly supported defensive forces, one element of the task is not well developed by the admiral. The broad strategic and geopolitical problem in the broad reaches of the Atlantic greatly favors the West and handicaps the Soviet Union. The enormous geographic problem of Soviet access to the sea, lack of support bases, repair and refit facilities, and shore based anti-submarine detection capability are formidable. Yet the potential destruction possible by only one or two nuclear submarines anywhere in the vicinity of our task forces sharply raises the ante for both sides.

Written primarily from a British viewpoint, ANTI-SUBMARINE WARFARE is of broad, general interest for the professional or armchair student.

Captain Paul R. Schratz

NAVAL SUBMARINE LEAGUE
HONOR ROLL

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