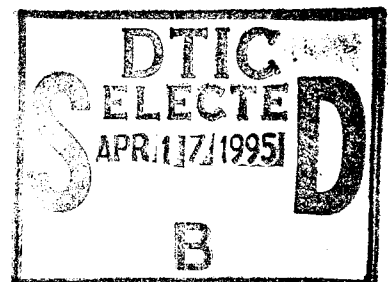


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THE ATTACK SUBMARINE (SSN) IN THE POST COLD WAR ENVIRONMENT:
OPERATIONAL ART IMPLICATIONS FOR THE OPERATIONAL COMMANDER

by

Daniel P. Mack
LCDR, USN


A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: 

8 March 1995

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Abstract for

THE ATTACK SUBMARINE (SSN) IN THE POST-COLD WAR ENVIRONMENT:
OPERATIONAL ART IMPLICATIONS FOR THE OPERATIONAL COMMANDER

The end of the Cold War requires a re-assessment of the strategic and operational environment. Some strategists argue that platforms like the attack submarine (SSN), though instrumental in an antisubmarine (ASW) role against the Soviets, are redundant and not essential in the changing world order. The utility of the SSN is readily apparent when viewed from the perspective of the combatant Commander in Chief (CINC). The CINC practices the operational art, and SSNs contribute significantly to the CINC's operational tool kit. When examined through the lens of the principles of war, the SSN's versatility and relative invulnerability bring a great deal to the CINC's table, where the true operational value of a platform is most important. Focusing on three principles of war--the offensive, security, and economy of force--reveals numerous tasks the SSN can accomplish (often simultaneously) for the operational commander in the joint littoral environment. Instead of looking backward at traditional Cold War missions, operational thinking should look forward and apply the unique capabilities of the SSN to tasking as diverse as conventional deterrence, strike warfare, surveillance, and integrated ASW against the diesel threat.

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The general released a deep breath, and the frustration reverberated throughout his body. He had worked over 30 years for this job, sacrificing his youth and a normal family life to fulfill the desire to serve his nation as a warrior. The entrance to his suite of offices read Commander in Chief (CINC), United States Central Command, but the general didn't feel very commanding. He recognized the limits of power, even for the only remaining superpower in the late 1990's, the United States.

The morning staff meeting ended as he anticipated, with a rehashing of the same tired options that had previously been proposed and employed over the last decade. The draft of the commander's estimate read like so many others: overwhelming force is necessary to ensure success; the enemy is neither a rational actor nor a traditional nation-state; the risk to U.S. forces is moderate, but any additional military casualties will be viewed as a victory for the enemy and defeat for the Americans.

The continuous political turmoil in Iran and the death of Saddam Hussein in Iraq had ignited the Persian Gulf region. The hostility toward neutral shipping and any foreign presence had accelerated over the past year, culminating in the sinking of an American-owned oil tanker last week by an unidentified diesel submarine or mine. Both Iran and Iraq claimed credit for the burning hulk in CNN interviews, but intelligence reports are inconclusive. The diplomatic threats and U.N. condemnation of the act were swift responses, and the general had pulsed his staff for recommendations to begin the crisis action planning process immediately. Yesterday, the newest Arleigh Burke (DDG 51) class destroyer encountered a mine in international waters in the Gulf, killing a dozen sailors and nearly causing the loss of the ship.

Again, the general lamented the situation to himself as he rehearsed the political reaction of the Administration, the crucifixion in the media, and the impotence of his forces due to current rules of engagement. Unless the United States reneges on last year's decision to no longer put aircraft carriers in the Gulf, the naval response was limited. The use of an Air Force strike was eliminated by the President's campaign proclamation that large-scale offensive force would no longer be used in a preemptive manner, citing President Reagan's 1986 strike on Qaddafi as an "abuse of power." The CINC set an evening deadline for their proposed response with his Chief of Staff. After labeling that morning's draft as satisfactory, the CINC challenged his staff to consider unconventional approaches, to derive new solutions to combat the chaos engulfing his theater of operations.

The CINC's Tool Kit. The collapse of the Soviet Union removed the familiar bipolar nature from the strategic and operational environment. The emphasis of national security is now regional vice global, economic vice military, presence vice containment.¹ Consistent with the expectation of a peace dividend following any war, the level of forces and size of military budgets are decreasing. But the CINC is responsible for linking these reduced resources and diverse missions effectively and efficiently, literally making do with less.²

The CINC combines knowledge of his area of responsibility (AOR) and his available forces with a sense of how best to employ these resources. He must be agile with both hard data (science) and its operational application (art) to succeed. As an operational artist, the CINC intuitively discriminates between science and art:

Some say war is an art, not a science. Art and science are not incompatible....Science is knowledge; art is knowledge translated into action. Indeed science is more than knowledge...It is useful knowledge. But science is only an instrument. It can never be master. Art is the master.³

Knowledge of history and familiarity with the lessons learned from previous wars enable the CINC to expand his operational art tool kit. Pitfalls of studying history include selecting the wrong lessons to apply to an uncertain future security environment, and the tendency to "fight the last war." For example, the submarine force played an important role cutting Japanese sea lines of communication (SLOCs) in the Pacific in World War II⁴; however, a completely different operational and strategic role evolved during the Cold War. The attack submarine (SSN) mission was primarily antisubmarine warfare (ASW): protecting the carrier from Soviet attack subs, hunting Soviet ballistic missile submarines (SSBNs) to prevent World War III, and maintaining SLOCs open to U.S. ships.

As in the late 1940's, the National Command Authority (NCA), the Department of Defense (DoD), and the Navy are struggling today for a cohesive strategy, and how the submarine (now the SSN) fits into that strategy is again under scrutiny. Some point to the lack of a credible submarine threat on the horizon, dismissing proponents of maintaining SSN force levels as submarine partisans, pork-barrel politicians, or theorists out of touch with reality as defined by Congress.⁵ Since the relative importance of the ASW mission has diminished on a global-strategic perspective, CINCs and operational planners need to re-examine the value of the SSN (as was done 40 years ago) outside the traditional ASW boundaries. One method to fully integrate the advantages of this uniquely capable platform into the CINC's vocabulary and tool kit is through application of the principles of war.

One influential Naval strategist recently examined the effect of the changing security environment upon naval forces, the SSN in particular. The SSN played at a disadvantage compared to other military capabilities in developing a cooperative international security

structure, and added little value to either the traditional regional conflicts (e.g., Desert Storm) or the non-traditional missions other than war (e.g., Somalia).⁶

Although there is significant support for this opinion, particularly as competition sharpens among and between the services for shrinking DoD budget dollars, the debate requires focus. What resources does the CINC or Commander of the Joint Task Force (CJTF) need to meet his objectives? Does the SSN add to the CJTF's tool kit, or is it "not essential to the area commander-in-chief's concept of operations--i.e., the absence of submarines would not substantially alter his plans"?⁷ Is the ability of the submarine to dominate the maritime environment, as espoused by military historian John Keegan in 1988, still relevant in the littoral world of the 1990's?:

The era of the submarine as the predominant weapon of power at sea must therefore be recognized as having begun. It is already the instrument of ultimate deterrence between the superpowers...It is now also the ultimate capital ship, deploying the means to destroy any surface fleet that enters its zone of operations.⁸

Operational art is where the CINC and CJTF earn their keep. Combining the knowledge of the science of war and the art of practical applications, these operational commanders bridge the gap between the strategy/force level debates at the NCA level and the mission accomplishment concentration of the tactical commanders. Consequently, this examination will focus on the SSN's enhancement or redundancy to the operational artist in terms of the principles of war.⁹ Surprise and maneuver, for example, are inherent in the SSN. Although the SSN is relevant to all the principles of war in some degree, three serve to limit the debate and adequately examine both sides of the issue: the offensive, security, and economy of force.

The Offensive. The offensive nature of war means carrying the war to the enemy's doorstep to seize and maintain the initiative.¹⁰ For this discussion, the offensive is limited to types of responses necessary to support the national security strategy. The offensive must, therefore, be forward deployed, shaped for joint operations, ready for combat, and tailored for national needs.¹¹ The offensive in the late 1990's is not global power, nor force levels able to fight the Mahanian sea battle or the decisive land battle for control of Europe.

The argument that SSNs bring only redundancy to the CINC's offensive table is persuasive on the strategic level, yet unidimensional. In developing alliances and extending cooperative security through partnerships, the submarine has demonstrated little utility due to the secretive and therefore secluded nature of Cold War missions. Clearly, although the submarine force has become more open and transparent to both allied and U.S. forces, other forces are more familiar to the CINC. In the presence and regional conflict response arenas, however, the view that SSNs would not play a significant role¹² is based upon the Cold War, and lacks operational focus.

Returning to the scenario of the Persian Gulf in the late 1990's, the versatility of options of strike warfare, presence, and delivery of special forces are important. The carrier strike relied upon in the past is not available due to political limitations and a plethora of land based antiship missiles and surface to air missile sites inside the Gulf. Surface ships are available, but the political risk of a subsequent mine explosion looms large. The Saudis refuse to allow Air Force staging due to their own internal turmoil. The SSN, with programmable Tomahawk cruise missiles, is an unique and available tool, and one which should be given consideration. Since the more expensive ASW mines are less proliferous in

the Third World than the contact type (which struck the Arleigh Burke class ship), the SSN is not as likely to fall prey to this risk. Additionally, by as early as 1994, the improved Los Angeles (SSN 688) class (SSN 751 and later) had arguably the most effective moored mine detection capability in the fleet outside dedicated mine warfare platforms.¹³ Although traditional ASW missions against the Third World diesel threat may be the CINC's gut reaction in this scenario, the CINC and his staff want options to demonstrate U.S. resolve and proportionate response. The SSN strike component is a welcome response for the CINC.

Forward presence and crisis response since 1945 has cemented the Navy's role as a military-diplomatic instrument. In Force Without War, Barry M. Blechman and Stephen S. Kaplan conclude that the Navy "clearly has been the foremost instrument for the United States' political uses of the armed forces: at all times, in all places, and regardless of the specifics of the situation."¹⁴ As integral as the Navy's position is to crisis response, the SSN's role is peripheral at best, as specified by several noted modern commentators, including Sir James Cable.¹⁵ Traditionally, the arguments against the SSN as an asset for the forward presence mission are the sub's lack of visibility; the lack of "proportional" violence available; and lack of powerful image (e.g., visible gun barrels or missile launchers).¹⁶

The shift from global to regional focus and the proliferation of satellite television communications may challenge this traditional thinking. Visible military presence can work against the United States in a regional conflict where the regional predator sees the forces as easy targets, and the objective is merely to inflict heavy U.S. casualties. In this environment, the character of the presence forces must be viewed as relatively invulnerable to inhibit regional aggression.¹⁷ Conversely, the presence mechanism must not politically inflame the

intended recipient nor escalate military tension, as in the October 1994 incident in the Yellow Sea involving the USS Kitty Hawk (CV 63) and Chinese naval forces.¹⁸ Returning to the presented scenario, the invisibility of the SSN is an advantage as a presence force, regardless of whether the SSN's presence is verbally communicated or visibly demonstrated to the regional enemy.

A third aspect of the offensive is the delivery of special operations forces via an SSN. Some argue that, like SSNs, Special Operations Forces (SOF) fill narrow niches outside the mainstream strategic and operational environment, and will get less support and use in the future.¹⁹ When the objective is not amenable to precision-guided munitions attacks, when the tolerance for collateral damage is zero, or when the specific task requires small highly trained units who require rapid entry and extraction, SOF from the sea are the answer. The SSN retains the capability to put forces ashore at any time at any location under the enemy's nose.²⁰ Removal of a command and control station, an anti-aircraft missile site, or a mine storage facility located within several miles of the coast are typical SOF missions from the littoral scenario.

The offensive nature of war in the late 1990's will require cooperative efforts with foreign nations' armed forces, increased regional presence, and potential offensive fires delivered against a regional predator. Naval forces will continue their usefulness as a political-diplomatic instrument, and probably increase their role as forward basing of forces continues to decline. The SSN, traditionally used sparingly in both strike and presence missions, has a greater role against regional bad actors, especially when the CINC desires

relative invulnerability over visibility of the deterrent force. The ability to deliver SOF covertly on short notice and extract them safely is another offensive tool for the CINC.

Security. Security provides the means for the operational artist to maintain freedom of action. Security implies not only denial of pertinent operational information to the enemy, but also the ability to gather operational intelligence about the enemy. Security also entails operational protection, the ability to deny enemy interference with one's own forces. In short, "It prevents surprise by the enemy; it is essential to the surprise of the enemy."²¹ Additionally, security means prudent management of the risk inherent in military operations by attacking hostile forces before they interrupt friendly operations.

The changing strategic environment demands a heavy reliance on real-time surveillance and an enormous need for early warning signals sent by a wide spectrum of potential adversaries. Additionally, technological advancements in numerous platform signature maskings and communications interference by decoy signature generation and jamming have increased the importance of electronic warfare (EW) to the CINC.²² Although air assets are also capable of EW, the SSN provides the CINC covert entrance into the theater without risk to pilots or aircraft; around the clock electronic and visual coverage without depending on the periodicity of national assets; and sustained (up to three months) coverage without air superiority or a logistics tail as a prerequisite.

SSN electronic support measures (ESM) are capable of monitoring and recording enemy communications and *modi operandi* -- a valuable capability to have in event of a regional contingency. As demonstrated during the Gulf War, SSNs operating ahead of a carrier task force can provide precious early warning of enemy preparations for an attack in

the Mediterranean Sea. According to naval expert Norman Friedman, SSNs, using enhanced ESM capabilities, transmitted invaluable "indications and warning" (I&W) data to the surface force en route to the Persian Gulf to eliminate the suspicion of Libyan support for Iraq.²³

The traditional coastal surveillance and intelligence gathering tasks have increased emphasis in the joint littoral environment. The SSN has demonstrated endurance and stealth in performing these missions during the Cold War, and these qualities will be even more important in the regional conflict in the late 1990's. The British experience in the Falkland Islands provides an excellent model for the variety of uses of the SSN in the littoral. In addition to enforcing the Maritime Exclusion Zone (offensive) and hunting diesel subs in an ASW capacity (economy of force), the Royal Navy also assigned SSNs to dedicated coastal surveillance for a significant amount of their on-station time. The SSN is "uniquely suited to long vigils of surveillance and reconnaissance efforts that could extend, unbroken, over months..."²⁴ or at least until the regional predator has altered his behavior.

In the late 1990's scenario, the SSN could be positioned to monitor movements of specific surface ships or diesel submarines from their homeports, pinpoint minelaying operations, and report any indications immediately to the CJTF. Then, SSNs can shadow hostile contacts so friendly forces can avoid potential trouble spots. ESM capabilities allow the SSN to monitor and report on the regional predator's command and control (C²) methods, and assist in localizing critical C² nodes by merging this information with other intelligence sources. The SSN performs these I&W and surveillance missions with virtually no risk to the platform or American lives, a characteristic the CINC welcomes in the joint littoral scenario.

Economy of Force. The principle of economy of force complements mass (or concentration) of force at the decisive point. Economy of force allocates the minimum combat resources necessary to complete secondary tasks. It has also been defined as "an intelligent expenditure for present needs in order to preserve maximum power for the future or final need."²⁵ In this discussion, the SSN's role in limiting the diesel ASW threat, protecting sealift or tankers, and assisting an air strike with targeting and/or battle damage assessment information will be examined. Again, the contribution to the CINC's operational art tool kit is the measure of effectiveness.

Some strategists believe that a capable ASW organization of air and surface ASW forces is more effective against the modern diesel submarine. In this argument, friendly SSNs complicate the ASW task by introducing the possibility of "blue on blue" attacks to the ASW problem.²⁶ With the expansion of modern joint communication suites, the ability to exchange cooperative location and targeting information between surface, sub, and air assets becomes a distinct advantage of the integrated ASW organization.

Although the surface/air ASW team is formidable, the integration of the SSN's sonar and weapons capabilities allows for the most effective use of resources against the Third World diesel. The potential threats of the modern diesel-electric submarine are well-known: conduct anti-ship (warship and sealift) attacks, provide target information for cruise missile launches, mine coastal areas against U.S. strike or amphibious forces.²⁷ Again, the British experience in the Falkland Islands demonstrates the importance of the modern diesel in a littoral conflict. The small Argentine diesel submarine force dictated the early pace of the Royal Navy's operations, causing the expenditure of a large portion of the British ASW

weapon inventory against non-submarine contacts. The engaged battle group commander observed that "the Argentinean commanders failed inexplicably to realize" the political value of putting a torpedo into the HMS Hermes, which "would surely have given them victory."²⁸

The changes in the world security environment have altered the Navy's thinking about ASW. Instead of focusing numerous assets on Soviet SSBNs and SSNs as in the Cold War, ASW elements now are part of joint littoral warfare and joint surveillance. Today, it may be sufficient to know where the diesel subs are located and how to avoid them while accomplishing the primary mission. According to then VADM William Owens, ASW is "simply a naval function that allows us to carry out our basic missions."²⁹ While serving as Commander of the Sixth Fleet, Admiral Owens developed a successful integrated ASW organization of cruisers, destroyers, SSNs and P-3 aerial surveillance capability.

Some advocate the SSN as the clear ASW weapon of choice versus the modern diesel. The maxim that it is "easier to shoot the archer than to shoot the arrow" applies well against the diesel submarine. The SSN is able to thwart the archer by a variety of methods: covert offensive mining of enemy operational submarine bases; most effective monitoring of early indications of a diesel's subsequent underway; identifying and attacking the diesel in its most vulnerable location -- on the surface.³⁰

The SSN's role in regional conflicts with little or no submarine threat will still be significant. With air superiority achieved separately, naval forces will perform the critical task of protecting vital sealift to the theater of conflict, ensuring the delivery of heavy equipment and re-supply of the forces forward engaged.³¹ The choices vary from an in-depth accounting of each threat diesel in an enclosed basin like the Persian Gulf, or an area ASW

search to sweep out the diesel lurking along the known route of vital sealift. The SSN is an excellent tool for the CINC to gain battlespace dominance of the surface and subsurface environments in either instance.

A third economy of force the SSN presents is the performance of targeting and battle damage assessment tasks in the joint littoral for a strike mission from a carrier or land based forces. The SSN covertly verifies the target selected, provides eyes on the target to ensure the strike's success, and electronically and visually monitors the target afterward for damage assessment (either battle or collateral). The covert nature of the SSN provides this capability to the CINC with minimal risk of being compromised or attacked by the regional predator.

Economy of force allows the operational artist to spend more time and resources more efficiently. Similarly, the participation of the SSN in the diesel ASW organization permits the CJTF to spend more time on other issues. In the scenario presented, the SSN could assist theater surface and air ASW forces in locating and shooting the archer responsible for the tanker's sinking. The protection of sealift is essential to any sustained joint operation, and the SSN can provide the operational commander additional time to focus on the regional predator by safeguarding the transit of the sealift assets from surface and subsurface threats. Finally, the CINC may choose to employ the SSN to monitor a specific target and conduct eyes-on damage assessments. Thus, the SSN frees up several other forces for other tasks, contributing to a greater concentration of effort at the decisive time or place.

Naval forces offer several comparative advantages (compared to other forces) to the operational artist dealing with a regional predator in the near future. These include forward deployment with an immediate availability of readily usable power; ability to sustain

operations in remote locations; and neutralization of the "CNN factor" by minimizing casualties and U.S. prisoners of war.³² Similarly, the SSN gives the operational artist several comparative advantages while planning the offensive, ensuring security of his forces, and employing economy of force by using fewer assets.

The value of the SSN to CINCs and CJTFs is not merely an ASW tool available in the operational tool kit, but a versatile platform that provides added offensive power, security, and economy of force. However, this requires the CINC to expand current operational thinking and include non-traditional uses of the SSN. Additionally, the employment of the SSN sends a message to the real audience in future regional conflicts: the political and military elite of the regional predator. These leaders have already demonstrated their appreciation for the submarine's capacity for stealth and violence by voting with their checkbooks. Although lacking the determination to establish the requisite maintenance infrastructure and training regimen to support nuclear submarines, the recent proliferation of modern diesels in Third World navies verifies this appreciation.³³ The war fighters in the United States should learn this lesson now, instead of in the next regional conflict.

The general felt better that evening, comfortable that his staff had indeed stretched the envelope and produced numerous alternatives in his joint littoral AOR. In his mind, he reviewed the strike plans, the timing of the SOF mission, the integrated ASW plan, and the contingency plans for the increased monitoring and reconnaissance in the region. After an hour or so of removing capabilities from his mental operational tool kit, connecting some here and changing the shape of another there, the general put the tool kit aside and fell asleep.

NOTES

1. William A. Owens, "Naval Voyage to an Uncharted World," U.S. Naval Institute Proceedings, December 1994, p. 30.
2. William J. Clinton, National Security Strategy of the United States (Washington: 1994), p. 10.
3. C.R. Brown, "The Principles of War," U.S. Naval Institute Proceedings, June 1949, p. 623.
4. Charles R. Girvin, III, "Twilight of the Supercarriers," U.S. Naval Institute Proceedings, July 1993, p. 41. Girvin cites figures from Ronald H. Spector's Eagle Against the Sun (New York: Random House, 1985), pp. 486-87 to support this claim. With only 2% of naval personnel, submarines accounted for 55% of Japan's losses at sea: more than 1,300 ships sunk, including 8 aircraft carriers, 11 cruisers, and a battleship.
5. James John Tritton, Our New National Security Strategy: America Promises to Come Back (Westport, Ct: Praeger, 1992), pp. 102-5.
6. Dr. John T. Hanley, "Implications of the Changing Nature of Conflict for the Submarine Force," Naval War College Review, Autumn 1993, pp. 22-25. Dr. Hanley is the Program Director for the Chief of Naval Operations' Strategic Studies Group.
7. Ibid, p. 23.
8. John Keegan, The Price of Admiralty (New York: Viking Penguin, 1988), p. 274.
9. The principles of war have evolved and will continue to evolve in both the academic and operational environment. See the Brown article in the June 1949 Proceedings for an example. I am referring to the principles as defined in Joint Publication 3-0 Doctrine for Joint Operations, (Washington: U.S. Govt. Print. Off., 1993), pp. A-1 through A-4: mass, objective, offensive, maneuver, security, simplicity, surprise, unity of command, and economy of force.
10. Brown, p. 626; Joint Pub. 3-0, p. A-1.
11. John H. Dalton, Jeremy M. Boorda, and Carl E. Mundy, Jr., "Forward...from the Sea," Washington, 1994, pp. 8, 10.
12. Hanley, pp. 22-24.

13. Stan DeGeus, U.S. Armed Forces...Basic Training (Newport, RI: Naval War College Press, 1994), p. 10.

14. Barry M. Blechman and Stephen S. Kaplan, Force Without War: U.S. Armed Forces As a Political Instrument (Washington: Brookings Institution, 1978), p. 39.

15. Jan S. Breemer, "Where are the Submarines?", U.S. Naval Institute Proceedings, January 1993, p. 38.

16. Ibid, p. 39.

17. Owens, "Naval Voyage," p. 31; Breemer, p. 39.

18. Jim Mann and Art Pine, "Faceoff Between U.S. Ship, Chinese Sub is Revealed," Los Angeles Times, December 14, 1994, p. A-1: 1-4.

19. Hanley, pp. 24-5.

20. P. Kevin Peppe, "Submarines in the Littorals," U.S. Naval Institute Proceedings, July 1993, p. 48.

21. Brown, p. 630 (emphasis added); Joint Pub. 3-0 definition, p. A-3.

22. Deputy Chief of Naval Operations (Plans, Policy and Operations, Future Deterrence Study -- Deterring the Use of Weapons of Mass Destruction, Final Report, Vol. 2, (Washington: 1993), p. 21.

23. Norman Friedman, "Submarines Adapt," U.S. Naval Institute Proceedings, November 1994, p. 72.

24. Peppe, p. 47.

25. Brown, pp. 630-1; Joint Pub. 3-0 definition, p. A-2.

26. Hanley, p. 24. "Blue on Blue" attacks are the unintended consequence of using friendly SSNs as ASW forces, when the surface/ air forces mistake one of their own SSNs for the enemy.

27. David Miller, "The Silent Menace," International Defense Review, No. 8, 1993, p. 613.

28. Adm. Sandy Woodward, RN (Ret.), and Patrick Robinson, One Hundred Days (Annapolis, MD: Naval Institute Press, 1992), p. xviii. For analysis of the diesels setting the early pace of British naval operations in the Falklands, see Harry D. Train, III, "An

Analysis of the Falkland/Malvinas Islands Campaign," Naval War College Review, Winter 1988, p. 40.

29. William A. Owens, "Antisubmarine Warfare: Still a Priority," U.S. Naval Institute Proceedings, March 1993, p. 124.

30. Peppe, p. 47. The SSN can detect testing of underwater communications that normally precede the diesel sub's underway as well as radio transmissions testing that the relatively poorly trained Third World crews perform.

31. Dalton, Boorda, and Mundy, p. 7; Owens, "ASW: Still a Priority", p. 126.

32. Joseph C. Strasser, "The Role of Naval Forces in Combat," in Naval Forward Presence and the National Military Strategy eds. Robert L. Pfaltzgraff, Jr. and Richard H. Shultz, Jr. (Annapolis, MD: Naval Institute Press, 1993), p. 260.

33. Breemer, p. 42; Miller, p. 613 for a detailed discussion of which nations possess diesel subs and their relative capabilities.

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