THE

SUBMARINE REVIEW

JULY 1989

A Quarterly Publication Of The Naval Submarine League

THE SUBMARINE REVIEW IS A PUBLICATION
OF
THE NAVAL SUBMARINE LEAGUE

NAVAL SUBMARINE LEAGUE • Box 1146 • Annandale, VA 22003 • (703) 256-0891

FROM THE PRESIDENT

When Chuck Griffith, Al Kelln and I teamed to form the Naval Submarine League in early 1981, little did we realize that the organization would root so firmly, and quickly chart a course and mission to fill a vital roll for the overall betterment of the Submarine Force. A lot has occurred and this has been amply documented. Wisely written into the By-Laws is a provision which limits a Director's tenure to eight years. My eight years have lapsed and consequently I must bid you adieu. On a positive note, this process forces new faces with new ideas and new energy to represent you on the NSL Board of Directors. Thus by the time you read this, a new President will have been appointed from the elected NSL Directors. This leaves me with mixed feelings. I share a sense of accomplishment for what has been completed, but more traumatic is the realization that I'll be on the sidelines cheering our NSL leaders on to bigger and better accomplishments.

This brings me to my only regret as your President. Somehow I have not been able to get you, our members, to carry a spare NSL membership brochure in your pocket or briefcase and to offer it to a prospective member. Many people are thrilled when they learn they can join our ranks without having been previously associated with submarines. This really works if you try it. As our membership grows, so does our impact. And this means the submarine story gets out better and more accurately. So please help by having the satisfaction of having introduced two new members into the League during the next year. It will make you feel good and you will share the pride I feel as I leave as your President.

Don't let me down.

Shannon

■

REMARKS BY ADMIRAL WILLIAM J. CROWE, JR.

Chairman of the Joint Chiefs of Staff
At the Submarine Birthday Ball, Washington, D.C.

April 8, 1989

As you know, I have a strong attachment for the Submarine Service. I've been associated on and off with submarines for more than 40 years--mostly off the last few years. But you never shed your affection for and pride in the Silent Service.

It was nostalgic for me to prepare tonight's remarks, as I recalled my own time in the boats. Inevitably my warmest memories are not of things, but experiences that have to do with people and human emotion--joy, sadness, triumph, even frustrations--and most importantly recollections of the men and women I served or associated with over the years.

Above all I have always treasured the opportunity to work with young American men and women--it's the prime reward of a career in the service. I have watched them in every condition: combat, peace, excitement, boredom, good times and bad. They inevitably give 110%. As a result I have no question about the future of our country; it's in good hands.

Certainly, as submariners, you have a great deal to celebrate tonight. You belong to an elite element of the world's finest navy.

- You undergo a rigorous selection process which assures quality throughout the force.
- As a group you probably enjoy the highest standard of education and training of any military organization on the globe.
- The men-of-war you operate and have mastered are pound-for-pound the most sophisticated and capable warships afloat today.

Your mission is not only important but vital. There is little question that if major war comes your role will be critical in fielding an invulnerable leg of our nuclear deterrent, in countering enemy submarines, in carrying war to places where no other units can go, in keeping the Soviet Navy bottled up

in its own waters, and in fighting alongside the rest of the fleet in coordinated operations.

No one can tell you exactly what the next war will look like, but no one will deny that the submarine force will play a crucial front-line role.

Lastly, you have a magnificent heritage of courage and achievement on which to draw. I suspect most of you are familiar with it. I believe, however, that it is healthy to occasionally recall our heritage. In the annals of conflict, the U.S. submarine force's achievements have seldom been matched.

U.S. boats sank over 5 million tons of Japanese shipping in World War II -- 55% of all the merchant tonnage and 29% of all the warships destroyed in the Pacific War.

- This feat was accomplished with only 1.6% of the WWII manpower of the U.S. Navy.
- Out of a total of 315 boats, 52 were lost; out of 50,000 men, 3,500 gave their lives in this effort (374 officers, 3131 enlisted); 16,000 actually made war patrols and their casualty rate was 22%, the highest of any service.
- Seven Congressional Medals of Honor were awarded to this small group.

Brave men blazed the trail you tread today. They established the submarine's worth in the only way it could be persuasively and irrefutably proved. Now you walk in their shoes and in their shadow. You can and should look to their example for inspiration and sustainment in times of trial.

While we honor their memory, as we rightfully should, their legacy is broader and a great deal more sobering than is normally acknowledged.

Preparing for war is a tough and uncertain business at best.

- Certainly our World War II submarine force success did not come quickly or easily.
- After Pearl Harbor it was soon clear that the demands and circumstances of war were a great deal different than had been forecast.
- The submarine force quickly learned that the best officers produced in peacetime were not necessarily the best fighting men. Books, inspections, tests and exercises simply don't replicate the full challenge of wartime. One

of the greatest tests the submarine service faced in 1942 was identifying those commanders with the aggressiveness, drive, tactical imagination, and coolness under stress that combat demands. This could only be done in the cauldron of war.

- Our submarines entered WWII with defective torpedoes. It took over two years to clear those problems up, and then it was only because Admiral Charles Lockwood, tired of foot-dragging in the Bureau of Ordnance, conducted his own tests at Kahoolawe which proved we were using malfunctioning weapons. Unfortunately the Navy had already relieved some very competent skippers for "nonperformance" when in fact a poorly designed torpedo had been at fault.
- Our strategy had to be altered a number of times before our boats were being used in the most effective fashion. Again, it took better than 18 months to arrive at a genuinely cohesive and effective deployment policy that selected the most profitable targets, and patrol areas that employed our resources to full effect.
- Successful tactics were equally long in developing.

Despite rigorous peacetime training they had not solved all their problems nor divined all the mysteries of subsurface warfare. No one believed that our boats could survive on the surface. Bold and imaginative skippers proved otherwise. Not only did they cut down transit times by using the surface, but many of the most successful night attacks were made on the surface. The rarest quality of all was a willingness to innovate -- to try new tactics. Curiously enough, in many instances peacetime training killed that trait rather than encouraged it -- a most important lesson for today's nuclear submariners.

The bottom line: Training must be accompanied with emphasis on imagination, new ideas, constant vigilance, and the foresight to hedge your bets against an uncertain future. I cannot overemphasize this philosophy.

Even with all that, you will never be completely prepared. Throughout history the unpredictability of war has confounded peacetime strategists, planners, soothsayers, and professionals. To acknowledge that simple truth is the beginning of professional maturity.

In my mind the most impressive tribute to the WWII submarine force was not that it was perfect, or compiled an exceptional list of sinkings, but that its people were able to rock with the punches--were flexible enough to learn with experience, to correct their shortcomings, to hang in there in the face of adversity, to ultimately defeat the uncertainties of war, and to persevere until they triumphed.

Birthdays are for expressing pride, for anticipating the future, and of course for looking back--to take account. When you do look back I urge you to remember the whole picture and to profit from our forbearer's experience, their problems as well as their victories, and strive to preserve their flexibility of mind and staunchness of purpose.

In saluting you I want to make it clear that tonight is to honor the whole submarine force, not just those on boats. Those in logistics, staff, and maintenance posts serve also, and their contributions are vital to the overall force's success. Likewise we can never forget the important bond between those who serve and their families. No ship sails, no sailor excels, no unit succeeds without the affection and support of loved ones.

I have always thought that from earliest times ships were referred to in the feminine gender for that very reason. So I want to quote from an authority on the subject.

> *Why is a ship called "she?" Fleet Admiral Chester Nimitz said in a talk to the Society of Sponsors of the United States Navy: "A ship is always referred to as 'she' because it costs so much to keep one in paint and powder"*

This is a tradition which has survived even the stern days of Admiral Rickover.

And as we consider such noble traditions, these festivities are also in accord with Navy tradition. Let me read you a description of a cruise of the **Constitution.**

> *On the 23rd of August USS CONSTITUTION set sail from Boston with 475 officers and men, 48,000 gallons of fresh water, 7,400 cannon shots, 11,000 pounds of black powder, and 79,400 gallons of rum.*
>
> *Arriving in Jamaica on 6 October, she took on 826 pounds of flour and 69,300 gallons of rum. She then headed for the*

Azores arriving on the 12th of November. She provisioned 550 tons of beef, and 64,000 gallons of Portuguese wine.

On 13 November she set sail for England. In the ensuing days, she defeated 5 British men of war and sank 12 British merchant ships, salvaging only their rum. Nonetheless, she made a raid on the Firth of Clyde. Her landing party captured a whiskey distillery transferring about 40,000 gallons of stagnant water.

You can see we have strong traditions to live up to. With that I wish the Submarine Service a hearty Happy Birthday, and many glorious returns of the Day! ■

SUBMARINES IN THE SPANISH CIVIL WAR

Seaborne troop movements and massive military imports were critical to both sides in the Spanish Civil War, 1936-39. This triggered two unique undersea campaigns, each involving foreign submariners. The Republican Submarine Force consisted of 12 boats built in Spain to U.S. designs in the 1920s. They were manned by crews loyal to Madrid's leftist government, but the officer corps was so decimated by executions and defections that the boats were ultimately commanded by Soviet captains overseen by Spanish political commissars. Franco's Nationalist submarine force, on the other hand, included 2 submarines transferred from Italy and 4 "Legionary" submarines flying the Spanish flag, but manned by "volunteer" Italian officers and crews. In addition Mussolini secretly ordered other units of his large submarine force to sink neutral ships with cargoes destined for Republican Spain. Outraged neutrals cried "Piracy", and also organized international naval patrols to combat the anonymous Captain Nemos.

The Naval Situation

The Spanish Fleet remained largely under the control of the Naval Ministry in Madrid, including the battleship JAIME PRIMERO, 3 cruisers, 15 destroyers and 12 submarines. Most naval officers sympathized with the Franco-led revolution, however, creating mistrust and hostility between commissioned and noncommissioned ranks. In view of the uncertain allegiance of the officers, Minister of Marine Jose Giral y

Pereira abruptly dismissed them by radio, appointed Chief Engineers to command, and ordered arms distributed to crewmen. A tragedy followed. Of the 764 officers and midshipmen on active service at the outbreak of the revolution, 320 officers were executed by lower deck committees within three months, and 290 more resigned or were expelled. This catastrophe destroyed the effectiveness of the Republican Navy, and gave Minister Giral notoriety as the assassin of the officer corps. The Nationalists soon overran the naval bases at Ferrol and Vigo, where they took over the old battleship ESPANA and the modern cruisers ALMIRANTE CERVERA, CANARIAS and BALEARES. From these circumstances the opposing submarine campaigns developed.

The Republican Submarine Campaign

The oldest submarines in the Spanish Navy were six B-Class boats built at Cartagena in 1921-23 to Electric Boat Company designs. They were 210-foot, 835-ton submarines, somewhat similar to American R-Boats. They were capable of 16 knots on the surface and were armed with four 18-inch bow torpedo tubes and a three inch gun. Manned by a crew of 28 under the command of a Lieutenant, their rust-pitted hulls were not considered safe below a depth of 66 feet.

Six C-Class submarines had also been built at Cartagena in 1928-30 under Electric Boat license. They were 247-foot, 1144-ton boats with a speed of 8.5 knots submerged and had a three-inch gun and four bow and two stern 21-inch torpedo tubes. With an operating radius of 4000 miles and a complement of 40 men under a Lieutenant Commander, they could operate safely down to 270 feet.

In the early morning hours of July 18th the Naval Ministry in Madrid ordered the submarines at Cartagena to load warheads and sail immediately to blockade the port of Melilla, Morocco. Since the Minister of Marine was unsure of the allegiance of the officers, he ordered the boats to report directly to him every four hours. The submarine radiomen had been cleared by Madrid for loyalty to the government, and were told to pass operational orders to lower deck committees to ensure compliance.

Off Melilla the Flotilla Commander disposed his wolfpack on

a nine-mile semicircle, with instructions to dive on station at dawn on the 20th. He ordered his captains to intercept the rebel transport MONTE TORO, to ascertain whether she carried troops, and if she resisted to sink her.

The Flotilla's officers were reluctant to open fire on a Spanish transport, but all submarines were in position by 0900 on July 20th. Conflicting orders then arrived from naval headquarters, instructing the Flotilla to abandon the blockade and recross the Straits to patrol off Malaga, Spain. Commander Bosch requested confirmation of these contradictory orders, but in Madrid senior officers were defecting and the naval staff was clearly in chaos. He therefore continued to blockade Melilla. This decision sparked dissension aboard the submarines, however, as suspicious crewmen argued with the officers about which of the conflicting commands was authentic and should be obeyed. At 1440 Madrid reconfirmed the orders to withdraw northwest to Malaga, and the subs departed. The bungled blockade of Spanish Morocco lost the Republican Submarine Force its one opportunity to contain the revolution, and exposed the wavering allegiance of its commissioned ranks.

Disaster then struck the Spanish Navy from within. On July 21st, 9 officers from four B-Class boats were arrested along with 6 submarine base officials; all 15 were then executed for treason. Three weeks later 20 officers from the Cartagena submarines who were incarcerated aboard the prison ship ESPANA No. 3 were shot along with 132 other naval officers. These atrocities destroyed the Republican Submarine Force's leadership, professional competence, morale, discipline, and aggressive spirit.

A grave strategic mistake followed in August when the now decimated Submarine Force was ordered north to show the flag off politically important ports in the Bay of Biscay. Remote from base support in the Bay of Biscay the Republican submarines achieved nothing.

The experience of two Republican submarines are of particular interest:

- C-5 departed Cartagena for the Bay of Biscay on August 22, 1936. On the night of August 31st off Cape Mayor she fired a torpedo that hit the 15,700-ton Nationalist

battleship ESPANA, but the warhead failed to detonate because of a defective exploder or too large a track angle. Ordered back to the Mediterranean with her sister ships, C-5 vanished with all hands off Ribadesella about December 30th. The cause of her disappearance is unknown, but her captain, Lieutenant Commander Jose Lara y Dorda, is said to have stated his intent to overpower his crew and defect, which may have precipitated C-5's loss.

- C-6 was dispatched to the Bay of Biscay on August 15, 1936, but the crew arrested the captain and sailed back to Cartagena, where they charged him with failure to attack the ESPANA and CERVERA when the warships were within range. Under a junior officer C-6 again sailed for Biscay on September 1st, but was recalled to the Straits on October 2nd. She returned north to the Biscay campaign under Captain Burmistrov of the Soviet Navy, but still achieved no results. An aircraft bomb put her out of action at Gijon, where she was scuttled on October 20th, 1937.

Observations on the Republican Submarine Campaign

The Spanish Civil War demonstrated again the critical need for professional competence and leadership in undersea operations. The tragic loss at the outset of experienced submarine officers destroyed the Spanish Navy's morale, discipline and offensive spirit, leading to malingering, sabotage and defection. Although ideological fervor ran high in the crews, the failure of the campaign demonstrated that submarines cannot be commanded by committees, nor by unpopular foreigners monitored by political commissars. The absence of high-level direction in Madrid and Cartagena also doomed the Republican submarine campaign. With no consistent strategy against Nationalist warships or supply lines, submarines were dispatched to areas chosen for political effect where they were employed against unsuitable targets. Without logistic support, and exposed to air raids in unprotected ports, they were put out of action or defected. The net result was 8 submarines lost with over a hundred men, and no damage to the enemy.

SPANISH REPUBLICAN SUBMARINE LOSSES, 1936-1939

Fate	No.	Submarines
Overdue or Lost on Patrol	4	B-5,B-6,C-3,C-5
Casualty or Air Raid in Port	1	C-1
Defected (Twice)	2	C-2,C-4
Scuttled at End of the War	5	B-1,B-2,B-3,B-4,C-6

The Nationalist Submarine Campaign

Concerned over growing military shipments from Moscow, General Franco declared a blockade of Loyalist ports in the Mediterranean and Bay of Biscay, and directed Nationalist warships to intercept cargoes destined for the Republicans.

To carry out the naval blockade Mussolini transferred two ARCHIMEDE class submarines to the Nationalist Naval base at Palma. Before their transfer to the Spanish Navy these boats had already carried out three patrols for the Nationalists totalling 48 days at sea. Their names were not stricken from the Italian Naval List but were assigned to two new BRIN class submarines on the ways at Taranto. Mussolini also supplied four Spanish "Legionary" submarines: IRIDE, ONICE, FERRARIS, and GALILEI. He loaned these boats to the Nationalist Navy with a crew of Italian "volunteers" operating under Italian control, and in addition secretly ordered other submarines to attack designated neutral ships carrying cargoes destined for Madrid. While these clandestine boats operated under Italian control, they were instructed to fly a Spanish naval ensign if forced to the surface to give Mussolini deniability for their actions. This unorthodox blockade was not popular with the naval high command in Rome.

The Nationalist submarine antishipping campaign got off to a fast start. Three Republican ships were torpedoed: The Spanish merchant ship CIUDAD de CADIZ was sunk off the Dardanelles, and the Spanish merchant ship AMURO destroyed. Before the end of August, a Spanish steamer was shelled by a submarine off the French coast, a French passenger ship chased into the Dardanelles by a submarine, and the Soviet freighter TUNIYAEV departing Algiers for Port Said was sunk by an Italian "Legionary" submarine.

August ended in an explosion of depth charges after the "Legionary" submarine IRIDE fired a torpedo at the British destroyer HMS HAVOCK on passage in the Western Mediterranean. The torpedo narrowly missed HAVOCK, which then picked up IRIDE on sonar and called other destroyers to the scene. A deliberate depth charge attack followed that shook up IRIDE but failed to put her out of action (HAVOCK got her revenge in October, 1940, by sinking IRIDE's sister submarine BERILLO off Sidi Barrani). London vigorously protested the attack on HAVOCK, but Rome denied responsibility.

In the first week of September, the British tanker WOODFORD was sunk near Valencia, and the Soviet steamer BLAGAEV sunk by a submarine in the Aegean off Skyros. Moscow claimed that it had "indisputable proof" that Italy was responsible for sinking the TUNIYAEV and BLAGAEV, and broke off relations when Rome denied involvement and the attacks continued.

British and French diplomats, anxious to dissuade Mussolini from forming a closer alliance with Hitler invited Italy to participate in an international conference at Noyen, Switzerland to organize anti-piracy measures.

On September 14, 1937, in the absence of Italy, the Noyen Conference authorized patrolling British and French warships to counterattack submarines or aircraft attacking neutral vessels in international waters. On that day Mussolini secretly called off his undersea campaign except for the four "Legionary" submarines. The Noyen decision in effect restricted Nationalist submarines to attacks within Spanish territorial waters.

Rome decried the Noyen Conference, but, not wishing to be excluded, demanded that Italian warships participate in the anti-piracy patrols. The British agreed, knowing from decoded messages that Italian submarine attacks had now been suspended.

On November 21st a prowling Italian submarine torpedoed the 7975-ton Loyalist cruiser MIGUEL de CERVANTES off Cartagena, putting her out of action for months. At the end of January another British ship was sunk off Valencia by a Nationalist submarine, and on June 15th the British ship

DELLWYN was destroyed off Gandia.

A total of 91 Italian warships and submarines participated in the Spanish Civil War, during which Italian "Pirate" submarines are said to have sunk 72,800 tons of shipping without suffering any losses. Audacious covert operations by clandestine submarines with "volunteer" crews on loan from a neutral power proved highly effective in the Spanish Civil War. Similar undersea guerilla warfare based upon the covert nature of submarine warfare could well be repeated in a future naval conflict.

Tom Paine

[The above article is digested from "Chapter 10 - Spanish Submarines" of Tom Paine's annotated submarine bibliography].

■

THE CONFUSING CASE OF CONVOY MO-TA-30

This convoy, enroute from Moji, Japan to Takao, Formosa, was attacked by Gene Fluckey's BARB, Eliot Loughlin's QUEENFISH and Ty Shepard's PICUDA, on the night of 8 January, 1945. The results have been the subject of confusion and debate ever since. The side-by-side account of the action from both the U.S. and Japanese sides, illustrate the great difficulty of reconciling such reports.

The U.S. account is taken from the patrol reports of the three submarines. the evaluation of the results come from:

- JANAC, the 1947 official U.S. attribution of credit for the sinkings in a report of the Joint Army-Navy Assessment Committee;
- SORG, the initial evaluation of results made by the Submarine Operations Research Group; and
- IJN, a narrative extracted from Japanese records by Roger Allen of the compilation of losses in "The Imperial Japanese Navy in World War II", prepared in 1952.

The U.S. submarines identified the convoy as composed of eight cargo ships, one destroyer, and eight or more smaller escorts. The Japanese gave the convoy composition as nine ships escorted by the frigates (kaiboken) CD 26, 39, and 112. Here is the running account of the encounter (Since all

merchant ships and naval auxiliaries were called Marus, for the ships involved the "M." stands for Maru):

The Action (U.S. Account)	The Results
8 January	
1723 BARB fires 3 torpedoes, Posit 24-55N, 120-26E. 1 hit on 10,000T AP (the Anyo M.), stern seen at 30 deg. angle.	IJN said that ANYO M., at 2036 breaks in half and sinks. Posit 24-34N, 120-37E. JANAC credits BARB with this sinking.
1 hit on 9200T AK (the Shinyo M.)	IJN said that Shinyo M., a 6892T AK loaded with munitions was hit and sunk at 24-50N, 120-35E and that it was sunk by aircraft 60 mi. SW of Taipeh. JANAC credits sinking to BARB. SORG credits sinking to BARB and later attack of PICUDA.
1725 BARB fires 3 more torpedoes, with 2 hits on 7500T AE; blows up (the Sanyo M.)	IJN said Sanyo M., a 2854T AO, hit by 1 of 4 torpedoes, continues on. Then at 2230 it runs aground at 24-42N, 120-46E and at 0430 on 9 Jan it breaks in half and sinks--"sunk by a/c west coast of Formosa." JANAC credits BARB with Sanyo M.
1738 QUEENFISH sees AO (Sanyo M.) blow up	

1915 QUEENFISH fires 10 torpedoes, at 3 ships, no hits. Posit 24-15N, 120-30E

1954 PICUDA fires 6 torpedoes, Posit 24-41N, 120-40E. 1 hit on 7600T AK (the Hikoshima M.), 1 hit on 9200T AK

2012 BARB fires 3 torpedoes, Posit 24-37N, 120-31E, 2 hits on 7500T AK; target disappears. 1 hit on 7600T AK (the Hikoshima M.)

IJN says Hikoshima M. a 2854T AO runs aground after avoiding 26 torpedoes since 1800. Lists it as a marine casualty, off Formosa.
SORG credits sinking of Shinyo M. to BARB and PICUDA jointly.
JANAC credits sinking of Hikoshima M. to BARB, PICUDA and QUEENFISH.

2033 BARB fires 3 torpedoes, Posit 24-31N, 120-28E, 3 hits on 7500T AE, huge explosion, Japanese firing into air

JANAC credits BARB with sinking the Shinyo M.

2036 PICUDA hears BARB's torpedoes go by, sees explosion

2150 QUEENFISH fires 4 torpedoes, Posit 24-25N, 120-28E, 2 hits on 10,000T AO (Manju M.), target stops and settles. PICUDA and BARB see and hear

Manju M., a 6516T AO avoids torpedoes
IJN lists Manju M. as heavily damaged by marine casualty, Taikokei, Formosa
SORG credits

explosions. Manju M., hit by 3 torpedoes, explodes, beached at Posit 24-27N, 120-32E	QUEENFISH with sinking Manju M. JANAC credits Manju M. sinking to a/c. Posit 22-37N, 120-15E on 21 January
Meiho M., 2857T AK, hit in the QUEENFISH attack, reverses course, beached and abandoned	IJN lists sinking of Meiho M. as a marine casualty, posit unknown JANAC credits Meiho M. sinking to a/c 28 Mar, posit 25-00N, 121-00E
9 January	
0915 Hisakawa M. 6886T AK, heavily damaged by a/c	IJN gives tonnage as 6600T, Posit 60 mi. SW of Taipeh
Rashin M., 5454T APK, lightly damaged in some air attack	
1220 Hisakawa M. reports heavy air attack; no further contact, lost with all hands	JANAC credits a/c for sinking Hisakawa M. at Posit 23-04N, 119-57E

The ninth ship in the convoy was Oga Maru. There is no indication in any of the material referenced that this ship was damaged during the above action.

John D. Alden

[The data cited here was collected for John D. Alden's book, U.S. Submarine Attacks During World War II. The book was reviewed in the April 1989 Submarine Review]

Editor's note:

It should be observed that there was only one submariner with JANAC making the assessments of sinkings after the war. JANAC's crediting of aircraft sinking of the Manju M. and Meiho M.--both beached derelicts after sustaining torpedo hits -- makes one wonder how many such other destroyed-by-torpedoes ships were improperly credited to aircraft which bombed the grounded hulks at a later time. IJN people also indicated the same prejudice against submarines. Note that they credited BARB's Sanyo M. and BARB's Shinyo M. to aircraft; and Hikoshima M., torpedoed by BARB and PICUDA, and Manju M. torpedoed by QUEENFISH to a "marine casualty."

■

SUBMARINES ARE SOVIET SEA POWER

The Soviets are unquestionably "true believers" in submarine sea power. This is evidenced in their writings, submarine building programs, the character of Soviet submarines and their weapons, and the position of submarines in their political and military plans. They view their submarine service as the heart and sinew of their navy:

"Missile armed submarines are the main component of the combat might of the leading navies in the world, including the Soviet Navy." ... S. G. Gorshkov.

The evidence is there for all to see and hear about. The Soviet submarine force is not a "Silent Service!"

The Soviet's great numbers of submarines -- the majority of which are nuclear powered -- have permitted a strategy for their use which is not only responsive to modern technologies but is also felt to be so decisive in its effects and so assured in its surprise and tempo of execution as to comprise -- in the estimation of Admiral Sergei Gorshkov, the former Head of the Soviet Navy, -- *"a new principle of war."* This strategy might be termed one of *"Simultaneous Destruction"* or *"Simultaneity."*

"The principle of simultaneous action upon the enemy to the entire depth of his deployment -- has acquired an increasingly realistic basis." ... V. A. Savkin.

This principle dictates that designated targets in a multiple target complex be destroyed at the same time in a single massive strike.

The reasoning which led to the Soviet Union's new strategy and the possession of the world's mightiest submarine fleet, results from a number of major factors. Among these are: how military policy is made; the adherence to Marxist-Leninist dogma; the amazing technology developments of the past forty years; and, of course, the special ability of submarines to operate covertly.

The genesis of this present submarine strategy of simultaneity in attack on groupings of targets can be found in the dictums of Nikolai Lenin who, according to A. S. Milodor, "considered the element of surprise to be the key factor in ensuring victory, while stressing the importance of seizing and maintaining the initiative." One of Lenin's dictums also called for a "first salvo" -- a gaining of the initiative by getting in the first blow.

Submarines certainly lend themselves to such doctrines for the use of sea power. Additionally, the character and numbers of Soviet submarines which have been produced lend credence to the intent of Soviet leaders to produce a form of sea power which can eventually dominate the sea areas of the world.

Lenin may not have recognized the value of the submarine to Soviet military and political interests, but Joseph Stalin, who became General Secretary of the Communist Party in 1922 and then Premier in 1928, began a series of programs which led to the Soviet Union's possession of the world's largest submarine fleet. Starting with the Soviet's first 5-year plan (1928-32), Stalin was mainly concerned with raising the economic level of his country and protecting the "homeland" from attacks from land and sea. This latter concern stemmed from the land-locked character of the Soviet Union, the threats posed by the sea powers of the West, the unfortunate results of conflicts over the past two centuries some of which were aided by the application of sea power to land offensives, and the growing imminence of invasion of the "motherland," from either the west or the east, during the '30s. Initially, Stalin called for a submarine construction program of 69 large, 200 medium and 100 small submarines in the second 5-year

plan. But then in the late '30s, with a deteriorating international situation, an even greater ship building program was inaugurated. By 1942 the submarine fleet was to have had 341 new high seas submarines. But by the time the Germans attacked the Soviet Union in June 1941, only 206 submarines had entered service. It was still, at the start of World War II, the largest fleet in the world.

Soviet submarines however, had little influence on the war's outcome because their role was defensive -- to protect the homeland -- while access to the open ocean was extremely limited. But Stalin had observed the tremendous success of German submarines in impeding the very essential overseas logistic support required by land forces of the Allies. Similarly, U.S. submarines strangled Japanese supply by sea. As the War drew to a close, Stalin was sorely frustrated by the lack of long range weapons to strike deep into the heart of Germany while German invading forces were striking deep into Stalin's homeland. With the U.S. A-bombing of Hiroshima and Nagasaki in August 1945, the solution to this problem presented itself. Stalin visualized the use of long range aircraft, missiles and nuclear weapons to attack enemies on their home grounds, and hold enemies of the Soviet Union at bay. Thus, he quickly began to change from a policy of strategic defense of the homeland to an offensive strategy -- consistent with Lenin's dictums -- which, with very long range atomic weapons, would hang the threat of a holocaust over the heads of potential enemies, like a veritable Sword of Damocles. It was a "threat of doom" new strategy.

Stalin's post-war actions revealed his plans to carry out this new offensive strategy. By acquiring buffer states around the Soviet Union, by gaining territory with access to the seas, and by building advanced weapons systems, he believed that the Soviets could present a direct threat to any enemy anywhere on the face of the globe -- and therefore at the same time insure the safety of the homeland from attack. The military force which was in the process of being created before his death in 1953 consisted of tactical and strategic nuclear payloads for delivery by long and short range missiles using ground launchers, submarines and long range aircraft. Rather than attempt to match U.S. bomber forces of the '50s, it was

decided to concentrate instead on the development of nuclear-armed ballistic missiles. A program to build about 600 diesel-electric submarines, some with a missile capability, following the lead of the United States with its Regulus program, was also adopted. Admiral Gorshkov, who became the spokesman for the naval programs initiated by the Politburo, noted that research had shown the high degree of effectiveness of submarines when correctly employed:

"Giving priority to the development of submarine forces made it possible in the shortest possible time to sharply increase the attack capabilities of our Navy, to pose a serious threat to the main forces of the enemy navy in the ocean theaters, and at a cost of fewer resources and less time, to intensify the growth in the maritime might of our country."

With the advent of the nuclear submarine, the Admiral would add that submarines with nuclear propulsion should even more insure that submarines were considered to be "the combat bulwark of the (Soviet) Navy."

From the time of Stalin's death until 1958, there was a Kremlin power struggle. In March 1958, however, Nikita Krushchev, having gained control of the Communist Party and hence control of the Soviet Government, became the Premier. He adopted the same objectives for the grand offensive strategy as his predecessor, Stalin. He continued to build up the Soviet Navy's submarine arm and improve its capabilities. He oversaw the integration of cruise and ballistic missiles into both submarines and modern surface ships. He also initiated space programs to support his submarines and oriented the Soviet surface fleet towards ASW and support of submarine functions.

Admiral Gorshkov interpreted this:

"The First and Second World Wars showed the mistake of the opinion that the submarine, in view of its ability to remain concealed after departing its base, could assure its own invulnerability." Moreover, "Diverse surface ships and aircraft are included in the inventory of our Navy in order to give combat stability to the submarines and comprehensively support them, to battle the enemy's surface and ASW forces."

Admiral Gorshkov, who in 1956 Krushchev had appointed to the rank of Admiral of the Fleet and the post of Commander-in-Chief of the Soviet Navy, was designated to carry out the Politburo's plan for naval dominance. Unlike the United States, where military programs are promoted by the White House, the Congress, a specific military service strongly affected by military service rivalries, and even the contractors for such programs, the government organization of the USSR offered Admiral Gorshkov the vehicle to get major submarine program decisions approved by a very small group of leaders -- the Politburo -- with the go-ahead rubber-stamped by the Premier. This stream-lined method of initiating new submarine programs and getting the necessary funding to carry them out, allowed the Admiral and his Navy to rapidly integrate new technology into their submarine programs as it became available -- even Western technology which was rapidly borrowed or even stolen. This was evidenced by the expose of the Walker's spy efforts and Toshiba Company's sending of equipment and methods for better silencing the propeller noises of Soviet submarines.

There is little need to recount the technical developments since World War II which have permitted the design and production of the Soviet's advanced weaponry and the sophisticated submarines which use these weapons. Suffice to say, they include but are not limited to: nuclear weapons; nuclear propulsion; long range ballistic missiles and cruise missiles; lasers; miniaturized computers; high strength, high temperature and non-magnetic structural materials; and a variety of satellites for reconnaissance, surveillance, search, tracking, communications and even orbital bombing.

Over the time span of twenty-five years -- under the direction and approval of the Politburo, and the stewardship of Admiral Gorshkov -- the "Threat of Doom" strategy was superceded by a "Simultaneity of Destruction" strategy for both conventional and nuclear war, with submarines playing the major naval role in this overall military strategy. Its objective is to completely wipe out, in one blow, an enemy's ability to effectively respond to an attack. This principle is embodied in the character of a "first salvo" which the Soviets believe will produce decisive results "in a matter of seconds rather than

hours and days," according to V. G. Reznichenko -- by destroying major designated targets almost simultaneously:

"The old well known formula -- the battle for the first salvo is taking a special meaning in naval battles under present day conditions."

Simultaneous destruction, as applied to strategic nuclear war, means that a target list of governmental, industrial, transportation and communication centers, military bases, enemy strategic weapons facilities and airports would be destroyed in one massive blow, depriving an enemy of his warmaking capability as well as satisfactory response.

Submarine based ballistic missiles can achieve a simultaneity of detonations on all strategic targets -- better ensuring attack success. This capability is the product of being able to program a ballistic missile's time-of-flight by controlling the missile's trajectory-velocity, using a preset time for thrust cut-off. A composite computerized guidance system, organic to the missile and made possible by the miniaturizing of guidance components, relates the accurate navigational position of the missile at launch to its target's geographic coordinates and the desired time of payload detonation.

The same sort of single-strike, massive weapon attack in conventional war is contemplated. Carrier battle and surface action groups, air defense ships, their command and control ships, their major units etc., -- the whole enchilada -- would be hit almost simultaneously in only a matter of seconds.

Swiftness in platforms which combine a submarine's high speed with very high-speed weaponry, produce "quickly developing operations" which, combined with surprise make it possible to beat the enemy to the punch and "to deliver a strike against the entire depth of the enemy forces' combat alignment." Admiral Gorshkov further notes that hostile groups of naval forces must be destroyed in "a strictly defined and very short time-frame -- before the enemy is able to employ its own weaponry in full measure." In short, the Admiral says that speed, a high tempo of offensive operations, a massing of weapons on a grouping of targets and the shock effect from a simultaneity of submarine missile hits (and possibly hits by land-based aircraft-delivered missiles as well), on several targets comprising the enemy's defensive alignment,

should create overwhelming effects. These effects should also allow mop-up operations with a submarine's torpedoes and produce a decisive victory at sea against a major segment of the enemy's fleet.

The Soviet's submarine-oriented Navy which fights fleet-against-fleet engagements with missile-armed submarines and missile-armed long range land-based aircraft is expected by the Soviets to produce an advantage in battle against the West's battle groups. This is thought, by the Soviets, to cause the defeat of an enemy's fleet and with that, in accord with the teachings of Alfred Thayer Mahan, and as interpreted by Soviet writers, *"the establishment of favorable conditions for a rather prolonged period of time for the accomplishment of follow-up missions, the victor being free to choose the time, direction, and character of his offensive operations, frequently using even weak groupings of own forces for this purpose."* In effect, the Soviets see their submarines playing a major role in gaining sea control over selected areas of the oceans for a limited period of time. This includes control of those sea areas where their strategic ballistic missile submarines lie in wait to launch their weapons at an enemy's homeland.

The Soviet Navy is not a "sea denial" Navy, but rather an offensive one designed for "sea control," because they see sea control as a necessary requisite for "ensuring the success of the operations of forces prosecuting the primary missions." Some Soviet thoughts about the nature of sea control must be appreciated -- because the submarine has been placed in an important sea control role:

> *"Soviet naval science has always viewed the gaining of sea control not as a goal in itself (not as a "mission" by Western definition), but only as a path to establishing certain conditions which would permit naval forces and resources to successfully accomplish one mission or another in certain regions of a theater." And, "the sphere of sea control will be extended to the depths of the ocean." And, "Combat operations whose goal is to strengthen control of the sea in selected areas can either precede the accomplishment by a fleet of its main missions or can be conducted simultaneously with it."*

The diverse character of the many types of Soviet

submarines for controlling the seas and carrying out important missions -- including strategic strikes against enemy homeland objectives -- are detailed elsewhere. But suffice to say, Soviet submarines are for the most part designed to operate worldwide. Even their minisubs (of which there are great numbers including bottom crawlers, as evidenced by the many penetrations of Swedish waters by "foreign" midget submarines) are carried on mother submarines to long-range destinations. Additionally, the Soviets continue to build long-range, high-performance diesel submarines -- for protecting their SSBNs, for defense close to their homeland, and probably for shallow water operations, including submarine mining of port areas. To the Soviets:

"Diesel submarines are improved, powerful warships, and they undoubtedly will also be widely employed under present-day conditions".

The Soviets are true believers in all kinds of submarines -- from the 25,000-ton TYPHOON to the minisub of a few tons, with emphasis on nuclear-powered submarines, while still maintaining a large conventional force of diesel-electric submarines which comprise more than one third of the Soviet's overall fleet of submarines.

Also, SSBNs should have a high degree of survivability if properly protected in their "bastions" -- unlike land-based missiles which are subject to destruction by an unanticipated enemy attack. In particular, Soviet submarines operating beneath the polar ice cap are most difficult to counter. And, at the same time they are pursuing vigorous submarine R&D Programs: to decrease detectability of Soviet submarines; to increase speed, operating depth and survivability; and to improve the capabilities of submarine weapons.

In summary, the numbers, variety and advanced capabilities of Soviet submarines speak for the fact that the Soviets are strong believers in the contribution which submarines make to their sea power. They make no claim that submarines can do the total job, but rather, when coordinated with other naval forces and adequately supported in their operations by other naval units, they are expected to play the leading role in a victory -- produced by projection of power from the sea against the shore while sea control over sea areas necessary

for the successful accomplishment of major missions is assured. Interdicting sea lines of communications would be one of the Soviet's important missions. The Soviets are particularly true believers in the massive first salvo. As V. A. Savkin observed, *"Victory in war will be formed as a result of effective application of a state's maximum power at the very beginning of an armed conflict."* Although the Soviets do not reveal the detailed secrets which give them the capability of "Simultaneity," nonetheless the Soviets evidently possess the technical know-how. The observed upgrading of Soviet ballistic missiles shows that they rely on mainly ballistic missiles for the simultaneous massive strategic strike and cruise missiles for the simultaneous overwhelming of an enemy fleet's defenses as well as the destruction of a convoy's combat-protection alignment -- with torpedoes for the follow-on mop up of fleet units and destruction of the ships of a convoy.

William P. Gruner

■

NUCLEAR SUBMARINES ARE THE "BATTLESHIPS OF TODAY"

Does the title of this article make any sense? Have new technologies such as: nuclear power in submarines; nuclear warheads; "smart" long range missilery; satellite surveillance, navigation, and communications; computers; and other sophisticated electronics, actually thrust nuclear submarines into the preeminent position of being the "battleships" -- the capital ships -- of their modern navies?

The answer is "Yes, nuclear submarines are truly today's capital ships, both in a traditional sense and in the role that they should play in present sea wars." Like the capital ships of the past -- the ships-of-the-line of Nelson's day, the dreadnoughts of World War I, and the aircraft carriers of World War II -- nuclear submarines project far greater firepower to far longer ranges than any other naval units including aircraft carriers with their sea based aircraft. They have the survivable toughness of "battleships." And they can deliver their weapons on-target against the concerted efforts of an enemy. But perhaps of first importance in establishing

the nuclear submarines' dominance in modern naval warfare is their very good control of the tempo of operations at sea. This ensures that their attacks -- initiated invariably with surprise -- will produce a new high-degree of attack effectiveness against the enemy. Moreover, under certain circumstances, they should achieve decisiveness in battle in a relatively short period of time -- similar to the outcomes at Trafalgar, Midway and Pearl Harbor.

Unfortunately, some of the generalities described above are not evident, nor are they easy to comprehend. Hence, there is a need for further explanations.

The Capital Ships of Strategic Nuclear War

Nuclear submarines carrying long range nuclear ballistic missiles -- SSBNs -- are generally accepted as today's "battleships" for strategic nuclear war. The nuclear weapon power they can project against virtually all of an enemy homeland's assets is measured in megatons -- a million times the explosive force of World War II conventional bombs. Moreover, the ranges of this projected power approximate ten times that of carrier based aircraft and at least 250 times that of a battleship's 16-inch guns.

Importantly, SSBNs are extremely survivable, particularly up to the time of their firing of SLBMs. Then, with missile speeds of over 7 mach and with their payload splitting into multiple, independently maneuvering reentry vehicles -- in their terminal phase of flight, and carrying individual nuclear warheads of fractional megaton weapon power -- their arrival on target is well assured even if nuclear war is in progress. It should be noted that nuclear submarines are least affected in their operations by the environment of a nuclear war -- their electronics are little exposed to EMP effects, the radius of destruction of nuclear bursts is less for underseas vessels, and submarine communications of very low frequencies are likely to remain usable. Hence, the superpowers opted in 1981 for an anti-ballistic missile treaty which eliminated a defense against such a weapon system.

So assured has been the potential for vast destruction of an enemy's homeland population and war-making activities by a fleet of SSBNs -- even the relatively small SSBN fleets of France and Great Britain -- that a World War III has been

successfully deterred for nearly half a century. Though only a part of a Triad of U.S. strategic nuclear weapon delivery systems, because of their stealth and precise control of their tempo of operations at sea, U.S. SSBNs provide a political leverage unmatched by the ICBMs and B-52s of the Triad. Significantly, SSBNs are not affected by the use-them-or-lose-them consideration. This alone has placed this form of maritime power in the forefront of national security. A carefully timed, measured response by SSBNs to enemy nuclear weapon initiatives is a truly valuable political option, since such a response allows for political dialogue between warring countries prior to counter-action being taken. For example, if a single nuclear ballistic missile was inadvertently fired at the U.S., with ready U.S. SSBNs at sea there would be no need for the U.S. to quickly unleash a massive ballistic missile response on the assumption that a nuclear war had commenced. Thus, if the enemy admitted their error, an unpressured and clearly defined token, fitting response could be used by the U.S. which would not tend to force an escalation to war and particularly to nuclear war.

If SSBNs were conserved as a fleet-in-being during a conventional war, the SSBNs' continuing threat of colossal destruction if their weapons were fired, provides a blackmailing threat for concluding a conflict on favorable terms. SSBNs are also a viable threat for preventing escalation of a major war to a level of conflict where nuclear weapons might be brought into use by an antagonist, to compensate for a radical imbalance in sea power caused by loss of a decisive battle at sea.

Note that, as of now, it is the mere presence of these modern underseas "battleships" -- the SSBNs -- which amplify the political advantages stemming from a nation having dominant maritime power.

The Capital Ships of Theater Nuclear War

With the introduction of nuclear-tipped cruise missiles into attack submarines, it would appear that attack nuclear submarines -- designated SSGNs -- might be classed as the capital ships, the battleships, of their navies for theater nuclear war. Then, with the arming of attack submarines with nuclear land attack cruise missiles, launchable from standard size

torpedo tubes, practically any submarine, diesel-electrics included, could now possess a viable shore bombardment capability which exceeded in range that of attack carrier aircraft.

Submarine launched cruise missiles with nuclear warheads, for example, the Soviet's SS-N-21 and the U.S. TOMAHAWK, have attack ranges of 1500 miles or more and can be launched covertly from a submarine close to an enemy's coast to destroy major theater targets far inland. But to effectively carry out a nuclear land attack mission against the shore objectives of a major power requires the use of nuclear submarines. Their attack flexibility plus their good control of the tempo of operations ensures that deep inland theater targets can be hit with surprise and at a time when the enemy is most susceptible to nuclear weapon destruction. This means targets such as airfields loaded with grounded aircraft, massed troops being held in reserve, congested railroad yards, communication centers in operation, exposed shipbuilding yards, harbors filled with ships, etc. Significantly, conventional submarines operating in a sea area like the Baltic Sea could play a similar "battleship" role against the shore targets of their enemy. By comparison, carrier aircraft would necessarily be launched at greater distances offshore, with little surprise, and would be able to attack critical enemy theater targets at only about half the distance inland, while their carriers should have a low probability of survival in the nuclear war environment. Battleships like the WISCONSIN when configured with several dozen nuclear land-attack cruise missiles might be thought of as capital ships for theater nuclear war. But their questionable survivability in the nuclear environment, lack of surprise and control of the tempo of operations seriously degrade them as capital ships.

Most importantly, like the tough survivable battleships of old, the nuclear submarine armed with cruise missiles can function offensively in nuclear war with little degradation of its weapons while enjoying a marked decrease in enemy ASW efforts. The shock effects caused by nuclear explosions on the men who man units in a nuclear battle, is almost impossible to evaluate. But it is safe to say that the submariner, who is far less exposed to blast, radiation and the heat of nuclear

bursts is likely to function more efficiently than the man who is on the surface of the oceans or operating in the air above the seas. Hence it is also possible to postulate that in fleet-against-fleet engagements in nuclear war, the SSN, even if armed only with conventional weapons, would play the role of the battleship against the enemy's fleet. The impairment of battle group defenses from the effects of only a single nuclear weapon-burst close to a major unit of the battle group, or an exoatmosphere nuclear burst's effect on the entire defensive alignment of the surface fleet should give the SSN considerable attack advantages which could lead to decisive results -- of the sort indicated by Mahan for gaining control of the seas for a short period of time.

A Capital Ship for Fleet Engagements in Non-Nuclear Sea Wars

The "battleships' of the past have been designed to provide the conventional fire power and battle toughness to win fleet actions. In Nelson's day, his capital ships -- the so called ships-of-the-line -- focussed on destroying the enemy's flag ships, their major capital ships. In World War I, British battleships at Jutland maneuvered to pour their gunfire on the heavy ships of the Germans. In World War II, U.S. aircraft carriers sought to destroy the opposing Japanese carriers hundreds of miles away. Today, , because of the advent of nuclear submarines armed with long range anti-ship missiles, a fleet-against-fleet action has a battlefield several times greater than that for carrier engagements, due to the 360° nature of a missile attack by several nuclear submarines firing from diverse positions. Carrier aircraft, on the other hand, have attacked an enemy fleet down relatively narrow threat corridors.

The Soviet Navy is structured around its nuclear submarines and will definitely use them as their "battleships" for a fleet engagement. In Soviet terms this involves "the concentration of weapons from a relatively modest number of platforms (nuclear submarines) for a single massive missile-strike action against the enemy, the platforms dispersed over a considerable area."

Thus it is safe to assume that a fleet action between the Soviets and the U.S. would pit a U.S. battle group (with

nuclear submarines in a far-out screening role) against a group of Soviet cruise missile armed nuclear submarines -- assisted possibly by cruise missile carrying land-based aircraft. The Soviets, by taking the offensive, count on attacking with surprise and directing over 100 of their missiles at an enemy fleet. In this type of engagement, the Soviets use their nuclear submarines as offensive capital ships, while the US. employs its nuclear submarines in a distant screening role -- which hopefully will intercept some of the Soviet submarines before they can launch their missiles, thus diluting the numbers of missiles fired at the U.S. battle group.

However, the U.S. has chosen a strategy for destroying Soviet missile-armed submarines well before they can be assembled for a major strike against a U.S. fleet. The U.S. forward submarine-barrier defense strategy is expected to attrite most of the enemy's submarines before they can move into the broad areas of the world's oceans, and is consistent with the recently established U.S. Maritime Strategy. In this mission U.S. nuclear submarines in effect are acting as battleships going head-to-head against the enemy's battleships.

Nuclear Submarines as Capital Ships in Raiding Operations?

The capital ship of the 16th century, a square-rigged, strongly constructed sailing ship of over 100 guns -- the galleon -- was a single-ship task force which preyed on sea commerce, bombarded forts protecting harbors, landed small parties of men to set fire to port installations and ships in port, and sacked coastal towns, while retaining sufficient fire power to destroy lesser ships of an enemy sent out to eliminate this threat. Then, using a capital ship for raiding operations was the consummate form of employment for such a vessel. In World War II the Germans designed a "pocket battleship" for much the same purpose -- a raider for remote ocean areas of the world. The GRAF SPEE was one such raider. Today, the SSN might serve as a "pocket battleship," spreading havoc against shipping in the southern parts of the Pacific Ocean and other ocean areas far from the military forces of the northern hemisphere. The new OSCAR-class, Soviet missile submarine appears to be a single-ship task force of great weapon power -- well adapted for raiding operations worldwide, including destruction of advance bases and enemy supply depots. In

fact, nuclear submarines configured to carry large numbers of weapons, supplies for many days at sea, commando units, and SEAL teams, would be properly configured to carry out the "raider" function in wartime in the traditional manner of certain types of capital ships of the past.

In summary, though it seems that only dyed-in-the-wool submariners will agree that today's nuclear submarines are the capital ships of their navies, it would also appear that those navies which believe this to be true are likely to build enough nuclear submarines to assure maritime dominance -- in the fashion of the "battleships" of the past.

Phoenix

■

NSL HEADQUARTERS SPACE

NSL continues to increase its range and scope of operations with new and expanding efforts. We are beginning to stress the capacity of our present office and the time has come to begin serious efforts to locate suitable and permanent space for our National Headquarters.

Our basic specifications include location in the Northern Virginia area (preferably Annandale, Alexandria or Arlington) and approximately 2,000 square feet (to accommodate normal office functions, small meetings and to house our Submarine Reference Library) at hopefully a modest outlay.

Members aware of spaces that may meet our needs are encouraged to give us a call at (703) 256 0891. We expect to move within the coming year if at all possible.

■


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

What's The Word From Westinghouse On Naval Submarine Systems?

Fathom.

Westinghouse has committed a significant force of its scientists and engineers to help fathom the needs of the U.S. Navy's nuclear submarine fleet.

Some of the successes include missile launching and handling systems, which have been installed on every Navy fleet ballistic missile submarine. We're providing the ML&H systems for the TRIDENT II missile and a new system that will allow vertical launches of Tomahawk cruise missiles from Navy attack submarines.

Also, we are currently developing the quietest-ever Main Propulsion System for the next generation attack submarine, and an improved SSN688 class unit.

Westinghouse is developing a sonar system Wide Aperture Array as part of the FY-89 Submarine Combat System, which will allow Navy submarines to rapidly localize enemy submarines.

We produce the transducer array/nose shell assembly for the MK48 ADCAP — the Navy's newest heavyweight torpedo.

Additionally, Westinghouse instrumentation and control systems are installed on virtually all nuclear submarines.

At any level, Westinghouse is helping to fathom requirements for the U.S. Navy's nuclear submarine fleet.

You have our word on it.

You can be sure . . .
if it's Westinghouse

SURPRISE IN SUBMARINE WARFARE

Ever since the first large-scale appearance of submarines in naval warfare, the commanders of surface forces have experienced great uncertainties as to the potential of this combat system -- with its deadly weapons and inherent stealth. How the submarine might change the outcome of fleet engagements has been very much in doubt. Hence the commanders often were inhibited from pressing for a decision in surface battles by fear of the consequences from possible submarine attacks. The submarine's capability to attack with a high element of surprise has placed into the equation of sea battles an element not well understood, but so worrisome that command decisions frequently have been flawed by an over-regard for "the submarine menace."

Today, because of high speed electronic actions and reactions, the value of attack-surprise is given an even higher premium in naval warfare. When surprise is added to a submarine's capability to control the tempo of operations, the combination enhances the submarine's battle effects and minimizes enemy counteractions. These two qualities of submarines place them in the forefront of all naval warmaking systems. But of first importance is the submarine's quality of being able to generate a high degree of surprise in its operations.

Use of the denser, more-difficult-to-penetrate medium of seawater by a submarine, coupled with a submarine commander's skills to utilize the many vagaries inherent to the ocean environment, reduce significantly the detectibility of the submarine until after its weapon has been launched. The most sophisticated electronics possessed by antisubmarine forces -- including satellites and bottom acoustic systems -- have yet to provide a capability to deny the submarine's offensive operations in virtually any and all areas of the world ocean, and its highly valuable asset of attack-surprise.

The similarity of submarine warfare to guerrilla warfare and terrorist actions certainly is marked. The military, political and psychological effects from the use of small numbers of men in surprise attacks, carefully timed to produce results out of all proportion to the resources used, seems to be the trend in the

nature of today's warfare. This is mainly due to the dominating and widely proliferated, sophisticated electronics available to all military forces, which are so effective in equalizing offense and defense, but which can be bypassed by submarines, guerrilla forces and terrorists. All three have the same covert approach to battle and a similar control of the timing for their actions. They are viewed as a difficult-to-define type of menacing threat, depend on surprise for the maximizing of their results, and have an ubiquity which greatly magnifies the threat they actually pose. Moreover, all three cause devastation and fear for a relatively low cost.

Unlike guerrilla warfare and terrorist actions, which can produce decisiveness only after many engagements over an extended period of time, the submarine can produce military results which could be decisive within a short span of time. The war in Vietnam is a good example of these points. The guerrilla warfare waged by the Viet Cong throughout the '60's showed only small increments of military success, while decisive psychological effects and adverse political effects were being generated which eventually would prove the undoing of the U.S. war effort, terminating with the U.S. withdrawal from that war. Similarly, U.S. submarines in World War II in guerrilla-like operations gradually seized control of the Pacific Ocean from the Japanese over a period of three years of warfare.

Today, on a far grander scale, submarines through their stealth and use of great weapon power can prove effective in causing a war to be quickly terminated on terms favorable to those who best husband them and employ them -- thus causing them to be an unacceptable threat to an enemy if conflict is continued. But the success of their weapon use is evidently their potential for employing surprise in their attacks.

Does the modern employment of surprise in submarine attacks represent a greatly improved submarine capability?

Since the first large-scale appearance of submarines in naval warfare, submarines have relied heavily on catching an enemy unaware at the time of launching its torpedoes. Submerged approaches, utilizing the opaque nature of the underseas, provided the ideal environment for gaining an undetected firing position. Only the active sonars of antisubmarine forces or detection of raised periscopes or electronic masts by their

radar or visual means proved to be sporadic ways for disclosing the submarine's presence and reducing the submarine's possibility of capitalizing on surprise to achieve attack success. But then, in World Wars I and II, the use of convoys, the submarine's lack of submerged mobility, and disclosure of the submarine's position by the presence of torpedo wakes as well as the direction from which torpedo hits were obtained, tended to prevent the submarine from enjoying multiple attack opportunities.

Thus, in World War II, German U-boat wolf packs -- to increase their attack mobility -- initiated night surface attacks against Allied convoys, using the cloak of darkness to avoid escorts and generate a reduced element of surprise at the launching of their torpedoes. The Allied convoy forces were aware that submarines were a nearby potential attack threat, but their exact location and timing for torpedo fire could only be guessed at. Surfaced mobility and low level of surprise caused the U-boats to exact, in the spring of 1943, a heavy toll of Allied shipping -- about 140,000 tons per week.

Winston Churchill, as related by John Keegan in his book "The Price of Admiralty", grimly summed up his shipping losses in this fashion: "How willingly would I have exchanged a full-scale attempt at invasion (of the British Isles) for this shapeless, measureless peril ...."

By the summer of 1943, with Allied radar-equipped aircraft, from both land bases and jeep carriers, providing coverage of the entire North Atlantic convoy routes from America to Europe and with significantly augmented surface escorts, both the submarine's capability to achieve surprise and its mobility were seriously curtailed -- resulting in few Allied ships being sunk while U-boat losses rose catastrophically.

Though World War II demonstrated how "the submarine menace" could be brought under control, the technology of the intervening years has so revolutionalized the character of the submarine, its operations and its weapons as to re-establish the submarine as the dominant naval unit of the world's ocean. The introduction of the nuclear-powered submarine in 1954, assured a high-speed, covert, fully submerged, long endurance sea weapon system with a high degree of surprise capable of initiating multiple attacks with torpedoes or missiles over a

short span of time. This formidable system insured a decisive effect as a likely outcome from the ship damage caused. And too, design and power developments greatly improved modern diesel-electric submarines giving them far higher submerged mobility and endurance than their World War II predecessors.

It is nuclear-powered submarines and the high-speed deep-diving diesel submarines and the surprise-attack effectiveness of their undersea weapons that have regained an ascendancy in naval matters.

Surprise and mobility place the offensive capabilities of today's submarine far ahead of the current limited defenses of air and surface antisubmarine forces. Its mobility, moreover, allows the submarine to control the tempo of its operations. This results in the ability to conduct deliberate, unhurried submarine attacks to ensure surprise; to avoid enemy ASW efforts without losing attack opportunities; and, to maximize attack success by careful submarine positioning at the time of firing.

Catching the Enemy Unaware

The modern submarine, particularly the nuclear submarine, capitalizes on factors unique to its underseas environment which allow attacks with almost total surprise. To illustrate this, a basic scenario is outlined here:

A submarine quietly patrols in a vast ocean containing: magnetic and infrared anomalies; shielding-noise from sea life, ship traffic and water disturbances; thermal layers; ocean currents; and all sorts of ocean phenomena which create "false contacts." Virtually invisible to enemy observers, the attacker submarine is imagined by the enemy to be anywhere or everywhere. Hence, any detected anomaly-- a radar contact on a piece of flotsam, a satellite contact on a streak of heated water, a sighted wake from a big fish -- calls forth a cry of "wolf." These "wolf" contacts then grow in number -- another and then another -- until enemy antisubmarine forces, saturated with false contacts, falter and begin to lose their enthusiasm for pursuing every "possible" submarine contact.

In the midst of this growing frustration, the undetected attacker submarine makes a passive sonar detection on an enemy ship and over a period of time determines that it is a submarine, a merchantman or a surface warship. And, not

infrequently, the attacker submarine is provided intelligence by one-way communications which helps to localize the enemy target. All the while there is no alerting of the enemy as to the location or even the presence of the attacker submarine. At the right moment, using high "quiet speed", and running in an advantageous sound strata, the attacker closes the localized target and identifies it passively by its sound signature. On the way, the submarine generates a tracking solution by a passive sonar-bearings-only technique.

Passive tracking of the target can involve hours, and during the tracking, the submarine, as necessary within its undersea envelope, can minimize chances of being detected by in-area ASW forces. These might include not only ships and aircraft but also fixed sonar arrays, towed linear arrays, air-dropped sonobuoys and surveillance satellites -- all integrated, and data processed to sort out submarines.

The undetected attacker slides through this large arrangement of detecting devices to reach its firing position with the latitude, due to the submarine's considerable mobility, to steer to a best firing position for the weapon to be employed. The submarine commander gauges where his enemy is least prepared to react to his attack.

If in this scenario the attack is on a grouping of surface ships, the submarine commander could expend his "surprise" by using a missile-salvo against enemy screening escorts. Then, with surprise gone, but using the submarine's mobility and diversity of weapons, the attacker submarine moves to fire on the escorted targets.

In this scenario, unlike naval surface or air forces, the submarine tends to arrive at a firing point unhindered by electronic measures and early recognition of intent to fire. The attacker submarine retains its favored situation because the one-way communications to the submarine are difficult to jam; the ASW forces emit noises which can be tracked and are difficult to disguise, false target decoys are difficult to place so as to confuse the submarine, and other active ASW measures often allow the submarine commander to use avoiding tactics.

Importantly, though the submarine itself can today generate total surprise for the launching of its weapons, the effect of

this surprise may be of little value if the weapon in use is noisily launched or is overt in its trajectory, disclosing its presence to the enemy well before arrival at its target. Unfortunately, current submarine weapons take a long time to get to their targets. Torpedo runs and missile flights of more than four minutes, for the most part, are expected. With this long detectable time available, the enemy, if alerted, can bring into play a host of high-speed electronic defensive measures to prevent the weapon from hitting. Thus, to ensure the benefits from attack surprise, the submarine must have weapons which are virtually undetectable in launching and in trajectory -- with active terminal homing employed in the final seconds before arrival -- giving inadequate time for the target's defenses to take effective countering measures.

Surprise Through Quickly-Developing Operations

In addition to gaining a distinct advantage by catching an enemy unaware, a similar effect can be generated by quickly developing operations which capitalize on a suddenly presented attack opportunity and which are so rapidly carried out that the enemy cannot organize a satisfactory counter defense to the submarine attack.

This type of surprise assumes that, while the use of high speed may cause an enemy to be alerted, the enemy will be incapable of catching up to the high tempo of operations which the submarine system produces.

The ingredients for this kind of surprise are: rapidity of staff planning (computer-aided) to quickly put in motion a submarine response to a suddenly disclosed opportunity; very high submarine speed to shorten the approach time; a high speed weapon covertly launched at the first firing opportunity; and, programming the weapon to mask it until shortly before hitting the target.

This type of surprise was demonstrated by the British nuclear submarine ***CONQUEROR*** during the Falkland Islands war of 1982. ***CONQUEROR*** was apprised of a suddenly-disclosed attack opportunity on the Argentine cruiser, ***GENERAL BELGRANO***, with its two destroyer escorts shortly before that surface group was to move out of the established exclusion zone south of the main Falkland Island. The cruiser had to be sunk before it reached its sanctuary for political

reasons, and, so, the ***CONQUEROR*** was selected to attack ***BELGRANO***. Staff planning was short-cut. ***CONQUEROR*** proceeded at maximum submerged speed, in excess of 25 knots, to intercept, while remaining covert during its approach. Although the torpedoes used by ***CONQUEROR*** were wave-making steam torpedoes, but used for reliability, the attack was carried out undetected at a range of less than 1,000 yards. ***BELGRANO's*** defenses were never mobilized for counteraction.

Strategic Surprise

It is generally thought that a major naval engagement between the leading sea powers will not be without a considerable amount of strategic warning time. In World War I the deployment of a large number of German submarines to a barrier line off the east coast of England on May 6, 1916 -- prior to the Battle of Jutland -- gave the British Admiralty five days of warning that the German High Seas Fleet would sortie from port to challenge the British Grand Fleet. This was an adequate amount of time for the British to prepare for the engagement.

Today, it is taken for granted that a similar pre-conflict deployment of submarines to sea in large numbers would signal the imminent start of a war, and that at least three days of warning time are assured before a sea war is joined. Hence actual strategic surprise, as generated by submarines, is considered highly unlikely. Yet, in a navy mainly dependent upon submarines for their offensive operations at sea, a surprise initiation of a war without strategic warning is a distinct possibility, particularly as Soviet submarines become increasingly quieter.

The Soviets, who see success in their military operations as requiring a high degree of attack surprise, also believe in a massive "first salvo" at the initiation of hostilities, which would provide a decisive result in the opening moments of war.

To produce a decisive "first salvo" while not producing any strategic warning suggests the setting up of Pearl Harbor-types of surprise attacks -- several simultaneous Pearl Harbors in widely separated locations. Is this possible? Could the U.S., with its close monitoring of Soviet submarine movements out from their bases, be made to believe that deployments of considerable numbers of Soviet submarines into the high seas

of the world was not worthy of "ringing the bell" of strategic warning? Interestingly, it would appear that this is possible. Only five years ago, after the Soviets announced that over forty of their submarines would take part in a North Atlantic fleet exercise, it was discovered -- several months later in the press of the West -- that close to a hundred Soviet submarines had been at sea simultaneously with no U.S. strategic warning bell being tolled. How did this happen? Simply, the Soviets told those of the West who monitor such exercises that halfway through the exercise more than forty additional submarines would sortie into the North Atlantic to relieve on station the first forty submarines taking part in the exercise.

Not only is it possible to lull an enemy's mindset into a complacency that believes that submarines at sea are not threatening ones, but also it is possible to so carefully deploy submarines that they can, for the most part, avoid being detected in transit. Minelaying conventional submarines, for example, could, in peacetime, hug coastlines, covertly lay a field of time-delayed mines to be activated at the time of the "first salvo", and then clear the area. The tempo for carrying out this sort of mission could be leisurely and circuitous to minimize noise in transit. (It should be noted that mines have the same inherent stealth and surprise characteristics of the submarine but that their immobility greatly limits their effectiveness and makes them far easier to countermeasure).

Later, a few nuclear submarines, having launched some midget submarines earlier, could wing cruise missiles into a battle group holed up in a port area, and with the combined effects of cruise missile, midget-submarine torpedoes and mine damage make the sortieing warships both disorganized and susceptible to mop-up operations by other nuclear attack submarines using torpedoes.

The same sort of "first salvo" attack on enemy fleets are just as plausible. Heavy warhead cruise missiles "from a modest number of submarine platforms" -- possibly augmented by land-based cruise missile-carrying aircraft and directed at a battle group's defensive alignment, might create such shock and disruption of a battle group's defenses as to make the battle group equally susceptible to mop-up by submarine launched torpedoes

Surprise With Midget Submarines.

Midget submarines launched from the decks of mother submarines standing well offshore and beyond harbor ASW defenses now can close a harbor fully submerged, neutralize harbor-bottom defenses and accurately inertially navigate without exposing a mast, to anchored ships or ships alongside piers. So total and so valuable can be the element of surprise in such attacks that the first intimation of danger to targeted ships is likely to be the explosion of the weapon used -- either a torpedo or a limpet mine. The devastating effect of submarines of a few tons using their quality of surprise against anchored warships of many thousands of tons, was well illustrated by the attacks in World War II by the Italian midgets, SLC 221 and SLC 223, known as "maialis", launched from the decks of the diesel submarine ***SCIRE***. The two "maialis" crept into Alexandria, Egypt, harbor and scored hits on the 32,000-ton British battleships ***QUEEN ELIZABETH*** and ***VALIANT***, sinking both.

Like a terrorist's bomb placed aboard an airliner which results in the deaths of more than a hundred passengers (as Pan Am's flight 103 was destroyed over Scotland with the loss of 270 lives), the controlled timing of a midget's attack -- along with the use of surprise -- results in greatly magnified military, psychological and political effects.

Summary

In today's environment of high speed electronics, without surprise:

- a massing of weapon platforms and weapons are likely to produce only inconclusive results;
- the attrition of offensive forces before weapon launch is likely to be considerable;
- electronic warfare is likely to neutralize much of the effectiveness of an attack;
- battle results are likely to be unpredictable; the offense will hold little, if any, advantage over the defense; and,
- sea battle will tend to lead to a protracted war with risk of nuclear war greatly increased.

With surprise, however, (and submarines, particularly nuclear submarines, guarantee this quality in their attacks):

- rapid and decisive actions are likely (with a sea war fought primarily by submarines having a good chance of being of short duration);
- there can be an economy in the use of force so that a relatively few firing platforms can achieve decisive results in fleet battles;
- enemy commanders will be frustrated and mentally tormented into choosing inadequate and unsatisfactory strategies for dealing with their antagonist's offensives (the "submarine menace" being greatly magnified);
- offensive units are best prepared for countering actions and evasion; and,
- the offense holds a large advantage over the defense.

Dr. Jon L. Boyes
William J. Ruhe

■

"UP PERISCOPE"

[*The Keynote Speech by Chester Nimitz, Jr. at the Nimitz Museum's Symposium honoring Sam Dealey.*]

What a pleasure it is to be with submariners once again after so long a time. And how fitting that the Nimitz Museum should be the agency that sponsors this Submarine Symposium and its accompanying Sam Dealey exhibit. My father was a confirmed submariner. His career included commands of the A-1 and the PLUNGER, as well as a squadron of our earliest really big submarines -- NAUTILUS, NARWHAL, PLUNGER, POLLOCK, PORPOISE and others whose names I can't remember. It was from the experience with the submarines of that squadron that the WWII so-called fleet submarine evolved. When Dad assumed command of the Pacific fleet, following Pearl Harbor, he chose to hoist his flag on a submarine -- the GRAYLING.

From this very distinguished group of submarine veterans, with so many, such outstanding performers, it seemed odd to me that I was asked to give the Keynote Speech. I have decided there were probably three reasons: first, it would have

been awkward to have to choose from among the four living Medal of Honor submariners we are privileged to have with us; second, I am the last living person to have talked with Texas's great Medal of Honor submariner, Commander Sam Dealey, lost on his sixth patrol, about whom I shall have more to say later; and third, my name is Nimitz! Herewith, then, is one old submariner's periscope view of the U.S. submarine campaign in the Pacific as viewed a long time after

U.S. submarine operations in the Pacific in WWII can quickly be put in dramatic perspective. Some 15,000 submariners, a minute fraction of the U.S. naval personnel in the Pacific Theater, with 288 submarines, sank 2/3rds of Japan's merchant fleet, and 1/3rd of its navy. And they did it with losses of only an approximate 1/5th of the people and submarines involved -- a remarkably favorable comparison to the horrendous losses incurred by German WWII submariners, who waged a similar campaign in the Atlantic. They lost 28,000 of the 41,000 men they sent to sea -- a 68% casualty rate.

It would be wrong to make any invidious comparisons with the performance of the rest of our Pacific naval forces. There were many different functions to be performed by many different kinds of forces. The 15,000 submariners were directly supported by thousands more, and indirectly supported by an even greater number. The war with Japan was the perfect opportunity for unrestricted submarine warfare -- an island enemy, poor in natural resources, with widely scattered bases and supply sources, not to speak of a vulnerable code. Submarines were not very useful when or where they were denied the element of surprise. In the presence of determined enemy forces, concentrating on a specific objective such as landing at Balikpapan or Lingayen Gulf, submarines could not keep the enemy from achieving his objective. Sink a few ships, yes, but drive them off, no. Nor could they defend Midway against a Japanese carrier strike force and landing attack group. Nor could they force the fanatical Japanese government to throw in the towel. But I will aver, that in the performance of their primary mission, interdiction of supplies to Japan, U.S. submariners, and in particular those of you here today, accomplished their important assignment in a manner

that has to be rated outstanding. In short, although you didn't win the war singlehandedly, you almost certainly eliminated any Japanese chance to win, and contributed greatly to their predisposition to quit. Hail to submariners!

It is interesting to consider why our submarine forces were so successful. I believe there were two principal reasons -- the People and the Boats. The nucleus of personnel, officers and men, with which we started the war simply has to have been our single greatest strength and asset. Their morale and their training were diluted and rediluted over and over again as the many new submarines were manned and commissioned. If the concentrate had not been of the highest quality, soundly trained and highly motivated, the subsequent successful results could not have been achieved. There were some -- but comparatively few -- combat failures among submarine skippers in the initial stages of the war and the service itself quickly replaced them. In defense of those replaced, many of them had contributed greatly to the training of others in peacetime, and many were instrumental in the materiel design and development of our almost perfectly suited, so-called "fleet" submarine. And, I believe, some of the less than aggressive postures demonstrated by a few early skippers can be traced directly to a loss of confidence from attacks they tried and failed to consummate due to the culpably ineffective state of their torpedo armament. Peacetime prediction of who would or would not become an aggressive wartime commander is still, in my opinion, a highly uncertain gamble. I submit Sam Dealey's case as an example.

One of the greatest skippers of our initial submarine officer pool, although he was certainly not so recognized before the war, was CDR Samuel E. Dealey, a native son of Texas, who put the USS HARDER in commission and completed five outstanding patrols. He was awarded Navy Crosses for each of his first four patrols, and the Medal of Honor for his fifth and epoch-making patrol for sinking five Japanese destroyers, in about as many days. I last spoke to Sam on August 23rd, 1944. We lay-to side by side, my HADDO and his HARDER, about five miles off the west coast of Luzon, some 20 miles north of Manila. I pointed out the lights and activity in a small coastal indentation directly inboard from us, where the

Japs had tried to tow and beach the remains of a destroyer whose bow I had blown off early that morning. I being out of torpedoes, Sam said "leave him to me: and sent me off to an advance base to get more torpedoes. HARDER was lost the next morning as she approached the beach submerged. Subsequent intelligence information indicated that HARDER was depth charged repeatedly, at successively greater depths, by Japanese Patrol Boat No. 102 -- which was, ironically, the old four-piper USS STEWART (DD224). As part of the combined Dutch-American striking force, STEWART was badly damaged by Japanese bombs, and then captured as the Dutch East Indies fell. the Japanese rebuilt her and sent her to sea as Patrol Boat 102. And she destroyed one of our greatest submarine skippers and his crew.

Second to the concentrate of submariners with which we began the war, I would have to credit our success to that remarkably appropriate "fleet" submarine, the 314 foot long surface raider with its tremendous cruising range, quite high surface speed, great logistic endurance and the useful ability to dive very quickly. Its submerged capabilities were minimal, but sufficient for that war. Consider the limitations. At maximum speeds, grinding down the battery to its low voltage limit, our WWII submarine could go all of about 25 miles, at an average speed of some 5 knots. Or it could skulk along at 1.8 knots for about 72 hours until the battery or the atmosphere in the boat, was exhausted. I can't help but contrast this with today's 688 class attack submarine that is a tub on the surface, but submerged can whip around the world at speeds well in excess of 20 knots! That we ended WWII still building essentially the same sub we started with, attests to its basic virtues, enhanced by a few significant improvements -- such as the electric vapor still, the bathythermograph, negative tanks, radars, somewhat deeper diving hulls, and, the Fairbanks Morse engine. Thus far, you understand, in discussing this fine boat and its improvements I am referring only to those material features that were the responsibility of the Bureau of ships, and its submarine desk.

It could possibly be alleged that our WWII submarine was such a success for the wrong reasons. Until that early morning of December 8th, 1941, in STURGEON, in Manila -- when I

decoded that urgent message in the wardroom, telling us that Pearl Harbor was under attack, and to execute war plan orange and wage unrestricted warfare! I never heard of any planning or specific training for that sort of warfare, or any speculation on how best it might be done. The fact is, we were known as "fleet" submarines, and our surface characteristics were designed to enable us to run with, and scout ahead of our own surface forces. Goodness, can you imagine anything worse from an anti-submarine warfare point of view: We couldn't identify ourselves submerged -- we really couldn't communicate! There seems to have been an almost hypocritical acceptance of the rules for knightly (spelled with a K) behavior, by refusing to plan for patrols in enemy waters, to attack unarmed merchant ships without warning. I wonder, if the Japanese had been more gentlemanly in the way they started the war, how long it might have taken the U.S. to recognize our proper employment -- to release us to do our thing. Because the logistics of unrestricted warfare were neither faced nor planned for, when the war started we were still hogging out and machining 2 foot diameter, 10 years cured, solid steel cylinders for airflasks for our steam torpedoes! Left to the methodology of the Naval Torpedo Factory, we could never have gotten enough torpedoes for the war we actually fought. Which brings me to the dismal part of our readiness for WWII -- that of its faulty torpedo armament.

A false kind of economy and an unscientific reliance on laboratory bench-type tests had the unfortunate result that real exploders in real warheads didn't get tested. Almost unbelievably, when they went to war, neither the magnetic exploder nor the impact exploder worked reliably. My guess is that, in the beginning, before we cottoned on to the fact that the fish were running up to 20 feet deeper than their setting, neither device exploded as much as half the time. When you think of the costs, risks, and efforts to find a target and get a sub in firing position, and then shoot the equivalent of water slugs, you can appreciate the heartrending frustration of the early skippers. And who knows what boats may have been lost because their attacks had failed for this reason. I personally, on three successive submarines, well up into 1943,

observed examples of ghastly torpedo failures. Everybody here knows all the reasons and the fixes, the binding of the contact exploder firing-pin block, the depth anomalies, the probability of the magnetic exploders prematuring. That's not all though. At the war's outset, our automatic gyro angle setter motors were 1/4 horsepower -- they were never required in exercises to set angles on more than two exercise torpedoes. When confronted with the task of driving gyro pots on four or six torpedoes the gyro setters overheated and stopped driving -- usually just when the command "final bearing and shoot" was being given.

Of course all these things did get fixed ultimately, and in almost every case by the operating forces in the forward areas. Overcoming them, and carrying on notwithstanding, only adds lustre to the records achieved by our people. Hopefully that sad weapons experience has been grasped and digested. There should be a bumper sticker for submarines -- "Have your fired a war-shot today?"

I must admit, when I read of our modern day submarines I can scarcely comprehend their fantastic capabilities. They are simply different vessels from those of our day, with speed and depth characteristics that make them seem invulnerable, and with far deadlier weapons for use against targets beneath and above the seas. I just hope to goodness they test them. Nonetheless, it is a curious sort of fact that there are in this room today Medal of Honor winners who could not have used a 688 class boat to do what they did in the shallow harbors into which our unrestricted warfare had driven a desperate enemy.

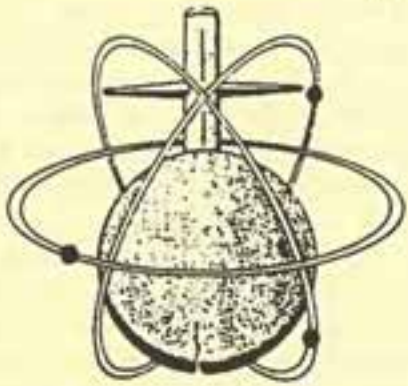
In another example of my warped and twisted thought processes, I wryly note that while our WWII performance was seriously jeopardized initially be weapons that failed to go off after they had been fired, we have, in the ballistic missile monsters, a completely different situation. So long as the enemy thinks the weapons will work, these boats accomplish their mission -- if their firing should ever be ordered. Whether they work or not, their mission has probably failed!

To close on a happier note. The submarine is clearly here to stay. Submarines have become even more important as time has passed -- not surprising, since they exploit much more

of the sea than just its surface. Admiral Christie once told me that he had been brought up with a round turn at an arrival debriefing of the CREVALLE, in Fremantle, just in from a patrol in which she had done a lot of damage on the surface, hardly diving at all, except to establish daily trims. He told me he pointed out to Frank Walker that CREVALLE's tactics seemed to ignore the salient feature of a submarine --its ability to submerge. Walker, however quickly pointed out that his experience taught him differently -- that all vessels could submerge -- but only the submarine could surface.

Chester Nimitz, Jr.

■

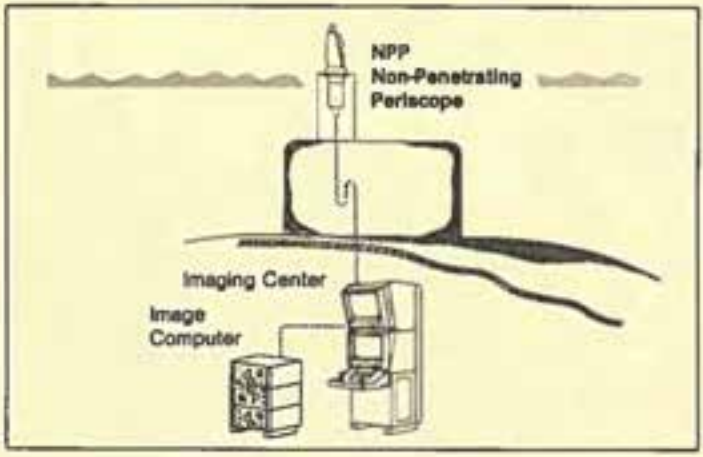


MISSING AND PRESUMED STOLEN

During the early hours of the morning on Friday, 9 June, following the NSL Symposium, some person or persons unknown made off with the Electric Boat Company's model of the SSN688 Class submarine which had been on display in the lobby of the Radisson Mark Plaza Hotel. The Naval Submarine League sincerely wishes to recover the model and would appreciate any information concerning this theft or the whereabouts of the model.

If anyone can provide information helpful to the retrieval of the model, Electric Boat would appreciate being advised. Either call NSL Headquarters or EB directly at (703) 553 1295.

Extending the Submarine Commander's Vision



As systems integrator for DARPA's Advanced Submarine Imaging technology demonstrations Kollmorgen is offering the Non-hull Penetrating Periscope (NPP):

- Complete, 24-Hour Threat Detection and Surveillance, Television/Thermal Imaging/ESM without a Major Hull Penetration.
- Enhanced Performance and Improved Command and Control Operations.
- Flexibility in Ship Arrangements and CIC Design.

KOLLMORGEN

EMERGENCY DEEP!

The Officer of the Deck, silently twisting around the periscope, begins to sense more than see the surface of the water above him as his billion dollar submarine glides up from the depths. The OOD hears only faintly the ships diving officer as he calls out each increment of depth change. The submarine begins to level. Straining for a glimpse of the horizon, the OOD suddenly hesitates -- ever so slightly -- in his circular walk. Although each member of the ship control party continues to carry out his particular task, there isn't anyone in the room who did not notice the pause. Time stops.

"Emergency Deep, Emergency Deep!"

Control erupts. The first reaction is the snap of the scope handles as they are slammed to the vertical. The hydraulic control ring snaps loudly as the OOD hurries to lower the scope. All else is curtailed by the quick flow of orders and actions. The helm rings up All Ahead Full and orders maneuvering to cavitate. The Diving Officer orders "full dive" on the fairwater planes, followed closely by "full dive" on the stern planes. The Chief of the Watch relays the OODs "Emergency Deep" orders over the ships general announcing system and immediately begins to flood the depth control tank. Sonar gains contact on a close aboard surface contact and reports that "sierra six shows no bearing drift." The once barely perceptible beat of a distant merchant ship's screws grows to a thundering sound -- only to be drowned out by the sound of the submarine's own propeller as it digs to move nearly seven thousand tons and one hundred people out of the path of the lumbering deep draft merchant vessel. As the submarine begins to pitch over and accelerate towards the relative safety of the deep, the sleeping are awakened and forced against the end of their bunks. Within seconds the captain arrives in control. Eyes not night adapted, he sees things only dimly. Although meeting with a cacophony of noise, he is able to recognize from sonar reports that the merchant ship, originally abeam to port with no noticeable

bearing drift, is beginning to draw rapidly left. He immediately orders the rudder to left full and braces for a possible collision.

Of the many routine evolutions conducted by submarines, few are as hazardous as taking the ship to periscope depth. Submarines become extremely vulnerable when operating near the surface. The most crucial period of these near-surface operations is the transition from deep to shallow. During this time the submarine's acoustic sensors, her ears during normal submerged steaming, are degraded. The physics of underwater sound and the near surface effect of solar heating and other factors combine to render sonar nearly useless.

It is during the ascent to periscope depth that the acquired skills and experience of the OOD stand as the first line of defense against collision and disaster. The OOD must carefully plan and execute this routine evolution. The submarine's control party, sonar, and other operators, must act as a team to expertly guide the submarine through the usual acoustic layer. In the final analysis, however, it is one eye, pressed up against the scope, which warns of close aboard and potentially damaging surface contacts.

A commonly stated rule of thumb for the OOD has been "One in low, time to go. Four in high, time to fly." That is to say, an average surface contact which subtends one division in low power or four divisions in high power through the scope should, under normal circumstances, be considered as an immediate threat to a submarine's safety with emergency deep procedures, as described above, initiated. Simple mental analysis shows that this thumbrule acts to avoid surface ships within roughly four thousand yards. While certainly prudent, it may be too conservative.

Consider a recent fleet exercise involving the Constellation Carrier Battle Group and the USS LA JOLLA (SSN 701). During this eleven-day exercise, LA JOLLA was tasked with the role of orange SSN to work up the ASW defenses of the battle group. It was soon found that due to poor acoustic conditions in the operating areas, submarine operations well inside four thousand yards were frequently required to provide adequate training opportunities for elements of the battle group. Obviously this was a problem.In order to gain a more

quantitative feel for the "emergency deep" scenario, a method was devised to test the submarine's ability to move out of the way of a close aboard contact. With the area free of any surface traffic and own submarine at periscope depth, numerous emergency deeps were conducted under a varying set of initial conditions and control party actions. The intent was to find out how long it took the submarine to get below 120 feet and to measure the advance and transfer during the evolution. The results are shown in Figure (1) and summarized in Figure (2).

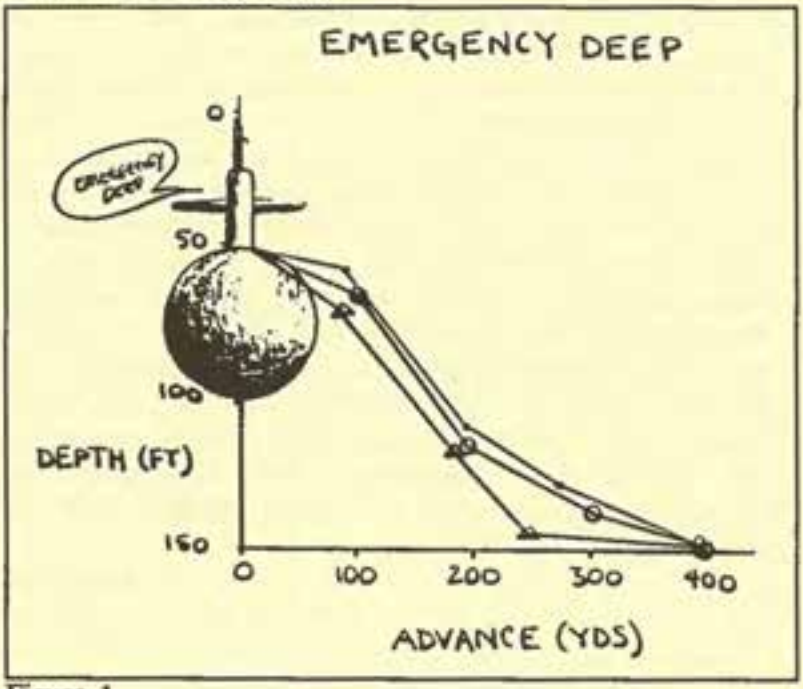


Figure 1

SYMBOL	INITIAL SPEED	RUDDER ANGLE	TIME TO 120 FT
•	7 KTS	0	37 SECS
⊙	4 KTS	0	40 SECS
△	4 KTS	30	43 SECS

Figure 2

As the reader might imagine, these results were found to be very interesting. Under no set of reasonable initial conditions and operator actions did it take longer than 45 seconds for the submarine to get below 120'. More surprising, in no case was advance of this 120 yard submarine greater than 250 yards. Taken to the extreme, it would appear that the doctrinal actions required for the "emergency deep" scenario would be effective for a deep draft merchant ship closing at thirty knots and at a range of 1000 yards.

While having little interest in proving the above results in practice, it is clear that armed with the results of the evolution conducted, the submarine's CO will not feel quite as anxious as he may when operating in the inner zone of a battle group. This evolution had many other beneficial effects. It allowed all members of the submarine's control party the opportunity to develop their skills in this demanding process. It provided invaluable training for the Junior Officers. It reaffirmed the value of proving a theory by means of a practice evolution. It proved that theory to operational reality is not just something our nuclear trained friends talk about. Without a doubt the results of this evolution allowed for a dramatic increase in the training provided the ASW elements of the Carrier Battle Group. Finally, and perhaps most importantly, it showed just how capable these magnificent LOS ANGELES class submarines are in getting our butts out of the fire in the most demanding of circumstances.

P. Kevin Peppe

■

HOW MANY SSBN'S ARE ENOUGH?

The world is now entering a new era. A key question when considering arms limitations proposals and future strategic force structures is how many submarines armed with strategic weapons (SSBN's) the United States should have. The INF Treaty actually decreased the types and numbers of intermediate range nuclear weapons and their delivery systems in Europe. The portending Strategic Arms Reduction Treaty, START, promises to follow the path of the INF Treaty to reduce the numbers of strategic weapons significantly. Caps of

6,000 missile warheads are discussed - roughly half the number of those now deployed by the United States. Henry Kissinger reports our initial START Proposals suggest we have 18 SSBN's, each with 24 tubes and each missile carrying 8 warheads (3,456 warheads). But this number was determined by arms control advocates who took present missile force distribution and simply divided by about 2. It bears no relation to what will be needed if the whole United States strategic force posture is examined.

Twenty-nine POSEIDON Class submarines and eight TRIDENT Class submarines carrying 656 missiles with about eight thousand warheads are now in commission. This year the fifteenth TRIDENT Class submarine was authorized. The reported present Navy program is to build one each year until 24 to 40 TRIDENTS are in operation. Forty would be an enlargement of the original program of about twenty SSBN's.

The concern usually voiced about the needed number of these submarines centers on their survivability. There is general consensus that the number of submarines must not be less than some minimum which ensures the continued perception of the systems' assured and unacceptable destruction of the enemy's homeland assets. There must be sufficient numbers also to ensure that an enemy's best ASW efforts cannot attrite SSBN's below this minimum. Perception is the key - perception by both sides; the United States and the Soviet Union. The reality is simple. There is no significant threat to the US SSBN now and no realistic threat appears on the horizon.

Submariners recognize that advances in oceanography, submarine design and acoustic processing have resulted in a more favorable situation for the SSBN - not a more threatening one. The advantages gained by nuclear propulsion, sound quieting, electronic countermeasures and similar developments have given U.S. submarines greater and greater advantage over their opponents, including their submarines. For SSBN's with no need to close their targets and which can evade at will, these advantages are unbeatable. Panels of scientists who examine this subject have become more and more positive in their statements that this situation has little probability of changing. To create a significant change

requires not just enemy resources and engineering. Apparently, new physical phenomena must be discovered before these conditions will be altered significantly.

Even though no developments can be foreseen which will threaten a strategic submarine force of any size -- even one as small as the French or British -- some minimum number of submarines is required by those countries in order to continue to convince a potential enemy that none of his efforts can compromise the survivability of the country's strategic submarine force. The number of submarines at sea must be high enough to deny success for any concentrated short term ASW effort. What constitutes that total number is not clear. But the number is probably smaller than that which will be required for reasons other than perceptions as to the ASW threat posed.

The consideration which should determine the number of fleet ballistic missile submarines eventually deployed is the number of nuclear weapons the American political leadership believes to be adequate to deter the Soviets from starting a war. Submariners tend to think only about the ASW issue because that is where their expertise lies. Arms control limits get the publicity. Yet it is the size and characteristics of the total US strategic forces (the TRIAD) that will deter the Soviets, which should be the determinant of how many and what kinds of strategic forces the United States should have.

The popular methodology used to determine adequacy of strategic forces is to compare numbers of warheads and delivery systems on each side. But that has meaning only when these weapons are aimed at each other. Submarine-based weapons cannot be attacked and their weapons are aimed at targets other than enemy submarines. The number of submarines the United States should have has no relation to the number the Soviets have but rather relates to American beliefs as to what forces will deter Soviet aggression and nuclear war -- and what other forces exist in the United States' arsenal to achieve these political aims. In the past, considerations of assured deterrence and survivable force structure have not been very important because force levels were over-subscribed. There were more than enough nuclear weapons. Both the Navy and the Air force were encouraged

to build forces to suit their own concepts without much concern. So warheads proliferated in accordance with service desires and designs.

This situation has changed. Arms limitation agreements, budget constraints and political objections to basing are changing the nature and size of strategic forces which Americans are willing to build. Politicians who formerly could be characterized as generally favoring nuclear weapons as a cornerstone of defense because of their low costs now see increases in numbers of nuclear weapons as politically undesirable and economically impractical. An almost certain outcome of these pressures will be fewer nuclear weapons in the future than we have had in the past.

In the circumstances where there are fewer weapons, each individual weapon is more valuable than it was when there were plenty of them. (The adage is as true for torpedoes in a "target rich patrol zone" as it is for nuclear weapons.) Weapons systems which are hardly vulnerable to destruction become even more important in a period when there are few weapons rather than in an era of "weapons plenty." The vigorous attempts to find a basing mode for ICBM's, testify to the value of this attribute. Nuclear weapons at sea possess the characteristics of being non-targetable and covert in ways which cannot be matched ashore.

The difficulties encountered while trying to find a basing scheme which would provide the MX ICBM some degree of protection against a first strike, testify to the increasing importance of systems based at sea. Strategic policy reservations working against land-based missile forces were expressed in the recent Report of the President's Commission on an Integrated Long Term Strategy for discriminate deterrence. This Commission condemns any reliance on Launch Under Attack. Without the ability to be launched while under attack, fixed forces are hostages to a first strike. Thus the Commission's proposed policy questions the worth of land based strategic nuclear forces and concomitantly increases the value of survivable at sea strategic forces. The debates over railroad and road mobile basing of ICBM's demonstrate how difficult it is to create conditions ashore that equate to the natural invulnerability of sea based forces.

As the numbers of weapons decrease and the potentially survivable Soviet targets increase, those which cannot be destroyed during an intercontinental exchange or are not used in an immediate retaliatory attack increase value exponentially; their value rises disproportionately faster than their numbers alone seem to warrant. The focus on reserve weapons in sea-based platforms which can endure for a prolonged period, even in a nuclear war, will continue to grow. They have a robustness and endurability which cannot be duplicated ashore.

Over the past few years the prominent argument advocating ICBM's has been a perceived need to threaten extremely "hard" targets. i.e. heavily fortified silos and command centers. With the advent of the TRIDENT D-5, sea based missiles will have the accuracy and yield to attack most kinds of target. With the deployment of D-5 in 1989, this last argument which has justified land based strategic systems disappears.

Basing nuclear weapons at sea allows the country and its political leadership to avoid the political costs associated with basing schemes for weapons ashore. Though debates will continue, the creation of defense mechanisms to improve ICBM and bomber survivability -- to buttress the arguments for land based forces -- are not likely to convince the political opposition. Political costs for land-based weapons are now very high. Finding a new ICBM basing mode which is politically acceptable seems to be unlikely and, as bomber costs rapidly escalate, opposition in the Congress and the country grow, and sea-basing of strategic weapons become even more attractive.

Finally, the American public supports sea-based nuclear weapons and this public support appears likely to increase. Since the political costs associated with sea-based systems is small, their importance in the entire US force structure is likely to grow. This effect can be seen in the 1988 Democratic platform which endorsed TRIDENT D-5 while questioning the modernization for both the ICBM's and the bombers. This public acceptance will accentuate the other influences enumerated above in making the Navy's role for strategic forces more significant in the future than in the past.

In summary, deterrence requires having enough weapons deployed in such a manner as to provide an unacceptable

threat to the targets deemed to be those which will dissuade the Soviets from using their strategic weapons. Since there appears to be no realistic way to gain additional political leverage from land-based strategic weapons, a continuing shift of strategic weapon capability to submarines is likely to take place without any effort or encouragement on the part of the Navy.

In this context, the number of SSBN's needed should be determined by considerations of national policy relative to an adequate strategic weapons structure. These considerations - invulnerable bases, second strike capability, substantial reserve forces, realization that other own strategic forces are not likely to be built or sustained - should establish the number of weapons which will have to be deployed in submarines. More strategic submarines will be required to fulfill these needs than will be required to ensure the perception of invulnerability of that force. Twenty TRIDENTs (3,840 warheads) will not be enough.

Jerry Holland

■

CORRECTING ASTIGMATISM IN PERISCOPE OPERATORS

People need eyeglasses to correct for two kinds of refractive errors. The eye may make the same focusing error (spherical error) or the magnitude of the error may depend on the orientation of the object being looked at (cylindrical error). The latter problem is called "astigmatism". Both can be corrected with eyeglasses, but, unfortunately, it is difficult to look through a periscope while wearing glasses.

Moreover, it is easy in complex optical systems to correct for spherical errors but not for cylindrical ones. Thus binoculars, microscopes, and periscopes provide a sizeable amount of spherical correction for the user but no correction for astigmatism.

Not only is it not feasible to provide a mechanism for correcting astigmatic errors, but even if it were, it would be very difficult for the user to select for himself the proper

magnitude and orientation of the correction. Individuals typically do not even select the optimal setting with a pair of binoculars!

Uncorrected astigmatism results in a significant loss of visual acuity. If an individual with normal vision can just barely classify a ship at about 10,000 yds, someone with only one diopter of astigmatism must close to about 7,200 yds to see it; with two diopters of astigmatism, he must be about 4,000 yds away, and with four diopters he must come to around 2,000 yds. Yet visual standards allow two diopters of astigmatism., The reason is that it is found in more than 80% of all patients examined. Twenty years ago it was reported that 14% of people in their twenties had it. In a recent survey of 1000 submariners -- men constituting a highly selected sample who had already been screened to eliminate large amounts of astigmatism -- we found that more than half had a measurable amount. An appreciable percentage of otherwise qualified men are liable to be disqualified from submarine service on this account at a time when the Navy has a problem recruiting enough men.

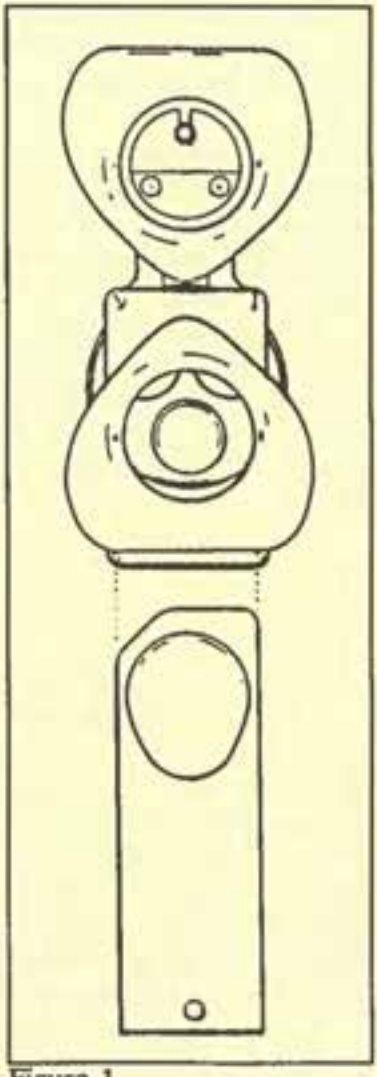


Figure 1

There is, however, a simple way to introduce corrections for astigmatism into the periscope optics. There is a rather thick plate to which the periscope eyecup is attached. It is a simple

matter to fabricate a slot just behind the eyecup large enough to contain an eyeglass lens; the operator's lens is then mounted in a holder which can be inserted very quickly into the slot in only one way (Fig 1). The lens which would be provided would, of course, correct for both spherical and astigmatic errors. With the lens mounted properly in the holder, the periscope operator's viewing eye would be perfectly corrected. In practice, each man would have his own lens holder. If he wished, he could have two inserts, one for each eye.

The fact that both spherical and astigmatic errors could be corrected means that visual standards for periscope operators could be relaxed to include those who are otherwise completely qualified.

S. M. Luria

■

A BETTER WAY TO PREPARE

There is little debate that a submarine's performance, and therefore success, in time of war will depend heavily on the experience and training of the crew. Prior training is most critical in the beginning of the conflict. The tragedies of the first patrols of WWII attested to the lack of adequate peacetime training. Not until patrol-experienced officers gained command did the tide turn in our favor.

Today the situation is better than it was some forty years ago, but realistic training is unnecessarily lacking. Some of the best submarine training received is during Pre-Overseas Movement (POM) workups and certifications. The expensive at-sea portion of a POM workup uses a U.S. SSN augmented with an unrealistic noise maker, conned by a Commanding Officer using his American training to imitate the enemy. Simulators ashore, or onboard training systems, could help fill the gap. Until now the realism of the simulated characteristics and tactics (using a U.S. SSN) have left much to be desired.

The Air Force Tactical Fighter Community have also appreciated the need for realistic simulations, in particular those which involve human combat behavior. Early Tac Air simulations modeled one-on-one USAF tactics. A simulation

that created a multi-threat environment, as experienced in Vietnam, was required. To fill this need the Air force Center for Studies and Analyses began an effort in 1976 that has led to a highly successful computer simulation called TAC BRAWLER.

TAC BRAWLER is a Monte Carlo event-driven computer simulation of multiple aircraft combat. The simulation follows a dual approach to the modeling of human decision processes, making use of what are termed "information-oriented architecture (Figure 1). Human decision making under conditions of uncertainty is the model's major strength. Even stress or lack of skill can be simulated. It would appear that the simulation architecture which is used can be directly transferred to the problem of multiple threat submarine combat. The interactive program is in place. Only the model characteristics of U.S. and Soviet aircraft, weapons, electronics

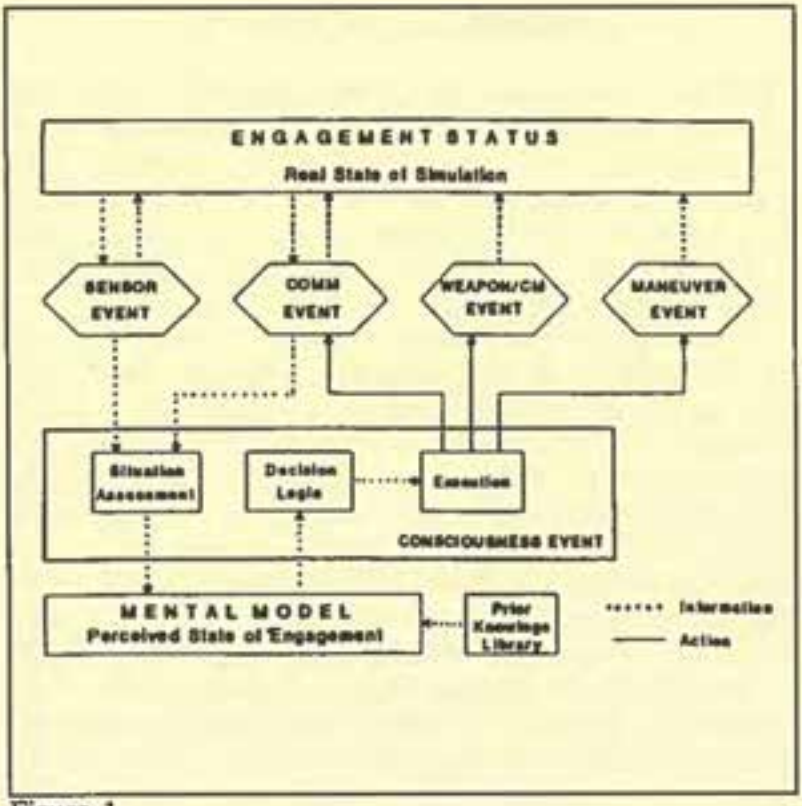


Figure 1

and fighter tactics need replacing with models of U.S and Soviet submarines, weapons and sensors. Special attention has been paid in the design of the program to simulating cooperative tactics and to capturing the importance of situation awareness. The program also avoids one of the major pitfalls of computer models in general and tactics development models in particular. To keep from solving the wrong tactical problems or arriving at unrealistic solutions to the right problems, the program has relied heavily on comments and criticism from current, qualified tactical pilots in the construction and validation of the program. An essential part of adapting the model to the submarine warfare community would involve the same type of input from current, experienced submariners. The end result could provide a submarine crew, in training, with a fighting enemy having realistic Soviet signatures and human (vice stereotype) reactive tactics based on Soviet doctrine.

The program's ability to model many different mixes of platforms and weapons in complex threat environments makes an adaption of the air-to-air model to submarine versus submarine warfare a step that appears to be technologically practical and fiscally prudent. The system has been extensively used by the Air Force for over ten years. Most military aircraft manufacturers own a version of the model for use in validating new aircraft and equipment design efforts. It could also add increased credibility to our wargaming efforts. It seems only prudent for the submarine force to take advantage of work already completed in order to realize significantly increased training effectiveness and tactical and design development improvements.

Tom Murray

■

WE HAVE ALWAYS DONE IT THAT WAY

"*Pride Runs Deep*", "*Fearless Underwater Commie Killers*", "*Ain't no Slack in Fast Attack*"; these and other T-shirt and bumper sticker slogans bespeak the image our Submarine Force wants to project -- professional, tough, and ready to win the fight. But the real issue is manning vs. training vs.

habitability vs. retention. Sounds a little like the line-up for a television tag team wrestling match.

In a recent article in *The Dolphin*, Submarine Base New London's weekly newspaper, the commissioning crew of *USS PASADENA (SSN 752)* shows 15 officers and 17 CPO's in a crew of 136 -- a tremendous corps of leadership and experience to guide our most advanced hardware and the fleet's finest people.

The improved 688 class has berthing for 12 officers and 12 CPO's. This is where the trouble starts. The augmented crew concept for manning our SSNs presents us with the dilemma of having plenty of people but a desire to take too many of them to sea.

Junior officers reporting on board are motivated, trained in the fundamentals and anxious to see what the "REAL NAVY" is all about. A sense of belonging to their first boat is something we all remember. The young division officer on an SSN will usually bunk with the crew for his first year on board. The junior CPO who is desperately seeking his new identity will also bunk with the troops. No room in the wardroom and CPO quarters puts these important members of the crew where they don't belong, "BUT IT'S ALWAYS BEEN THAT WAY."

The trickle down effect of this is that there isn't room for the crew to berth so the overflow goes to the torpedo room, or hot bunking is used -- a tough situation, "BUT WE HAVE ALWAYS DONE IT THAT WAY." We must take enough crew to make up a watchbill. That fills up the boat. We must take our junior non-quals to sea so that they can learn and qualify and we have to take midshipmen, VIP's, squadron staff, and inspectors. "THAT'S THE WAY IT'S ALWAYS BEEN."

It's a hard enough life for a young unqualified submariner to saddle up for a major deployment without having to sleep in the torpedo room on a skid bunk and live out of his seabag. Is it any wonder our Career Counselors are meeting resistance? That retention is low?

This scenario is not the way it has to be, it's the way we have let if become. It's time to practice what we teach; foresight and good management. Let's look at future manning requirements with a realistic eye and specify the design of our

new boats to accommodate the crew we must take to sea.

We demand that our people be: professionals, loyal and dedicated. Can we be any less dedicated in our efforts to provide the best for them.

Bill G. Elrod

■

TRIDENT SUBMARINES
THE STRATEGIC TRIAD'S STRONGEST LEG

by the Assistant Chief of Naval Operations
(Undersea Warfare)

I feel strongly that the REVIEW's readership needs to understand well the value and necessity of our TRIDENT SSBN Force. All of us, especially those within the Washington, D.C. arena, frequently encounter "news" reports of yet another supposed vulnerability of some part of the Strategic TRIAD.

Of greater concern to me, though, is discussion which suggests we should "offer up" a TRIDENT from the Five Year Defense Plan (FYDP) to help cut defense spending. The level of discussion has not, as of this writing, progressed beyond the initial stages, but this is only because of TRIDENT's well-earned reputation.

The fact remains that the TRIDENT program is the most reliable, cost-effective and survivable element of our Strategic TRIAD.

I encourage you to use the following White Paper. In my opinion, we can do no more for our country and the deterrence of war than to understand this most important element of our defense.

TRIDENT SUBMARINES

TRIDENT submarines provide the most effective strategic platform in the world today and in the foreseeable future. They are unsurpassed in the vital areas of survivability, reliability, responsiveness, flexibility, endurance, lethality, cost effectiveness and connectivity. With the TRIDENT II (D-5) missile on board, they will be the most capable and cost

effective strategic weapon system in the U.S. arsenal. Those qualities which make the TRIDENTs predominant in the TRIAD are:

- Survivability. TRIDENT submarines are at sea 70% of their life and their day to day survivability does not change for the entire duration of a patrol. They are the most survivable launchers of all strategic weapons. Scientific and intelligence communities assess that there is no threat to the U.S. SSBN force now or in the foreseeable future. Mobile, quiet TRIDENTs operate undetected in ocean areas over four times the area of the United States -- while denying their adversaries' ability to neutralize their at-sea effectiveness. The survivability of TRIDENT submarines eliminates the requirement to launch strategic weapons on warning of an enemy missile attack, and promotes crisis stability.
- Reliability. U.S. SSBN systems have been proven reliable over 29-years of deterrence patrols and more than 100 TRIDENT patrols to date. Comprehensive operational test programs have thoroughly tested the TRIDENT's entire weapons system -- confirming their high weapons system reliability.
- Responsiveness. SSBNs effectively respond to all scenarios including: enemy strategic attack without warning; enemy nuclear missile attack during an ongoing conventional war; and strategic weapon attack during a protracted war.
- Flexibility. The TRIDENT weapons system holds virtually all strategic targets at risk. This is limited only by the geography of the world's ocean and the maximum range of the strategic missiles in use. TRIDENTs can attack designated strategic targets using a multitude of azimuths and times of flight.
- Endurance. TRIDENT submarines maximize alert time by using patrol cycles designed for greater at-sea/upkeep ratios and by having expanded times between shipyard overhauls. Under protracted war scenarios, contingency plans allow each submarine to operate unsupported for most of a year while still retaining a full strategic system capability.

- Lethality. The improved accuracy and increased payload of the D-5 missile will provide the U.S. SSBN force with the ability to cover the full spectrum of strategic targets including hardened targets -- and from nearly any direction. This multi-directional targeting capability greatly complicates Soviet ABM defenses.
- Cost Effectiveness. TRIDENTs are the most cost effective of U.S. strategic weapons systems. They have the lowest cost per delivered warhead. They carry almost half of the U.S. strategic warheads on a day to day basis, for only about 25% of DOD's strategic budget -- and less than 10% of the Navy's budget.
- Connectivity. TRIDENT's exceptional connectivity results from a robust communications network which uses frequencies across the total spectrum of frequencies -- while using multiple transmitters. An independent analysis of every patrol along with extensive JCS testing of communications have shown outstanding performance. Current systems in their entirety will provide full connectivity even in a stressed environment.

The TRIDENT system is highly dependable and the Soviets are fully aware of this capability. The United States knows it can depend on this strategic force as demonstrated by its 29 year history of 2700 deterrent patrols and our overt test firing programs. All major powers recognize that TRIDENT submarines can remain on station in a fully ready state -- for days, weeks or months -- and be fully ready and highly responsive to any order, be it immediate or delayed.

The force size of TRIDENT submarines requires that there be sufficient TRIDENTs to ensure adequate strategic target coverage as well as a force in being during a protracted war which can bring a war to a favorable conclusion for the United States. Building TRIDENT submarines at a rate of one per year in accordance with the Five Year Defense Plan will result in a minimum of 21 TRIDENT submarines by the time our aging POSEIDON SSBN force is retired at the turn of the century. Commitment now to a reduced force level weakens the U.S. negotiating position and provides an arms limitation agreement which is beneficial to our adversaries.

The TRIDENT weapons system is the keystone of our

nation's strategic deterrence. It is a proven mobile weapon delivery system which assures -- most importantly -- survivability along with accuracy and dependability and must continue as the most critical element in our nation's strategic force modernization program.

Vice Admiral Daniel L. Cooper, USN

■

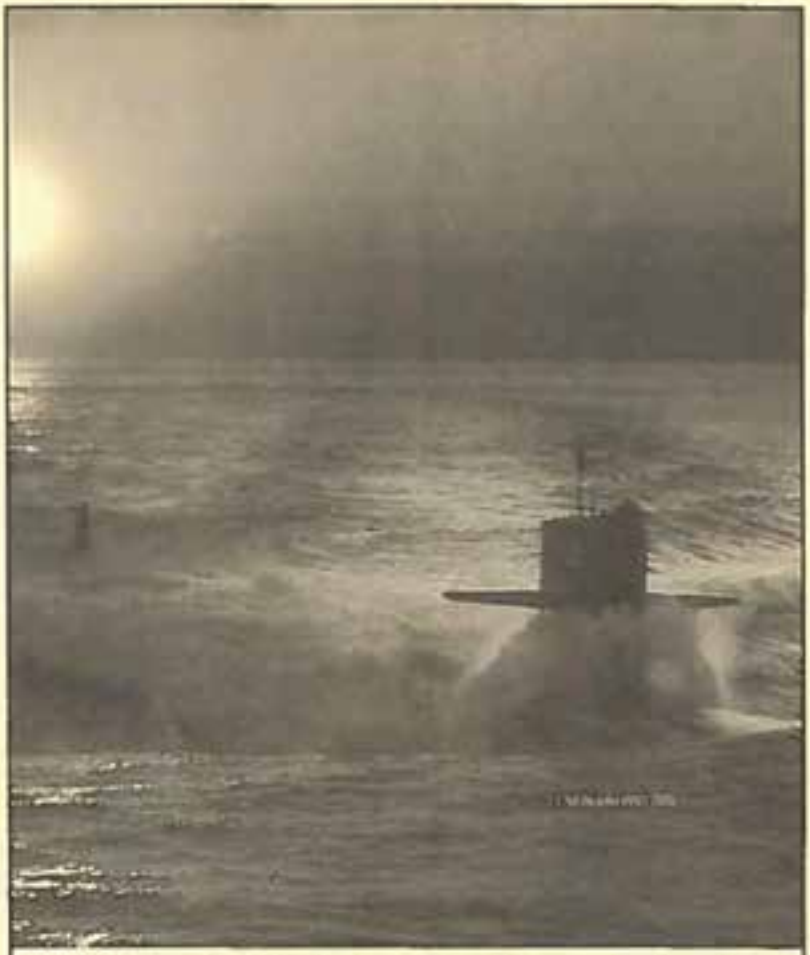
MEMBERSHIP STATUS

	Current	Last Review	Year Ago
Active Duty	934	909	924
Others	2897	2757	2761
Life	175	162	153
Student	23	22	28
Foreign	54	45	38
Honorary	8	10	11
Total	4091	3906	3915

HAVE YOU GOTTEN 2 NEW MEMBERS FOR 1989?

IN REMEMBRANCE

Commander Robert E. Blake, USNR(Ret.)
Lake H. Johnson
Captain Alfred A. Ortlieb, USNR-R



Submarine Technology in a League by Itself.

General Dynamics has been designing and building nuclear submarines for more than 35 years, and is the sole designer and builder of Trident ballistic missile submarines. We also build the SSN688 class, the Navy's premier fast-attack submarine since the mid-1970s.

Now the Navy has awarded us the lead-ship construction contract for Seawolf, the first of a new class of fast-attack submarines. At our Electric Boat Division, we continue to set the standard of excellence in submarine construction and technology.

GENERAL DYNAMICS

A Strong Company For A Strong Country

THE LYNCH PLOT
THE FIRST BEARINGS-ONLY SOLUTION

A few years ago when Frank Lynch entered my office, he was surprised to see a reproduction of the deck and frame plans of the R-1 (SS No. 78), which I had hanging in a prominent position in my office. He walked to the picture, pointed to the crew's mess table, and with considerable enthusiasm exclaimed, "That is the table where I drew the first diagrams that led to the development of the Lynch Plot". He then told me the following story, which marks the beginning of the development of modern passive sonar bearings-only target motion analysis techniques; a function that is vital to modern submarine warfare.

The R-1 was built in World War I and then decommissioned after the war ended. In 1940 the submarine was tested briefly at New London, found not to leak too badly, recommissioned, and deployed to Panama with Frank as third officer.

Soon after arriving in Panama, the R-1 was fitted with her first sonar system, which arrived in a crate from the United States, and was installed by the ship's company with little or no assistance. Those who are involved with today's AN/BQQ and AN/BSY systems find that a remarkable contrast to current installation procedures.

The R-1 was to conduct several fully submerged torpedo attacks to complete the checkout of her new sonar system. A day or so before getting underway, Frank was tasked to develop a procedure for conducting a "sound only" attack. A quick inquiry on the other submarines in the area revealed that no one knew how to carry out an attack without using numerous periscope observations.

Starting with a blank piece of paper, and a remarkable insight to kinematics, Frank spent long hours plotting various submarine and target encounter geometries. He searched for relationships among a series of sonar bearings, own ship course and speed, and target course and speed that could be used to determine the required torpedo gyro angle. The pivotal

relationship he found was between bearing, bearing rate, and the target's line of relative motion. He told me that the night before the R-1 sailed he discovered that using observed bearing rate as a measure of target motion caused seemingly distinct encounter geometries to reduce to similar triangular diagrams! The R-1's exercise torpedo attacks were conducted using a maneuvering board upon which a series of bearings -- -observed with a fixed time interval between them -- was plotted.

During the following weeks Frank said little and spent his evenings plotting submarine attack geometries. As a result of those evenings he perfected the Lynch Plot, the first bearings-only TMA technique. Lynch plots were used throughout World War II on the SS HARDER and then on the SS HADDO. After the war, the Lynch Plot was among the war-proven fire control techniques that were documented and introduced to the Submarine School curriculum. The Lynch Plot remained part of the curriculum into the 1960's. Lynch Plot devices are still in the submarine force's inventory of tactical aids, although their use has been supplanted by modern onboard computers.

After the war, Frank was assigned to Washington, D.C. where he worked in submarine fire control development. While there he succeeded in having an indicated bearing-rate display added to position keepers. He was proud to have made that contribution to submarine combat systems. What has remained unsaid was that Frank Lynch was the grandfather of modern submarine bearings-only attack techniques.

David C. Ghen

■

CONVOY MO-TA-30

Thanks for giving me the opportunity to review -- before publication -- the MO-TA30 convoy story.

In 1946 Karl Hensel informed me that JANAC had found the BARB had sunk ANYO, SHINYO, HIKOSHIMA, and SANYO Marus in the day-night battle on 8 January 1945 in Formosa Straits, at the times and places stated by BARB in her patrol report.

All of the U.S. wolfpack agree that there were only eight large ships and nine escorts, five of which were PCs or subchasers. Tokyo Archives listed 9 ships plus frigates 26, 36 (flag), 39, 67 with unknown number of PCs. This April, my Tokyo friends notified me that the ninth ship (Daiyu Maru) did not join the convoy.

All Japanese ships invariably use Tokyo time (ITEM), so to make sense shift our wolfpack times from HOW to ITEM.

It was a three echelon convoy: Starboard echelon, three ships, all engines aft, lead ship brand new modified standard cargo. This jibes with Shinyo Maru - 6892T. on maiden voyage loaded with ammunition picked up at Dairen - followed by Sanyo M. -2854T. diesel fuel. Center echelon, transport Anyo M. - 9257T. surrounded by four PCs followed by two MFM stragglers which by deduction can only be the Rashin Maru and the Manju M. the port echelon was led by the passenger freighter Hisakawa M - 6886T. (troops, vehicles, horses) with the Meihu Maru - 2857T. astern.

BARB fired at Sanyo with Hisakawa overlapping ahead at 1824 (I). Two fish hit the Anyo and one fish hit Hisakawa. At 1825 (I) BARB fired three fish at the Shinyo (Passengers, ammunition) which exploded at the first hit, driving BARB sideways and down to 80 feet, tearing off deck gratings aft. Returned quickly to periscope depth. There was only smoke where the Shinyo had been, only the stern of the Anyo was sticking up at a 30 degree angle with two escorts alongside taking off survivors, and Hisakawa was aflame above the waterline. The rest of the convoy changed course from 143 to 030. The explosion and fire were witnessed by packmates at great distance who also noted that two ships disappeared.

Back Channel intercept reported Anyo sank first and Shinyo Maru, a modified freighter, sank at 1830 (I). The Second Repatriation Agency reported that on 8 January the Tatsuyo (Shinyo) was sunk at this spot by AIR and the Hisakawa received heavy damage by AIR. (There were, however, no air attacks in the straits until late morning on the ninth.)

At 1900 the convoy reformed in two columns and headed south, probably in this order. Starboard column, Rashin Maru, Manju M., Sanyo M., Hikoshima M. Port column (500 yards

from Sanyo), Hisakawa M., Meiho M. Night very dark.

At 2010, attacking from starboard bow, QUEENFISH fired 6 fish at Rashin and Manju, then 4 fish at Hisakawa. All missed.

At 2054, attacking from starboard bow, PICUDA picked out two large AKs, passenger freighters with composite superstructures, and fired three fish at Rashin (certain) for one hit and three at Manju (most probable, for at 1500 yards broad on her bow she looks like a passenger-freighter) for one hit. She then set up for a stern shot at the next tanker in the starboard column, the Sanyo, which turned away. Convoy did not slow, but Rashin and Hisakawa both headed for the coast, probably ready to beach if necessary to avoid sinking.

BARB had been held down by escorts after her submerged attack, reloaded and surfaced at 1956. BARB then attacked from astern working up the escort line acting like an escort.

At 2115, attacking from starboard escort line, BARB fired 3 fish at Hikoshima-Meiho overlap for two hits in the first and one in Meiho. One ship sank and the other, damaged, headed toward the beach. Moving ahead of the next escort, but staying in line, BARB attacked again up the line.

At 2133 she fired 3 fish at the Sanyo M. which, full of avgas, erupted. The escorts went full speed for the minefield slot near Formosa. Again BARB moved up, but there was only one ship left. As we closed in to fire, QUEENFISH (Loughlin) sent a message, "Hey, save one for me!" I gave him a green light, and the course and speed of convoy. BARB passed this last ship at less than 2,000 yards. Only escorts were ahead. Elliott hit her with two torpedoes. Stopped, she opened fire, as did escorts and shore batteries, thinking they were being bombed. Believing QUEENFISH had been forced down, and the ship was not sinking fast enough, I backed in for the coupe de grace at 1500 yards, covered by the smoke from her guns and opened the outer doors. Just then she started to settle rapidly. Her guns ceased fire as her decks were awash. PICUDA had gone on way ahead and found the sole surviving ship Rashin, fired 4 fish and missed. Nothing else was afloat.

Tokyo Archives assured me that all eight ships in this convoy were sunk, damaged or beached, even the Rashin

Maru. Yet the air arms, in their raids in the following day and bombing of long stranded ships later, laid claim to half of them without giving any credit to the subs who put them in that position. Somehow the Hisikawa Maru was abandoned by escorts somewhere in the Formosa Straits after grounding once because she was heavily damaged. She was alone when she took a bomb hit on 9 January and sank later. Exactly where, is a mystery. There are several versions of the demise of the Hisakawa. She was definitely alone at the end and no survivors are known. After being hit by BARB, receiving heavy damage and set afire, she may have rejoined the convoy for a short time, then beached herself after PICUDA attack on Rashin and Manju. Rashin left the convoy at that time and Hisakawa was no longer present. At 0850 Jan 9th the Rashin and two frigates encountered her (no position mentioned). She may have received additional damage during the 0915-1000 air raid, because Rashin and escorts left her alone. During the noon air raid, on the ninth, though there was no report of her being hit, she sent her final message at 1320 reporting she was sinking. The escort war diary states she sank at 1255 at 230-4N, 120-35E which is 32 miles inland.

Rear Admiral Gene Fluckey, USN(Ret.)

■

SUBMARINE JACKET PATCHES

I am doing some research on the origin and early history of submarine jacket patches, of which I have a large collection.

I would like to hear from anyone having knowledge of submarine jacket patches in use earlier than 1963, their origin, boats that had them, where they were obtained, etc. Please contact John D. Alden, CDR,USN(Ret.), 98 Sunnyside Avenue, Pleasantville, NY 10570.

John Alden

■

USNA SERVICE SELECTION NIGHT

Dear Admiral Long,

Service selection night for the Class of 1989 was held on Tuesday, 7 February 1989. I am happy to report that of the 977 men in the class, 181 chose submarines as their career

path. As each of the submarine candidates completed his choice of Nuclear Power School dates, he was welcomed into the Submarine Force by our USNA submariners to the accompaniment of a claxon. Each was then presented a check representing a bonus for selecting nuclear power training. In addition, they were each presented, courtesy of the Naval Submarine League, a Dolphin lapel pin, a complimentary membership card and membership certificate, and your letter of welcome.

Each of these prospective submariners most certainly felt warmly welcomed into our community. Thank you for supporting our efforts to recruit the highest quality midshipmen for the submarine force and in providing a warm welcome to them.

V. L. Hill, Jr.
Rear Admiral, U.S. Navy
Superintendent, USNA

■

NSL 1989 FLEET AWARDEES

Congratulations to the following outstanding submariners for their selection as 1989 NSL Fleet Awardees:

Frederick B. Warder Award

LCDR Michael J. Matthes, Submarine NR-1

Charles A. Lockwood Award

LCDR Mark R. Myers, USS Honolulu (SSN 718)
MMCM(SS) Louis G. Boothe, USS Mariano G. Vallejo (SSBN 658)(Blue)
ET2(SS) Robert K. Olson, USS Augusta (SSN 710)

Levering Smith Award

CWO4 Douglas L. Davis, Shippingport (ARDM 4)

Rear Admiral Jack N. Darby Award

CDR James W. Metzger, CO, USS Minneapolis-Saint Paul (SSN 708)

■

1989 NROTC NSL AWARDEES

Congratulations to the following outstanding NROTC submarine volunteers who were selected as recipients of the Frederick B. Warder Award for Outstanding Achievement:

Name	Unit
Charles A. Jones	Boston University
Dain F. DeGroff	University of California, Berkley
Odilon M. Serrano	University of Colorado
Dennis A. Hanson	The George Washington University
Steven Myron	Old Dominion University
Christopher A. Bohn	Illinois Institute of Technology
Jeffery G. Killian	Massachussetts Institute of Technology
Richard M. Waer	University of Arizona
Craig P. Earls	University of California at San Diego
Douglas Matthew Schauer	The Citadel
Chad Lee Magendanz	Cornell University
Eric John Lange	Duke University
Terry V. Oswald	University of Florida
Mark B. Benjamin	Georgia Institute of Technology
Roger Gagnon	College of the Holy Cross
Matthew A. Kosner	University of Illinois
Ryan Brookhart	Iowa State University of Science and Technology
Steven Cincotta	Maine Maritime Academy
Reginald Conner	Memphis State University
Brian M. Capoccia	University of Michigan
William R. Kronzer	University of Minnesota
Christopher A. Vanderneck	University of Nebraska
Michael J. Gordon	University of New Mexico
Ivan N. LaCross	Norwich Universtiy
Charles A. Barker	University of North Carolina - Chapel Hill
Andrew B. Youel	Northwestern University

Name	Unit
John J. Marschewski, III	University of Notre Dame
Michael E. Mellott	The Ohio State University
Robert M. Fairbanks	University of Oklahoma
Tony Gascon	Oregon State University
Robert J. Sweeney	University of Pennsylvania
Vernon J. Parks	The Pennsylvania State University
William R. Stevenson	Purdue University
Stephen H. Muir	Rensselair Polytechnic Institute
David C. Krulak	Rice University

■

CHAPTER NEWS....

PACIFIC SOUTHWEST CHAPTER

The Pacific Southwest Chapter membership consists of 543 in California, 9 in Arizona, 6 in New Mexico, 1 in Nevada, 1 in Utah, and 7 in Colorado for a total of 567. There are approximately 200 members in the San Diego area.

PACIFIC NORTHWEST CHAPTER

At the April 22 meeting, the chapter elected Capt Guy A. Grafius, USN(Ret.): President, Paul A. Robinson: Secretary and Capt Richard E. Tennent, USNR: Treasurer.

Because of the geographic dispersion of the membership, the Pacific Northwest chapter elected two vice presidents, one for Puget Sound West side (Willis A. Lent, JR.) and one for Puget Sound East Side (Capt Donald M. Ulmer, USN(Ret.). the intent is for each side to hold quarterly or semi-annual meetings separately and then to have one combined annual meeting.

■

IN THE NEWS

- o DEFENSE NEWS of March 29, 1989, in an article by William Mathews, describes some of the implications of a special report to Congress by a panel which included VADM Edward A. Burkhalter and RADM Robert Wertheim. The report notes that the Navy's ability to detect Soviet submarines has deteriorated to the point that the nation's "future ability to carry out a major part of the national security policy is becoming less certain." Also that unless corrective action is taken, the future capability of the U.S. to reinforce Europe in a war may be jeopardized. "The Navy establishment is so hardened with traditional, deeply rooted and powerful vested interests that it is failing to deal effectively with the problem," the panel said. The panel, called the Advisory Panel on Submarine and Antisubmarine Warfare was established by Rep. Les Aspin of the House Armed Services Committee. The panel noted that there was no evidence that Soviet subs were qualitatively superior to U.S. submarines, but that the Soviets have an "ambitious technology program that may produce a superior submarine unless our research and development efforts at least match theirs in scope and productivity.
- o The Washington Times of 21 March has an article by Clarence Robinson, Jr. which notes that "So quiet have Soviet submarines become that several times during last year American submarines were placed on collision courses resulting in near misses. The crews did not even know their boat was close to a Russian submarine until sonar operators heard the other boat's propeller noise receding after the vessels had passed one another at close range." Similarly, a Navy task group in the Pacific was unable to detect the presence of Soviet submarines in the fleet's vicinity until a Soviet boat surfaced just behind the U.S. carrier. According to Les Aspin, the Soviets have started to construct submarines quiet enough to present "a major technological challenge with profound national security implications for the United States." The implications for U.S. Navy policy are:
  - the secrecy in which the Navy has shrouded questions

about the submarine fleet has worked to the disadvantage of the U.S., because the whole science of submarine detection is known only by a handful of those directly involved;

- the U.S. Navy has depended on superior submarine capabilities in the past to offset the decided Soviet numerical advantage. But the time may arrive soon when the U.S. will have to rely on quantity to counter Soviet submarine quality;
- just as the Soviet Union has integrated its submarines with other branches of its armed forces, U.S. submarines may become too critical to be relegated to a single element of one service -- thus losing their lone wolf status.

The Pentagon estimates that continued R&D efforts by the Soviets will provide boats even better within the decade -- submerged speeds in excess of 60 knots and diving to depths greater than 1200 meters. Moreover, in a report released by Les Aspin, the developments in submarine quieting are being reflected in conventional submarines constructed in Europe and marketed to Third World countries. "It is no longer possible to continue the myth that the Soviet Union is very capable in theory but poor in implementing new concepts."

o The Washington Post of 28 May tells of the diesel-electric ***BLUEBACK*** out of San Diego being forced to the surface due to an electrical fire in her propulsion system and being towed back to port. Also, "On Tuesday, the nuclear submarine ***GURNARD*** (an attack submarine from San Diego) ran aground on a reef four miles offshore but was freed and returned to port." An earlier Post story told of the nuclear submarine ***HELENA*** being towed to Hawaii after its reduction gear broke on May 17, rendering its propeller inoperable. She was 1100 miles northwest of Pearl Harbor near Midway, when the accident occurred. There were no reported problems with ***HELENA***'s reactor.

o The Washington Post of 31 May tells of Navy plans to sink the WW II sub, ***BLENNY***, off Ocean City, Maryland, in June -- to make an artificial reef. "In five years, the reef is expected to be a prime fishing spot."

- NAVY TIMES of 22 May, '89 explains why newspaper reports are wrong which have claimed that nuclear submariners and particularly those of SSBNs are more prone to develop cancer than the general population. Vital statistics for 73,731 enlisted nuclear submariners -- those of the force between 1969 and 1981 -- taken as an entire group, had the same probability of getting cancer (if not less) than all of their civilian counterparts. But when only the discharged enlisted were examined, the cancer incidence was higher because all those who had contracted cancer in the service were discharged. Consequently, those who stayed in-service had a correspondingly less incidence of cancer.
- NAVY NEWS & Undersea Technology of 3 April, quotes ADM Mario Flores, chief of naval materiel for the Brazilian Navy, as claiming that there is a program for construction of modern submarines in a Rio de Janeiro shipyard, "to provide us with training for the great leap forward to nuclear submarines, perhaps during the last few years of this century." A pressurized water reactor is under development. Brazil is now building two 1,440-ton Type 209s, of German design. Designs are in process to increase the displacement of the 209s to accommodate the reactor.
- The PROCEEDINGS/Naval Review 1989 has an article by CDR R. W. Herrick, USN(Ret.) which spells out the Soviet's naval missions in nuclear war -- as derived from ADM Gorshkov's book, "The Navy." The first mission is to search for the enemy's "basic strategic weapons platforms" so as to locate and destroy them. Second is the suppression of the enemy's "military-economic capacity." To degrade the enemy's industrial capacity involves counter-value strikes, anti-SLOC operations, and anti-seabed exploitation. The third is "to defeat the enemy's main naval forces", and last is "to cover and give support for the coastal flanks of the ground forces." Soviet war planning for the naval side of the general nuclear war calls for the destruction of all enemy aircraft carriers and strategic submarines before they can launch nuclear strikes at the Soviet homeland. In summarizing the role the Soviet submarines play in any type of warfare, it is noted that "All principal indicators

characterizing any modern navy are concentrated in nuclear powered submarines' great striking power, high mobility and concealment, and the capability of conducting actions on a global scale -- destroying enemy ground targets, submarines and surface combatants."

- The Journal of Defense and Diplomacy of 1 April 1989 notes that the CNOs of the U.S., Soviet and Chinese Navy are all submariners of about 59 years of age, all have served in both diesel-electrics and nuclear powered submarines, all commanded submarine flotillas and each took about 37 years to get to his present position.
- NAVY NEWS & Undersea Technology of February 27, 1989 tells of testimony by RADM Thomas Brooks to the House seapower subcommittee. Brooks said that "submarine threats in the Third World are growing and in some cases pose a significant threat to the U.S. Navy." Also, "The proliferation of advanced submarines and submarine technology adds yet another element to the trend toward global diffusion of naval power. Some 21 Third World countries collectively possess more than 250 submarines. Several more will acquire diesel subs for the first time this year. A few such as China and India are beginning to demonstrate a respectable degree of competence in submarine operations." In selected missions, such as regional straits and sea-lines-of-communications interdiction, such forces could prove militarily significant even against a more capable naval power. Brooks noted that India leased a Charlie 1-class Soviet SSGN in 1988 and "Within the next decade, additional nuclear submarines will probably be transferred from the USSR. Also, that India, Brazil and Argentina have nascent nuclear propulsion programs and hope to develop their own SSNs by the end of the century."
- The Washington Times had an article by Clarence A. Robinson, Jr. on projects within the Defense Advance Research Projects Agency. One project involves shooting at incoming torpedoes with high speed underwater projectiles; another was; generating powerful submerged whirlpools to disrupt torpedo attacks; another involves decoys for luring hostile torpedoes away from the boat; and still another is to fire an electromagnetic generated shock wave into the

oceans, creating a strong doughnut-shaped whirlpool ring that can travel outwards at speeds up to 200 knots and cause a violent disturbance for a torpedo and cause it to tumble out of control. Electromagnetic propulsion with railgun launchers, appear promising for anti-torpedo defense.

- NAVY TIMES noted that in the last selection of Commanders for the rank of Captain, of the 36 submarine commanders in the zone for selection (all of whom have had submarine commands) 24 were selected, giving a selection opportunity of 67%. However, six more submarine commanders were selected from above the zone and 3 more were selected from below the zone.
- NAVY NEWS & Undersea Technology of 27 March describes a GTE new portable communications system, SUBTACS, to allow battle groups to communicate with submarines. Using a frequency between that of ELF and VLF, it has a 10-words-a-minute transmission rate and can be picked up by modified existing ELF receivers on the submarines. The range is expected to be in excess of 1,000 nautical miles. "The system with a transmitter on the carrier would allow surface ships to coordinate with submarines in tactical situations" and is ready for propagation experiments within the Navy.
- SEA POWER/March 1989 says that the Navy has begun installing "phase two" elements of the BSY-1 submarine combat system (the new SUBACS) aboard 688-class attack submarines. The phase two installation adds UYK-43 computers with new software and upgrades the active sonar system on the phase one system installed in the first 4 submarines. The active sonar systems are claimed to give a three-fold increase in target detection capability. It will permit full under-ice operations and double the range of detection of mines. The new passive sonar array, the TB-23 should quadruple the range of the older BQQ-5 sonars. The BSY-2, being developed by General Electric will employ fiber optics and is planned for installation on the SSN-21 class.
- Admiral Carlisle Trost, the Chief of Naval Operations, in a San Diego speech to the American Defense Preparedness Association, suggested funneling research money into the

development of a new, nuclear-powered submarine which could "attack aircraft and space vehicles and enter the information war." Think what it would mean to be able "to take out the other side's space launch and tracking facilities, and its early-warning aircraft. A few submarines like this could leave the other side groping like a blind giant." Such a submarine would negate the Soviet Union's ability to conduct what is known as a "decapitating strike." The suggested new super submarine could also, according to Admiral Trost, become a fleet command center for directing a surface battle from its deep submerged location.

- SUBNOTES/March-April 1989 describes The First Annual International Submarine Races, as a competition to design human-powered small submarines and race them off Palm Beach, Florida, June 23 to 25. Organized by the H.A. Perry Foundation, the many participants will vie for design honors, greatest speed, and other classifications. Entries, both U.S. and foreign, have been submitted by individuals, university teams and engineering companies. Brad Mooney will be Chairman of the Judges Panel. A sub-America's Cup in the making!
- Sea Technology/March 1989 notes that "the upgraded Mk48 AdCap -- advanced capability -- torpedo can go deeper and faster in its ASW and surface warfare roles (than the improved Mk48). The budget request is for 320 of them in FY90 for $493.9 million and 320 of them in FY 91 for $473.6 million."
- SUBNOTES/May-June 1989 says that the Royal Thai Navy has purchased three ROMEO class diesel-electric submarines from the People's Republic of China. This is a Soviet design submarine of the 1960s. They will require major upgrading with Western technology if they are to have any credibility. Also, that "the Soviet Union has withdrawn all nuclear-powered submarines from waters near the USA and Western Europe" -- this is reported to be part of Gorbachev's policy of "reasonable sufficiency."

■

SILENT VICTORY

The U.S. Submarine War Against Japan
by Clay Blair, Jr.
Bantam Books, New York 1072 pages
IBSN: 0-553-34278-9

As the History of Sea Power is required reading for Naval Academy Midshipmen so should Silent Victory be for anyone involved with submarine warfare. The New York Times described it as "The most detailed and authoritative account of United States submarine operations ever printed." Its author, Clay Blair, is no stranger to the submarine community. He served as Quartermaster on Guardfish during the close of WWII and after the war became a Washington journalist who closely followed submarine developments. He has published many other books on submarines including The Atomic Submarine and Nautilus 90 North.

The book opens with a brief history of submarine development. Then follows a discourse on the use of submarines in WWI and the beginning stages of WWII. The early politics surrounding submarine warfare are also examined.

The author then concentrates primarily on the war in the Pacific beginning with the attack on Pearl Harbor. One particularly interesting theme throughout the book is the importance that intelligence played. If the Japanese had resorted to more frequent code changes the war might very well have had a different ending. Without question our submarines would have been less effective.

The submarine campaign was not without its controversies. The infamous torpedo problems, professional disputes between not only force commanders but also various ship's CO's and XO's, material problems, poor performing submarine commanders and discrepancies between claimed and confirmed sinkings are all given extensive coverage. You will also find an account of what can be interpreted as a wartime atrocity being committed, not by the enemy, but by a U.S. submarine.

Among the horrors of war are interspersed many personal stories and humorous anecdotes. Numerous maps are included

portraying various submarine and surface operations. The bravery of our submarine crews is made well apparent. The severe poundings that many of these submarines endured attests to the quality and care that went into building these durable vessels.

The appendices provide a detailed listing of every submarine patrol of the second world war, both Pacific and Atlantic. They give the port of departure, ship name, patrol number, commanding officer and his graduating class, days on patrol, ships sunk and tonnage according to both wartime credit figures and JANAC statistics, and the area assigned to patrol. Additionally are found lists of best war patrols and the top submarines, by number of ships sunk and by total tonnage sunk, of all U.S. submarines lost during the war, and of the top skippers by number of confirmed ships sunk. An excellent source bibliography is also included.

This book is both informative and fascinating. A lot can be learned from this historical accounting that is very much applicable to modern day submarine warfare. It is hoped that the submarine community never repeats the mistakes of WWII.

Richard D. Lanning, Jr.

■

<u>AXIS SUBMARINE SUCCESSES -- 1939-1945</u>
by Jurgen Rohwer, Naval Institute Press, Annapolis, MD
ISBN: 0-87021-082-3

This publication contains a wealth of information on German, Italian, Japanese and Finnish submarine operations, as well as one sinking by a Vichy-France submarine, in World War II.

In the Introduction, the author briefly describes the research that preceded the book's first publication in German, in 1968, and the additional research that preceded the publication in English at a later time. This English version uses patrol reports of the boats, naval records of the Axis countries, corresponding records of the Allies, and interviews with Allied naval and merchant marine personnel.

The heart of the book is a chronological listing of Axis submarine attacks during World War II. It leads off with the

attack on the ATHENIA on 3 September, 1939 and ends with a Japanese attack using a manned suicide torpedo -- a Kaiten carrying one man who directed the torpedo in its run. The Kaiten missed, however, against the USS THOMAS NICKEL, a DE, on 12 August, 1945.

The table listing the Axis submarine attacks is divided into seven parts, one for each of the following geographical areas: the North Sea; the Northern and Southern Atlantic theater; the Baltic Sea; the Black Sea; the Mediterranean; the Indian Ocean theater; and the Pacific Ocean. Sinkings in the Gibraltar area are listed under the Mediterranean.

There are fifteen entries for each submarine attack, eleven entries of which are supplied by the attacking submarine. These comprise: the GMT time and date of attack; the nationality of the attacking Axis submarine; the name and number of the submarine; the skipper's name; the general area of attack; the target designation by the submarine; the weapon used; the convoy designation if applicable; the date of attack; the time of hit; and the nationality of the target. The remaining four columns are supplied by the target's organization and give; the name of the target; its actual tonnage and damage assessment; and its position and time when it was hit. There are also comprehensive footnotes which give vital additional information. These are of particular interest for the reader who is intent upon analyzing submarine campaigns.

Some of the footnotes, for example, state that the torpedoes prematured prior to reaching the target. The Germans, it appears, also had troubles with their influence exploders. It is my recollection that U.S. magnetic exploders tended to premature at about the time when the exploder had armed itself -- about 300 yards from the launch point. The German exploders however apparently prematured a second or so before reaching their target. A design study to understand why the two influence exploders functioned differently should be of interest. Other footnotes mentioned that the target was run aground and later destroyed, or was salvaged, or whatever.

There are four Indices (A through D) that refer the reader to the pages in the chronological list relative to: the skippers; the individual submarines; the convoys; and the targets which

were attacked. Under A is listed the submarine by number or alphabetically, as appropriate, and refers the reader to the pages of the list when attacks were made by that specific boat. Index B lists the skippers, their rank, their commands and the pages on which their attacks appear. Index C lists convoys and where specific convoys were put under attack. And Index D is an alphabetical listing of all target ships.

A great deal of very interesting submarine history can be obtained from this book. For example, according to the weapons column, the Germans started the war with a torpedo that only ran a straight course. In December of 1942, a torpedo which ran a preset course appears for the first time. In February of 1943, a homing torpedo appears for one attack but then doesn't appear again until September 1943 -- time probably to do some correcting of the torpedo's performance. Significantly, the U.S. submarine's first homing torpedoes didn't appear until late in 1944. Also of interest was that the Germans started using a pattern running torpedo. And notably, the Japanese torpedoes seemed to be efficient from the very start of their submarine campaign. Japanese use of the suicide "Kaiten" torpedo was first listed in November 1944 at an attack at Ulithi. Later, most of the Japanese submarine attacks used this man-guided torpedo, but without success.

I was surprised at the amount of submarine activity in the Indian Ocean -- including U-boat activity. In 1947 the Japanese were shown to have been very active between Australia and India. In October of 1942 this activity lessened and German U-boats more or less took over but along the East African Coast.

The Axis submarine commanders, like those of the Allies tended to be quite optimistic in their estimations of the tonnage of their targets. In very few cases does the actual tonnage from Allied records exceed the estimated tonnage from Axis submarine skippers.

The Germans had an interesting method for noting attack locations. The entire ocean area of attacks was overlaid with a numbered grid. The U-boats would then give the number of the grid as their attack position -- although the grid squares were 50 to 75 miles on a side.

All in all, Axis submarine successes, 1939-1945, contains a

great deal of information about the Axis submarine campaigns and should see considerable use in settling arguments between underseas warfare buffs.

CAPT Paul Loustaunau, USN(Ret.)

■

THE PRICE OF ADMIRALTY

by John Keegan
Published by VIKING, Penguin Editions, New York
ISBN: 0-670-81416

Have you ever read a naval history with only six maps or diagrams? If not, try John Keegan's interesting and sometimes gory account of the "evolution of Naval Warfare" (the sub-title) from 1800 to the present.

Keegan has chosen an unusual format in which he selected four significant periods in naval warfare, choosing a battle within each to make his case. There are similarities amongst the four segments, and some differences as well.

A quick look at the whole is useful before a more detailed assessment of the parts.

Trafalgar is the centerpiece of the first segment. The development of the ship of the line, the wooden-walls as Keegan frequently describes these behemoths, is traced in great detail. The history of battles of the period, the evolution of strategy and weapons, the failures and successes of politicians and flag officers, and most important, the story of Horatio Nelson lead naturally to an account of the great battle of 21 October 1805.

The inexorable development of steam and screw propulsion, iron ships, and explosive shells sounded the death knell of the wooden-walls. The dreadnought or battleship, the battle cruiser, and the supporting cast of light cruisers, torpedo boats, and torpedo boat destroyers passed adolescence as World War I brought untold destruction of men and material upon Europe. Keegan had no problem selecting Jutland as his period battle, because there was no comparable action. A ship in the Grand Fleet's order of battle which played no part is the stepping stone to the third phase of the book.

That ship was the seaplane carrier *ENGADINE*, whose

aircraft "were a presentiment not only of the shape of things to come but of the mainstream of development which naval warfare would follow in the post-dreadnought years." So we reach World War II and the coming of age of the aircraft carrier. Keegan speaks to several Pacific battles including Pearl Harbor, Java Sea, and Coral Sea but he singled out the Battle of Midway as a classic example of a "war-decision" engagement.

The last section of the book is entitled "The Battle of the Atlantic," and is the link to a concluding chapter which is controversial because it contains predictions of things to come. He introduces the submarine as a developing force in World War I, and a major player in World War II. He speaks to the highly successful U.S. submarine operations in the Pacific, but selected the dramatic battle of 17-20 March 1943 between convoys HX229 (a fast one at 9 knots) and SC122 (slow at 7 knots) and the U-boats. A total of 100 ships with 20 escorts was pitted against 40 submarines in three patrol lines. The heroics of both the hunters and the hunted are well documented, but Keegan identified aircraft and radar as the deciding factors in the Atlantic.

Now, a few more details:

Each chapter opens with historical and strategic factors bearing upon the central theme, and concludes with an analysis of the impact of the era upon the nations particularly affected. These portions are well worth careful study and merit investigation into bibliographical references which are also divided by subject area.

Keegan has used effectively many quotes from participants in the actions as well as pronouncements of statesmen and leaders to give the reader a feeling of "being there" to the point of over-emphasizing the casualties.

A sampling:

- The broadsides of solid shot fired at 100 meters or less against the wooden-walls left a scene of blood and gore beyond belief with dozens decapitated, limbs cut off, and injured heaped with the dead. However, only rarely did a ship of the line sink as a result of close action.
- In the days of the dreadnought, action was at ranges of thousands of yards, with explosive shells literally raining

at high angles of impact. Death from explosion or fire was common. Moreover, many of the ships at Jutland capsized from flooding; and crews perished in the cold North Sea.

- Casualties in the carrier battles from bombs and torpedoes were principally from fires fed by aircraft fuel and fueling systems and bombs ready for loading.
- Great allied loss of life in the Battle of the Atlantic resulted from an inability to rescue those set adrift after abandoning ship. Many of the U-boats were sunk with all hands.
- Intelligence has played a significant role throughout the history of naval warfare, and Keegan's episodes follow the norm. At Trafalgar, Villeneuve was aware that Nelson might attempt to breach his line and attack groups of ships close aboard from leeward -- and, indeed, Nelson won in just that way. Nelson, concurrently, used his frigates to collect enemy information up to the very engagement. It was his unique signalling system which gave him effective tactical command.

The Royal Navy read German coded traffic from the earliest days of the war. Although the Imperial Navy likewise broke Royal Navy traffic, the Germans determined to destroy one source of RN intelligence, trawlers on Dogger Bank. This resulted in the battle of 24 January 1915, and it was no accident that the Royal Navy was on scene in force. (Faulty tactics let the German High Seas Fleet get home.)

The World War II code-breaking story has been well documented. It was the single most important U.S. Navy advantage at Midway; it was also a major factor in U.S. submarine successes against the Japanese.

But, while the Royal Navy read the *ENIGMA* code in the Atlantic, it was Admiral Doenitz' strategic concept of controlling his U-boats and wolf packs from the French bunkers and later Berlin that cost him the "Battle." His U-boats were regularly required to transmit enemy submarine and mine alerts, contact, *OPSIT*, weather, and own position reports, and respond to Headquarters messages. This gave the Allied DF network all the data needed to re-route convoys and concentrate forces against U-boat packs.

Keegan has done an admirable job, and apparently lives up to the reputation he gained from his "The Mask of Command" and "The Face of Battle." But, no review would be complete without a criticism or two.

His technical description of submarines in the introduction to "The Battle of the Atlantic" is elementary and in part erroneous. The reader may then question whether his far more detailed technical dialogue on the wooden-walls and even the dreadnoughts may not be less than perfect, as well.

Finally, Keegan puts his reputation on the line by writing a 'history of the future' in his final chapter aptly entitled "An Empty Ocean." He concludes his admirable work with a dissertation on the development and refinement of U.S. nuclear attack and missile submarines, and submarine and ASW weapons and tactics (similarly open to some criticism). He then states categorically that today is: "the era of the submarine as the predominant weapon of power at sea – the ultimate capital ship, deploying the means to destroy any surface fleet that enters its zone of operations."

This is meat for debate!

M. H. Rindskopf

■

BOOK SALE

At the Seventh Annual NSL Symposium, we were fortunate to have Admiral Pete Galantin aboard to autograph his book, ***Take Her Deep***, which was available for purchase. We have a limited number of copies left which Admiral Galantin graciously agreed to autograph in advance of sale. These may be purchased by sending a check for the special low Symposium price of $17.00 to The Naval Submarine League, P.O. Box 1146, Annandale, VA 22003. ■

FIRST ANNUAL INTERNATIONAL SUBMARINE RACES RIVIERA BEACH, FLORIDA

The H. A. Perry Foundation, in partnership with Florida Atlantic University of Boca Raton, Florida, sponsored the First Annual International Submarine Races in Riviera Beach on June 23-25, 1989.

The Submarine Race was established to foster innovative advances in subsea vehicle technologies and featured the design, construction and racing of two-person, human-powered submersibles over an underwater course. There is an obvious parallel between this event and the well publicized human-powered flight competition held for many years in England.

Over 20 university and corporate entrants registered for the races, and 18 teams and submarines assembled for the inaugural event.

Each submarine was manned by two persons; one provided propulsion power while the other person was required to have only piloting and safety duties. Each crew member breathed through a SCUBA type apparatus, as these were "wet" submersibles.

The races were marked by high enthusiasm, creative and sound engineering, impressive craftsmanship and rugged perseverance. The normally balmy Florida weather took a turn for the worse midway into the race events, and the currents and surface chop provided a stern challenge to the racers and support teams.

National media groups provided comprehensive race coverage, complete with underwater color video, and included: National Geographic Society, PEOPLE magazine, CNN, CBS and ABC network news.

The entry from the U.S. Naval Academy took top honors for overall performance in the categories of Cost Effectiveness, Innovation and Speed.

The USNA submarine was constructed entirely of composites and was one of the most reliable vehicles across the four days of competition — when the flag dropped, they were always ready and missed top speed honors by only several seconds. Newly graduated Ensign Rick Miller headed the development team and piloted the USNA "SQUID."

Individual category winners included: Cal-Poly, APL-University of Washington, Florida Atlantic University, Lockheed Advanced Marine Systems, Florida Institute of Technology, Massachusetts Institute of Technology, Innerspace Corporation and University of New Hampshire.

The race competitors, sponsors and those of us in attendance deemed the festivities a first rate success; and there are plans to continue the competition every two years. Any new competitors out there ???

Captain K. A. Lee, USN(Ret.)

■

25th COMMISSIONING ANNIVERSARY REUNION

USS CASIMIR PULASKI (SSBN 633)(GOLD) will hold it's 25th Commissioning Anniversary in Charleston, SC, on 1 August 1989. All previous members, new construction contractors and interested parties please contact Chief of the Boat, Mike Bauer (Gold Crew) (803) 743-6643, Building 646A Naval Station, Charleston, SC 29408 for more information.

■

NAVAL SUBMARINE LEAGUE HONOR ROLL

BENEFACTORS

1. ARC PROFESSIONAL SERV GRP, DEFENSE SYS
2. AT&T
3. ADVANCED TECHNOLOGY
4. ALLIED-SIGNAL, ELECTRODYNAMICS DIVISION
5. AMERICAN SYSTEMS CORPORATION
6. ANADAC, INC.
7. ANALYSIS & TECHNOLOGY, INC.
8. APPLIED MATHEMATICS, INC.
9. ARGOSYSTEMS, INC.
10. ARGO-TECH CORPORATION
11. ARGUS RESEARCH CORPORATION
12. BABCOCK AND WILCOX COMPANY

13. BATTELLE MEMORIAL INSTITUTE
14. BBN SYSTEMS & TECHNOLOGY CORPORATION
15. BDM CORPORATION
16. BELL AEROSPACE TEXTRON
17. BENDIX OCEANICS DIVISION
18. BIRD-JOHNSON COMPANY
19. BOEING AEROSPACE COMPANY
20. BOOZ-ALLEN & HAMILTON, INC.
21. CAE/LINK TACTICAL SIMULATION
22. COMPUTER SCIENCES CORPORATION
23. CONTEL FEDERAL SYSTEMS
24. DAEDALEAN, INC.
25. DATATAPE, INC.
26. EDO CORPORATION
27. EG&G SEALOL ENGINEERED PRODUCTS DIV
28. EG&G WASCI
29. ELECTRIC BOAT DIV OF GENERAL DYNAMICS
30. ELIZABETH S. HOOPER FOUNDATION
31. ESSEX CORPORATION
32. FMC CORPORATION
33. FOSTER-MILLER, INC.
34. G.E. AEROSPACE
35. GENERAL DYNAMICS/UNDERSEA WARFARE CTR
36. GENERAL ELECTRIC MARINE & DEFENSE FSO
37. GENERAL PHYSICS CORPORATION
38. GLOBAL ASSOCIATES, LTD.
39. GNB INDUSTRIAL BATTERY COMPANY
40. GTE GOVERNMENT SYSTEMS CORPORATION
41. HAZELTINE CORPORATION
42. HONEYWELL, INC.
43. HUGHES AIRCRAFT COMPANY
44. HYDROACOUSTICS, INC.
45. IBM CORPORATION
46. IMI-TECH CORPORATION
47. INTEGRATED SYSTEMS ANALYSTS
48. INTERSTATE ELECTRONICS CORPORATION
49. JAYCOR
50. KAMAN AEROSPACE CORPORATION
51. KOLLMORGEN CORP ELECTRO-OPTICAL DIV
52. LIBRASCOPE CORPORATION

53. LOCKHEED CORPORATION
54. LORAL SYSTEMS GROUP
55. L. Q. MOFFITT, INC.
56. MAGNETIC BEARINGS, INC.
57. MARTIN MARIETTA BALTIMORE AEROSPACE
58. NATIONAL FORGE COMPANY
59. NEWPORT NEWS SHIPBUILDING
60. NOISE CANCELLATION TECHNOLOGIES
61. NORTHROP CORPORATION
62. PACIFIC FLEET SUBMARINE MEMORIAL ASSOC.
63. PEAT MARWICK MAIN & COMPANY
64. PLANNING SYSTEMS INC.
65. PRESEARCH INCORPORATED
66. PURVIS SYSTEMS INCORPORATED
67. QUADRAX CORPORATION
68. RAYTHEON COMPANY SUBMARINE SIGNAL DIV.
69. RCA CORP, ELECTRONIC SYSTEMS DIVISION
70. RES OPERATIONS, PHYSICAL DYNAMICS INC.
71. RIX INDUSTRIES
72. ROCKETDYNE DIVISION/ROCKWELL INT'L.
73. ROCKWELL INTERNATIONAL CORPORATION
74. SAIC
75. SANDERS ASSOCIATES
76. SCIENTIFIC ATLANTA GOV'T PRODUCTS DIV.
77. SEAKAY MANAGEMENT CORPORATION
78. SHIP ANALYTICS
79. SIGNAL CORPORATION
80. SIPPICAN, INC.
81. SOFTECH, INC.
82. SONALYSTS, INC.
83. SPACE & MARITIME APPLICATIONS CORP.
84. SPERRY CORP. MARINE SYSTEMS DIVISION
85. STONE & WEBSTER ENGINEERING CORP.
86. SUBMARINE TACTICS & TECHNOLOGY, INC.
87. SYSCON CORPORATION
88. SYSTEMS PLANNING & ANALYSIS
89. TASC, THE ANALYTIC SCIENCE CORPORATION
90. TITAN SYSTEMS, INC.
91. TRACOR APPLIED SCIENCES
92. TREADWELL CORPORATION

93. TRIDENT SYSTEMS, INC.
94. UNC INCORPORATED
95. UNIFIED INDUSTRIES, INC.
96. UNISYS SHIPBOARD & GROUND SYS. GROUP
97. UNITED TECHNOLOGIES CORPORATION
98. VITRO CORPORATION
99. WESTINGHOUSE ELECTRIC CORPORATION
100. WESTON CONTROLS
101. ZIMMERMAN ASSOCIATES INC.

NEW PATRONS

GEORGE S. ZANGAS

NEW SKIPPERS

CDR LARRY W. COOK, USN
DR. CHARLES DEVIN, JR.
PETER J. BRIN
CAPT EDWARD L. VONFISCHER, USNR-R

NEW ADVISORS

CAPT H. A. BUNCH, JR., USN
MICHAEL A. TOBITS

NEW ASSOCIATES

LCDR NORMAN P. ELTRINGHAM, USN
DAVID JOHN BLACK
RMCS(SS) TIM J. SHANNON, USN
LCDR JOHN M. ELLIOTT, USN
CAPT THEODORE W. HACK, USN
LCDR JOHN MARK ELLIOTT, USN
LT PETER L. CARRIER, USN
ENSIGN DEAN F. WATTS
CDR M. R. HALL, USNR-R

■

THE SUBMARINE REVIEW

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

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

A stipend of up to $200.00 will be paid for each major article published. Annually, three articles are selected for special recognition and an honorarium of up to $400.00 will be awarded to the authors.

The views expressed by the authors are their own and are not to be construed to be those of the Naval Submarine League. In those instances where the NSL has taken and published an official position or view, specific reference to that fact will accompany the article.

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

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

■