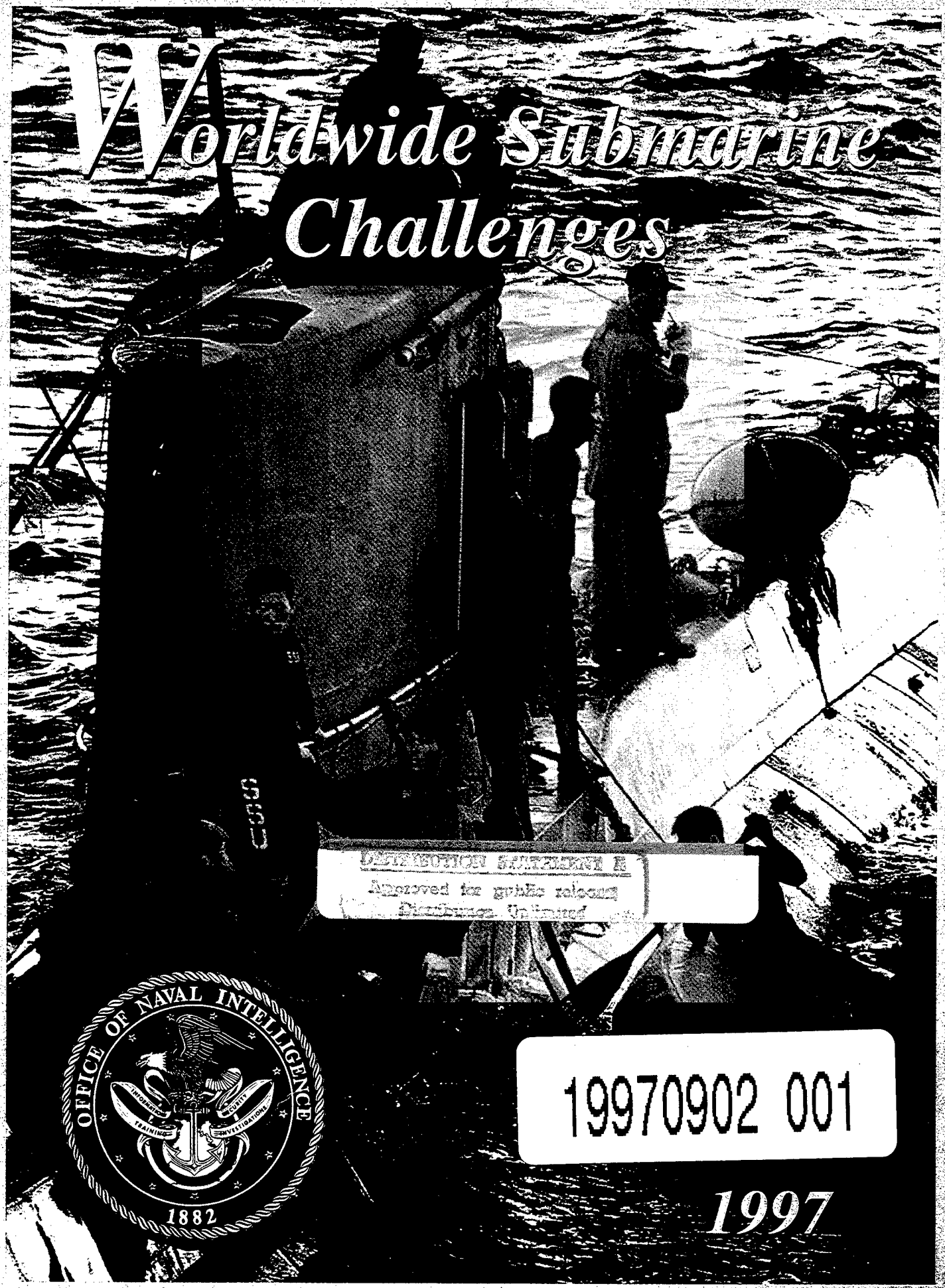
Worldwide Submarine Challenges



OFFICE OF NAVAL INTELLIGENCE
1882

1997

PROLOGUE

*The **Worldwide Submarine Challenges** that the United States and its allies face today are more diverse and more complex than at any time during the Cold War. These Challenges now encompass both the open ocean and the littoral. They run the gamut from the highly sophisticated and predictable to the unsophisticated and irrational.*

The issue of proliferation of submarine technology continues to cloud the Challenge picture. For countries making the decision to acquire a submarine for the first time, issues of national security goals, defense budgets and operational constraints must be thoroughly evaluated to fully justify such a purchase. For those with an existing submarine force, mission success depends on submarines that have the right combination of components and features for the job. However, while upgrades of existing submarines may improve mission effectiveness and extend service life, old units eventually will have to be replaced by new construction submarines.

*In spite of the demise of the Soviet Union and enormous budget constraints, the Russian Navy has made a series of hard, practical choices to maintain the best of its submarines, bring on new units, backfit updated technologies, and carefully plan for the future. At the same time, it has maintained vital readiness, tested new tactics, conducted demanding anti-SSBN and anti-carrier warfare exercises, funded the design and construction of three new classes of submarines, and generally survived in the face of remarkable economic hardships. The Russian nuclear submarine force is 60 percent smaller today than it was in 1990, but it has added units which are far more capable than ever before. It still remains the **technological pacing challenge** by which the U.S. submarine force measures itself, and is the apex of the challenge triangle facing the U.S. Navy. Russia also continues to sell some of its best submarine technology to **"countries of concern,"** another worrisome trend.*

*China, the second leg of the Challenge triangle, has announced a dramatic increase in the area of its maritime interest and is investing heavily in submarine technology. China has employed its submarine force to support military exercises in the Taiwan Strait, to reinforce its claims in the Spratly Islands, and to maintain training and readiness. Its current submarine force is largely obsolete, but it is investing in new designs for nuclear attack submarines, for strategic ballistic missile submarines, and for the purchase of KILO Class submarines from Russia. China hopes to leap "generations" of submarine technology in its ambitious buying and building program. Its submarine force is clearly **investing for the** future.*

*The final leg of the Challenge triangle is composed of a number of **Countries of Concern** (e.g., Iran and North Korea) that recognize that submarines can yield affordable regional power status, in limited areas, for limited periods of time. These submarines, particularly along the littoral, need not be sophisticated. North Korea has demonstrated that its SANGO SSC submarines can effectively support special force insertion and mining operations, and greatly complicate the ASW environment. Iran continues to show that a small submarine force, in a strategic area like the Strait of Hormuz, can easily threaten the world's supply of oil and readily hold U.S. and allied interests at risk.*

*The goal of **Worldwide Submarine Challenges** is to give policy makers, industry, acquisition officials, and all interested parties an overview of the current state of worldwide submarine capabilities.*

Worldwide Challenges to Naval Strike Warfare 1997

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WHAT MILITARY LEADERS SAY

Honorable J.H. Dalton
Secretary of the Navy

"As a global maritime power, the United States must be able to deal with any undersea challenge—from the technologically unsophisticated to the state-of-the-art."

General John M. Shalikashvili
Chairman, Joint Chiefs of Staff

"Without the ability to protect our deploying and deployed forces from submerged threats, we will not be able to execute campaign plans successfully. Recent Russian submarine deployments and the continued proliferation of capable, quiet diesel submarines are serious concerns to joint planners."

Igor Rodionov
Russian Minister of Defense

"It is not possible to protect the country's national and state interest without a powerful Navy."

General Liu Huaqing
Chinese Central Military Commission

"Fewer than 10 percent of China's land-based missiles would survive a large-scale nuclear first strike; the less vulnerable SLBMs would preserve our nuclear counterattack capabilities."

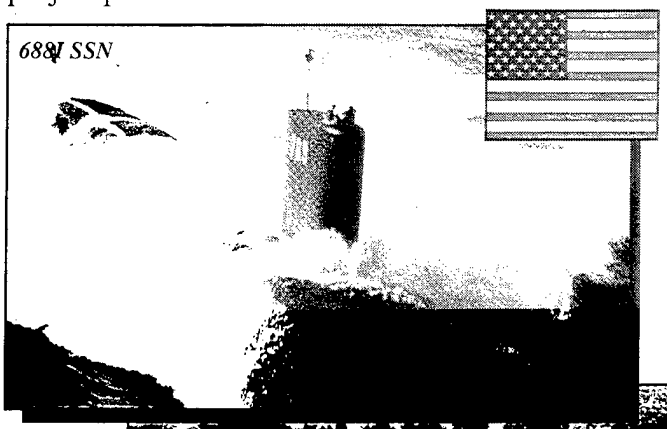
SUBMARINE CHOICES COUNTRIES MAKE

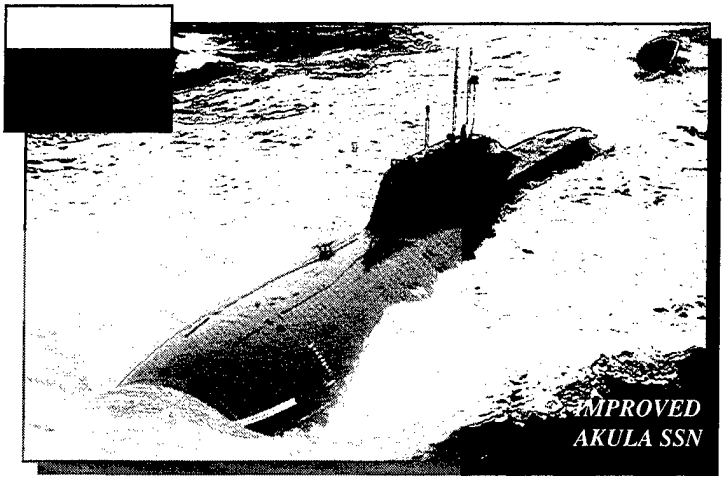
When a nation considers the acquisition or construction of submarines, a number of questions need to be answered to ensure the force will meet that country's national security requirements.

Countries make acquisition decisions based on the following critical questions:

- What submarine missions need to be accomplished to fulfill national security goals?
- How much capability can be purchased with the available defense budget?
- Are there any geographic constraints like shallow water or restricted access to the open sea that will affect the size and composition of the force?

The United States, because of its global responsibilities, must maintain a high technology submarine force—one that provides the strategic deterrent of nuclear-powered ballistic missile submarines (SSBNs), and has the range, endurance, and conventional firepower of nuclear-powered attack submarines (SSNs)—to influence events, or project power worldwide.

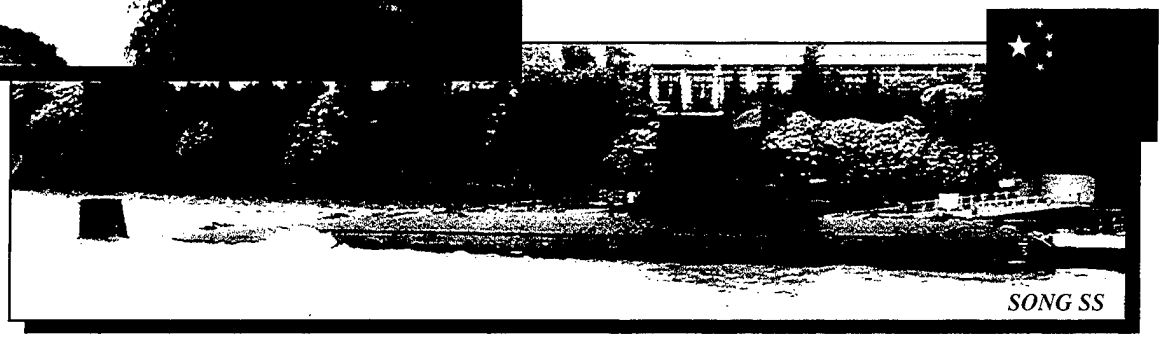




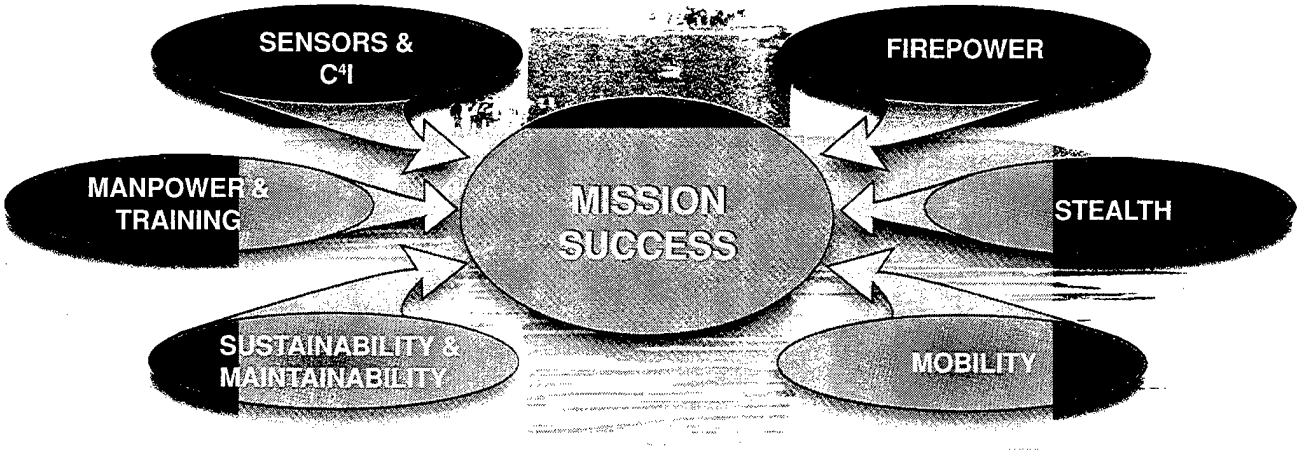
Russia's claim to superpower status rests largely on the maintenance of a strategic nuclear strike capability that will be increasingly vested in its submarine force. For this reason, the Russian leadership has made a commitment to preserve the combat potential of their most modern submarines today. They will design and build an even higher technology force for tomorrow.

While China's current submarine force is not sophisticated, it is acquiring technology from the Russians and other sources to incorporate into its SONG SS and other new designs. This investment will improve the capability of its forces in the future, as a new generation of Chinese-built SSNs and SSBNs join its fleet in the next decade.

Countries like Iran and North Korea have more limited national security goals. They are able to improve the combat effectiveness of their submarine forces with simpler, lower cost technology.



Components of Mission Success



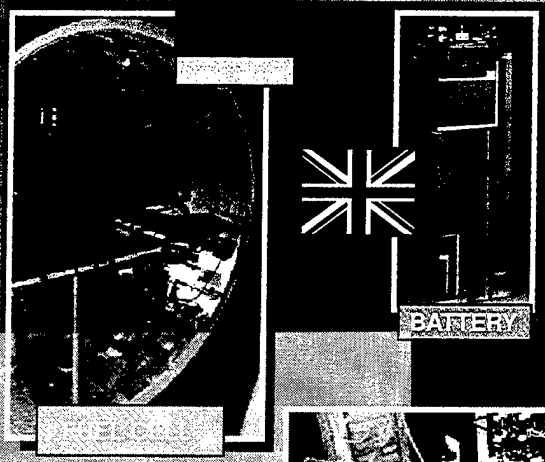
Regardless of where a country may fall on the technology and capability spectrum, if it seeks to improve the combat effectiveness of its submarine force, it must achieve a balance between the components that will improve the chances of mission success, while at the same time remaining within budget. Concentrating on only one component, such as achieving very high levels of stealth, is very expensive, and serious trade-offs would have to be made in the areas of sensors, mobility, and firepower.

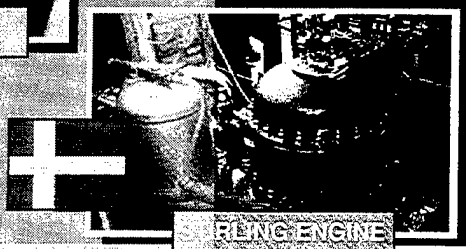
The following technology components must be optimized at an affordable level to maximize mission success:

- **Sensors and C^{4}I (Command, Control, Communications, Computers and Intelligence Information Systems):** Improved sensors, information systems and combat displays can significantly increase the probability of mission success, even for older submarines.
- **Firepower:** A range of submarine-launched weapons is available for sale, from inexpensive explode-in-place mines to advanced submerged-launch antiship cruise missiles.
- **Stealth:** Improvements in quieting and other physical signatures make a submarine less vulnerable to detection.
- **Mobility:** The type of propulsion plant will determine a submarine's maximum speed, its range of operations and its endurance on station.
- **Sustainability and Maintainability:** A country that cannot produce spare parts or conduct periodic maintenance on its submarine force will have problems maintaining operational readiness, and that in turn will degrade its long term chances for mission success.
- **Manpower and Training:** A significant investment in the skill and proficiency of the system operators is required.

Components of Mission Success

MOBILITY



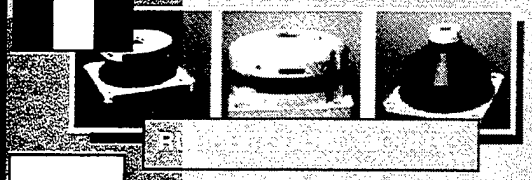


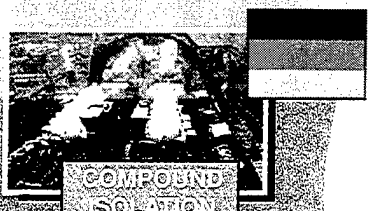
[illegible] to U.S. interests [illegible] sophisticated technologies being developed for Western submarines. Air independent propulsion (AIP) technology is available as an option for conventionally powered submarines. Today's first generation of AIP submarines uses hybrid designs combining diesel engines, batteries, and an AIP system. The AIP system acts as a low capacity battery charger or provides limited power in parallel with the batteries, thereby extending the submarine's submerged endurance.

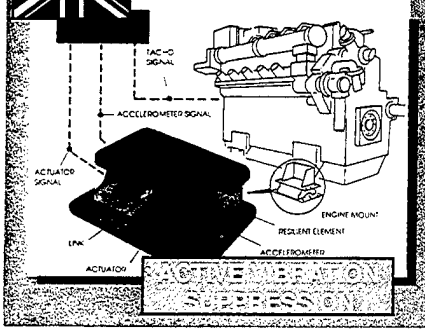
These submarines are able to remain submerged for 2 to 3 weeks at slow speeds. This is a dramatic improvement over the 3- to 4-day submerged endurance characteristic of typical diesel-electric submarines.

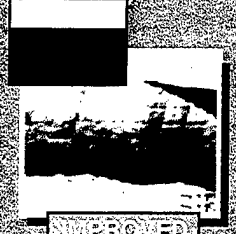
AIP systems in the future may provide conventionally powered submarines with a submerged endurance of 30 days or greater, giving them a significant advantage over other conventional submarines.

STEALTH









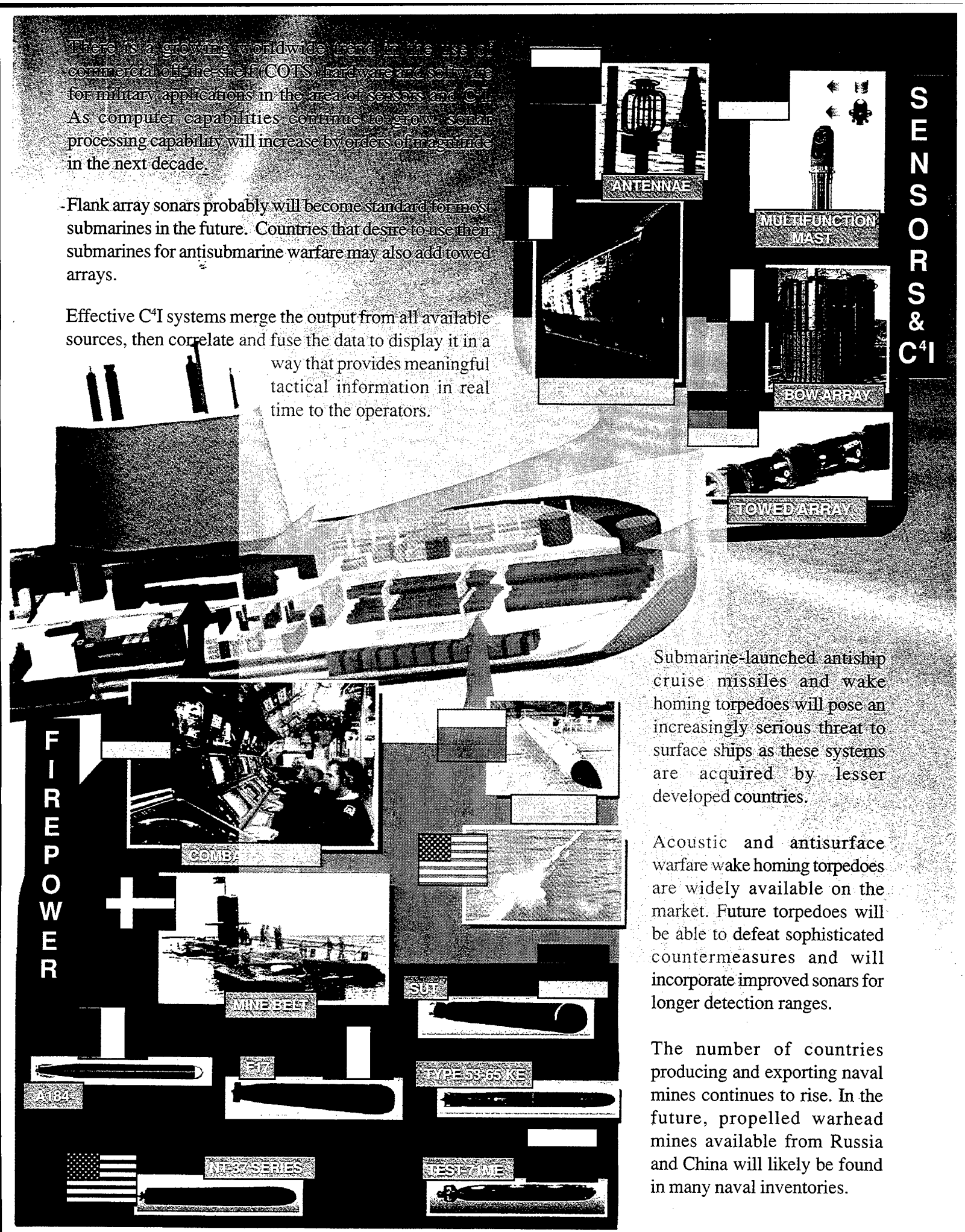
In the area of stealth, advanced quieting technologies available include outer hull acoustic coatings, skewed 7-bladed propellers, and compound machinery isolation using sound mounts. These provide a significant noise reduction.

In the future, these technologies will be widespread. In addition, more quieting can be achieved through the use of pumpjet propulsors, magnetic bearings, improved outer hull coatings, and active machinery vibration suppression.

There is a growing worldwide trend in the use of commercial off-the-shelf (COTS) hardware and software for military applications in the area of sensors and C4I. As computer capabilities continue to grow, sonar processing capability will increase by orders of magnitude in the next decade.

- Flank array sonars probably will become standard for most submarines in the future. Countries that desire to use their submarines for antisubmarine warfare may also add towed arrays.

Effective C4I systems merge the output from all available sources, then correlate and fuse the data to display it in a way that provides meaningful tactical information in real time to the operators.



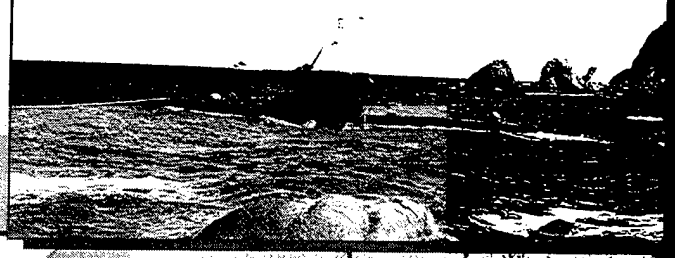
Submarine-launched antiship cruise missiles and wake homing torpedoes will pose an increasingly serious threat to surface ships as these systems are acquired by lesser developed countries.

Acoustic and antisurface warfare wake homing torpedoes are widely available on the market. Future torpedoes will be able to defeat sophisticated countermeasures and will incorporate improved sonars for longer detection ranges.

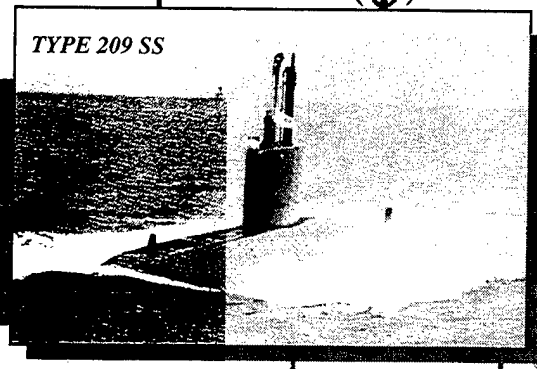
The number of countries producing and exporting naval mines continues to rise. In the future, propelled warhead mines available from Russia and China will likely be found in many naval inventories.

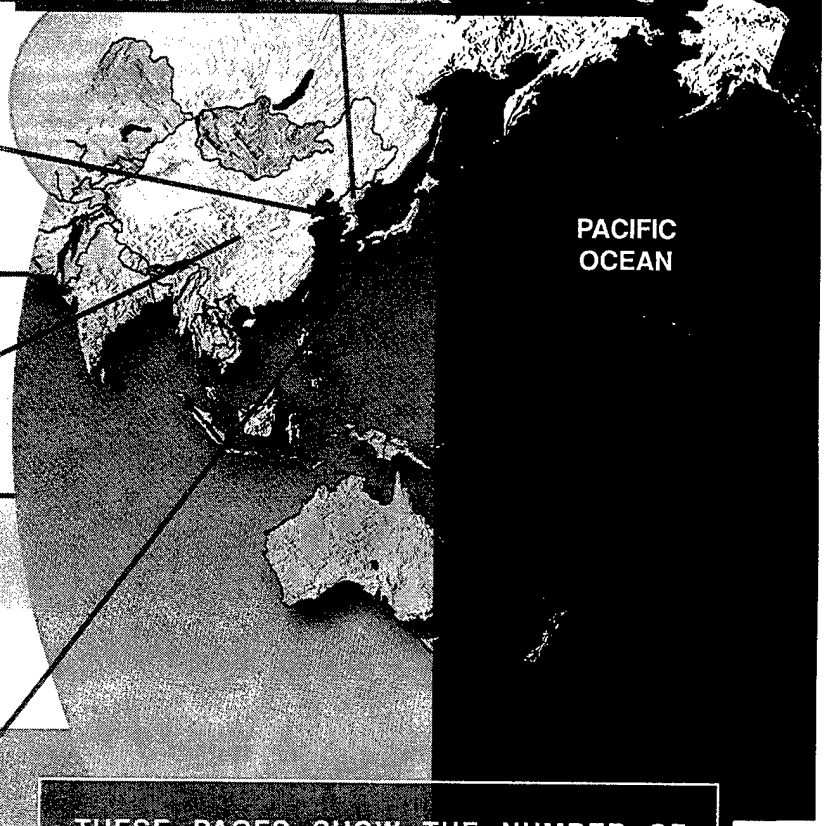
SUBMARINE PRODUCTION 1996

SANGO SSC

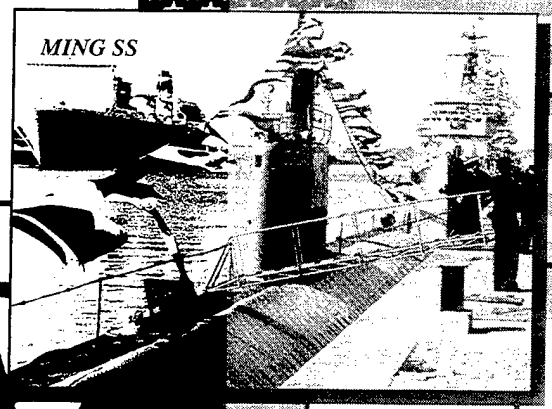


TYPE 209 SS

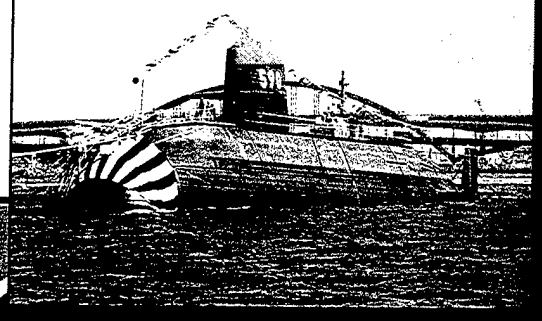




MING SS

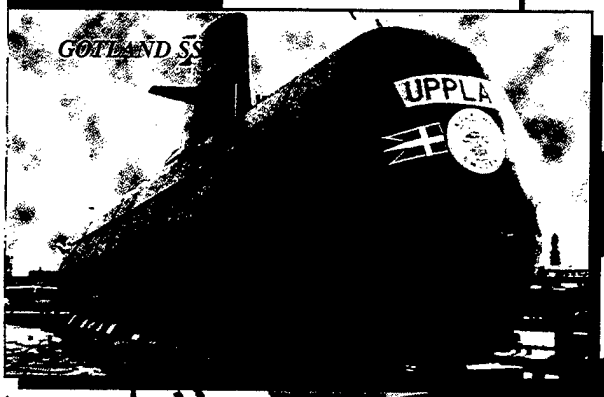


OYASHIO SS

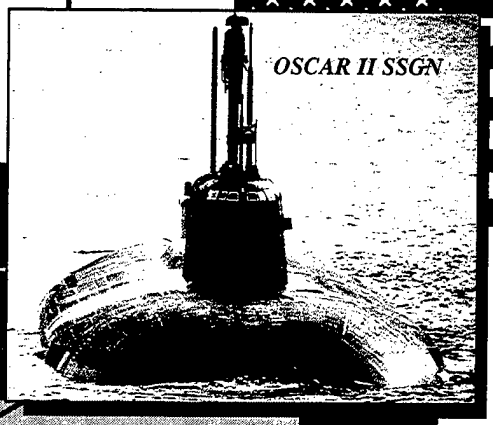


THESE PAGES SHOW THE NUMBER OF COUNTRIES INVOLVED IN SUBMARINE PRODUCTION, AND THE NUMBER AND TYPES OF SUBMARINES CONSTRUCTED.

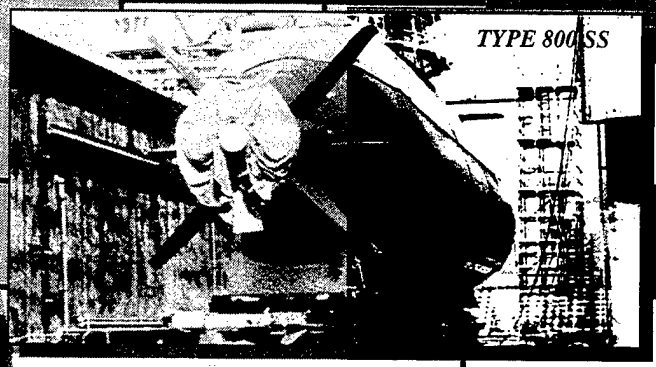
ALTHOUGH THE TOTAL NUMBER OF SUBMARINES BEING ACQUIRED APPEARS SMALL, THESE SUBMARINES PROVIDE WARFIGHTING LEVERAGE DISPROPORTIONATE TO THEIR NUMBER OR COST.



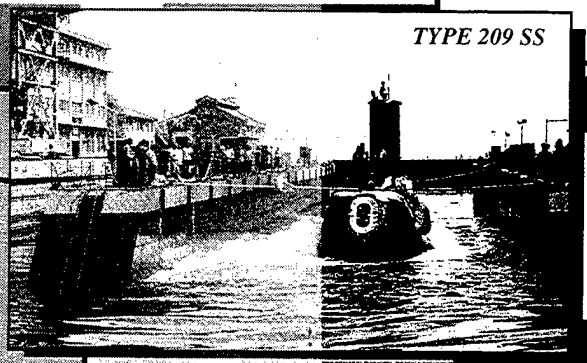
GOTLAND SS



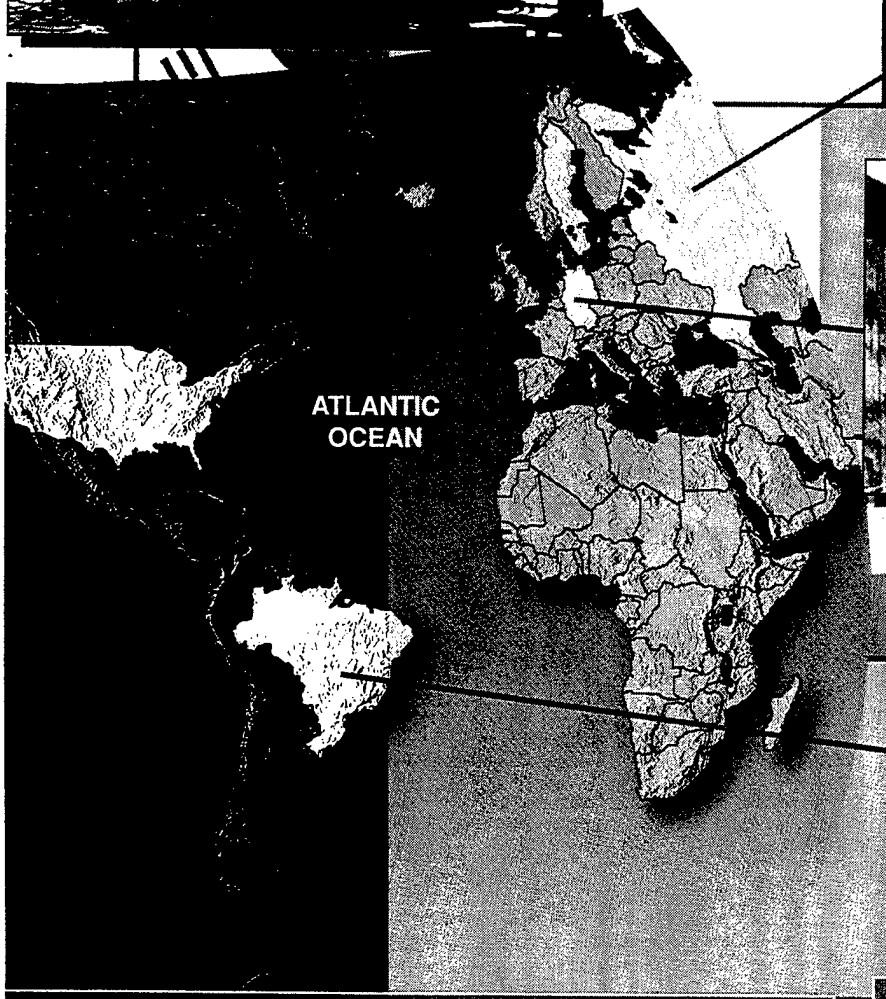
OSCAR II SSGN



TYPE 800 SS



TYPE 209 SS



FOR EXPORT
1996 LAUNCHES & OUTSTANDING CONTRACTS - 9

PRODUCER	NUMBER AND TYPE	STATUS	CUSTOMER
RUSSIA	1 KILO (877) SS	DELIVERED (1/97)	IRAN
GERMANY	1 TYPE 800 SS	LAUNCHED	ISRAEL
RUSSIA	2 KILO (636) SSs	CONTRACTED	CHINA
GERMANY	2 TYPE 800 SSs	CONTRACTED	ISRAEL
FRANCE	3 AGOSTA 90B SSs	CONTRACTED	PAKISTAN

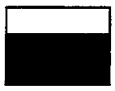
FOR INDIGENOUS USE
1996 LAUNCHES - 11

PRODUCER	NUMBER	TYPE
SOUTH KOREA	1	TYPE 209 SS
CHINA	1	MING SS
SWEDEN	2	GOTLAND SSs
NORTH KOREA	3	SANGO SSCs
RUSSIA	1	OSCAR II SSGN
BRAZIL	1	TYPE 209 SS
UNITED STATES	1	TRIDENT SSBN
JAPAN	1	OYASHIO SS

WORLDWIDE SUBMARINE CHALLENGES

Many countries are making submarines and their sophisticated subsystem components readily available on the international arms market. Since this sophisticated technology is expensive, the general trend is toward fewer, more capable submarines in the world's oceans tomorrow.

There are several countries whose submarine programs compose today's challenge triangle. The high technology challenge will continue to come from **Russia's** submarine force. Russia is taking steps necessary to prepare for the future. **China** continues to invest to ensure it will have a capable submarine force in the coming decades. Finally, there is the challenge of submarine forces of nations that are openly critical of U.S. policy, such as **Iran** and **North Korea**. The significance of new submarine acquisition by these and other **countries of concern** is not lost on neighboring countries or the United States.



Russia: Preparing for the Future. In spite of today's economic difficulties, Russia continues to maintain a high-technology submarine force, while planning to field an even more capable force tomorrow. This past year, the Russians announced that they are building a new class of ballistic missile submarines, named BOREY (Arctic Wind). Construction of their next generation SSN, the SEVERODVINSK Class, continues (albeit slowly), and forward deployments of their extremely quiet Improved AKULA I SSN and OSCAR II SSGN Class submarines were conducted again in 1996.

China: Investing for the Future. China is integrating the first two KILO Class diesel submarines, acquired from Russia, into its naval order of battle. Two more KILOs of a more advanced design are being constructed in St. Petersburg and will be delivered in the near future. Construction of SONG Class diesel submarines continues at Wuhan Shipyard, while the first SONG SS is conducting acceptance trials with the navy. Technologies acquired from Russia and on the international arms market are expected to be incorporated into new designs of Chinese nuclear and conventional-powered submarines to be built early in the next decade.

North Korea and Iran: Countries of Concern. The failed infiltration attempt by North Korean Special Operations Forces from a SANGO SSC in September 1996 highlights one of the threats to Allied forces posed by North Korean submarines. North Korea continues to produce SANGO SSCs in large numbers. The SANGO SSCs could supplement North Korea's ROMEO and WHISKEY diesel attack submarines in posing a significant threat to Allied maritime operations near the Korean peninsula. Iran's acquisition of a third KILO SS from Russia, just like Units 1 and 2, could pose a threat to ships transiting the strategic Strait of Hormuz, and will keep Western attention focused on the capabilities of the developing Iranian submarine force well into the next century.

RUSSIA: PREPARING FOR THE FUTURE— NATIONAL GOALS

CHALLENGES

"Russia has always been a great sea power and always will be. This is an objective and historical necessity. The geo-strategic position of Russia obliges us to have a modern and well-equipped fleet."

Igor Rodionov
Russian Minister of Defense

The Russian submarine force continues to set the most competitive technology pace for U.S. submarines and antisubmarine warfare (ASW) forces. Sophisticated propulsion, quieting, and weapon systems are at sea now and are being incorporated into new construction submarines.

This technology ensures Russia's submarines are prepared for the future and will be an essential front line force in executing core naval missions:

- **Strategic Deterrence:** Russia depends more heavily today than before on its strategic nuclear forces to provide for its security. At the same time, arms control agreements are putting an increased percentage of nuclear warheads on ballistic missile submarines (SSBNs).

- **Pro-SSBN Operations:** With an ever-increasing share of their nuclear deterrent force at sea, protection of these SSBNs takes on increased importance and requires sophisticated nuclear and diesel-powered general purpose submarines (SSNs/SSGNs/SSs) to do the job.

- **Aerospace Defense:** The Russians view SSNs and SSGNs as their front line force in "aerospace defense." Beyond their potential mission to prosecute enemy SSBNs, these general purpose submarines contribute to aerospace defense by countering enemy aircraft carriers and other warships capable of launching land-attack cruise missiles.

- **Anti-assault Defense:** Having fought invading armies on home soil many times in its history, Russia places a continuing emphasis on defeating invasion from the sea. Submarines, particularly SSGNs and SSs, have a central role in Russia's anti-invasion plans.

"The navy's main task is deterrence, nuclear deterrence, which it manages to carry out despite obvious difficulties."

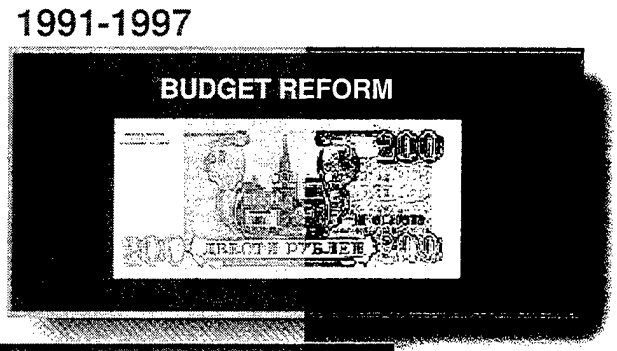
Fleet Admiral Felix Gromov
Commander in Chief
Russian Navy

RUSSIA: FORCE MANAGEMENT

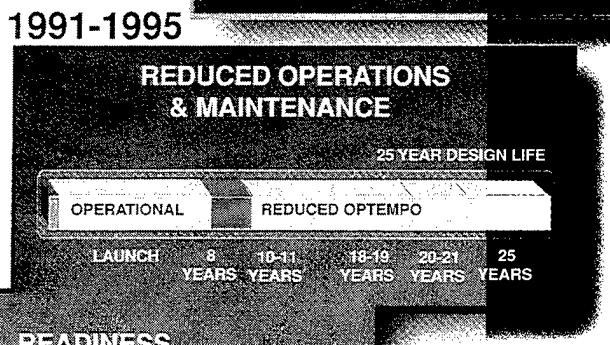
CHALLENGES

Before focusing on missions and operations, it is necessary to review the hard decisions Russia's naval leadership made when faced with significant defense spending cuts in the early 1990s. The primary goals were to minimize the effect of the cuts on the combat potential of the current force, while at the same time laying the groundwork for a more capable force in the future.

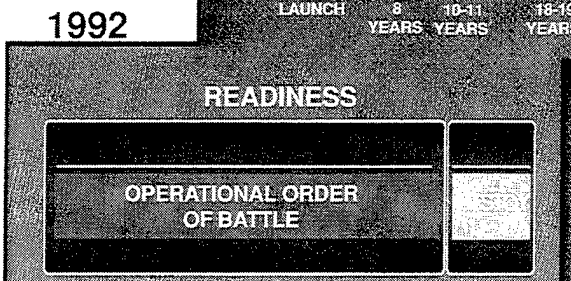
As the first step, the Russians decided which submarines were the most capable. The newest submarines got priority for maintenance, manning and operational funding. The intent was to focus limited resources on the most combat effective portion of the submarine force.



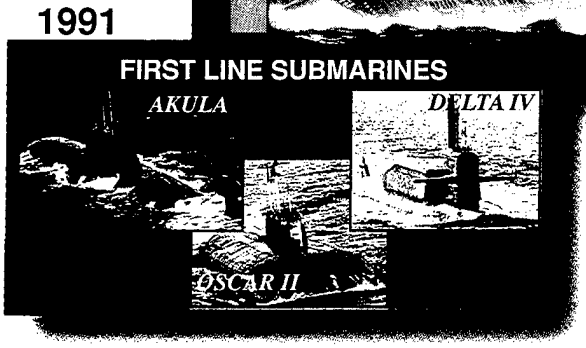
The second step was to retire those submarines that were not front line units. These submarines were taken out of service when they required major maintenance, even if they had not reached the end of their design lives.



To accommodate its newly retired units, the navy modified its readiness system and created a new category, "OTSTOY," for submarines awaiting funds for overhaul, conversion or scrapping.



Throughout this period the navy reduced the operating tempo of all nuclear submarines. This yielded substantial savings by lengthening the interval between, or eliminating the need for, submarine refuelings.



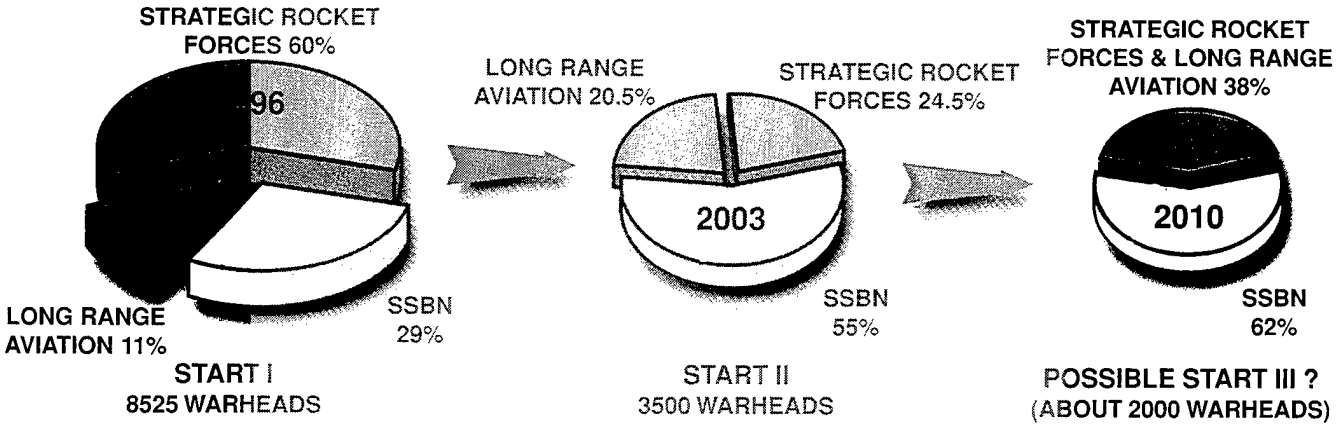
Budget reform continues, although its outcome remains uncertain. The Russian Navy's focus is now on maintaining its most modern submarines, while continuing next generation construction programs. Ultimately, the Russian submarine force will be much smaller, but individual units will be far more capable. The culling of the older, less effective units will make the submarine fleet newer, more capable, and less maintenance intensive.

RUSSIA: MISSIONS AND OPERATIONS—STRATEGIC FORCES

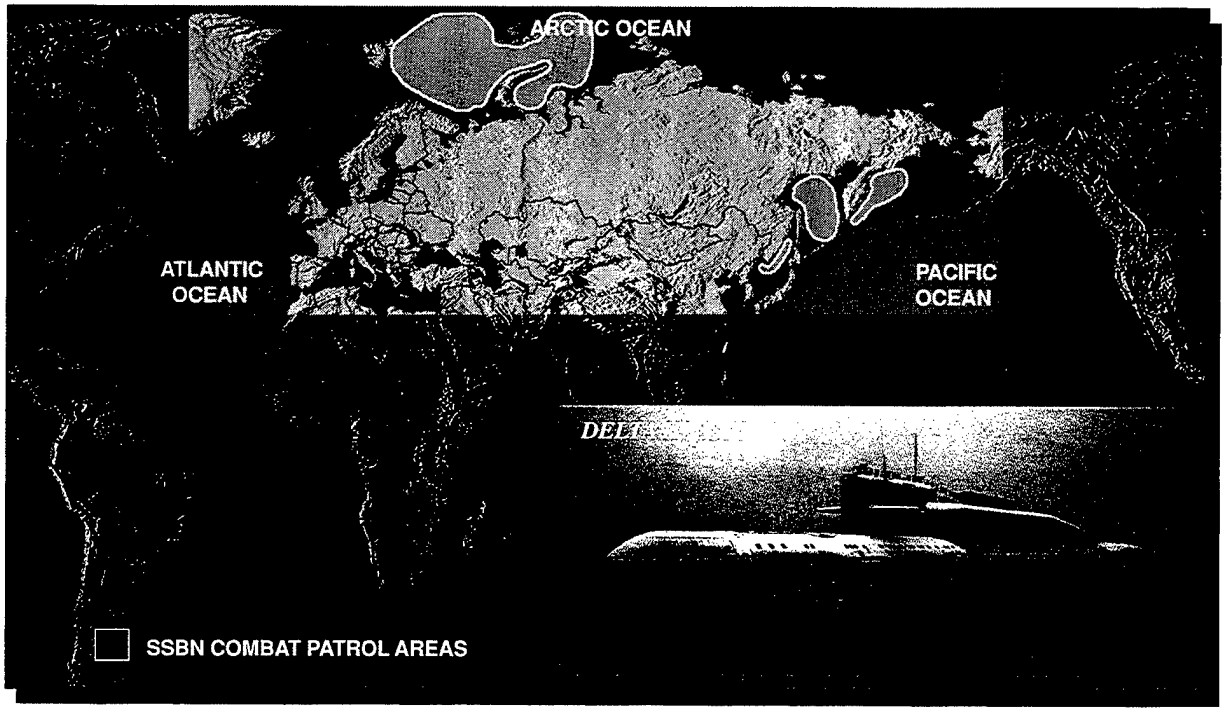
CHALLENGES

Strategic nuclear forces receive top priority when it comes to allocating Russia's limited defense funds. Russian Defense Minister Igor Rodionov recently stated that only the Strategic Rocket Forces and the Navy's strategic nuclear units are capable of accomplishing their missions. The Russian Navy's contribution to nuclear deterrence is vested in its strategic submarine (SSBN) force. This force currently plays a key role in maintaining Russia's deterrent posture, and it will carry an increased share of Russia's nuclear warheads in coming years. The START II Treaty, if ratified, will reduce the number of Russian nuclear warheads from 8,500 to no more than 3,000-3,500 by 2003. Over half of these remaining warheads would be based on SSBNs. Additional reductions in nuclear warheads may only serve to further increase the relative importance of the Russian SSBN force.

RUSSIAN SUBMARINES' INCREASING STRATEGIC ROLE



MAINTAINING STRATEGIC MISSION PROFICIENCY



RUSSIA: MISSIONS AND OPERATIONS— GENERAL PURPOSE FORCES

Russia's maritime strategy requires a strong navy capable of protecting its strategic forces at sea and defending its shores from maritime threats. Despite having gone through one of the most difficult periods in its history, the Russian general purpose submarine force continues to conduct operational training and maintain its mission proficiency. Admiral Oleg Yerofeyev, the Northern Fleet Commander, recently outlined the missions of Russia's general purpose forces:

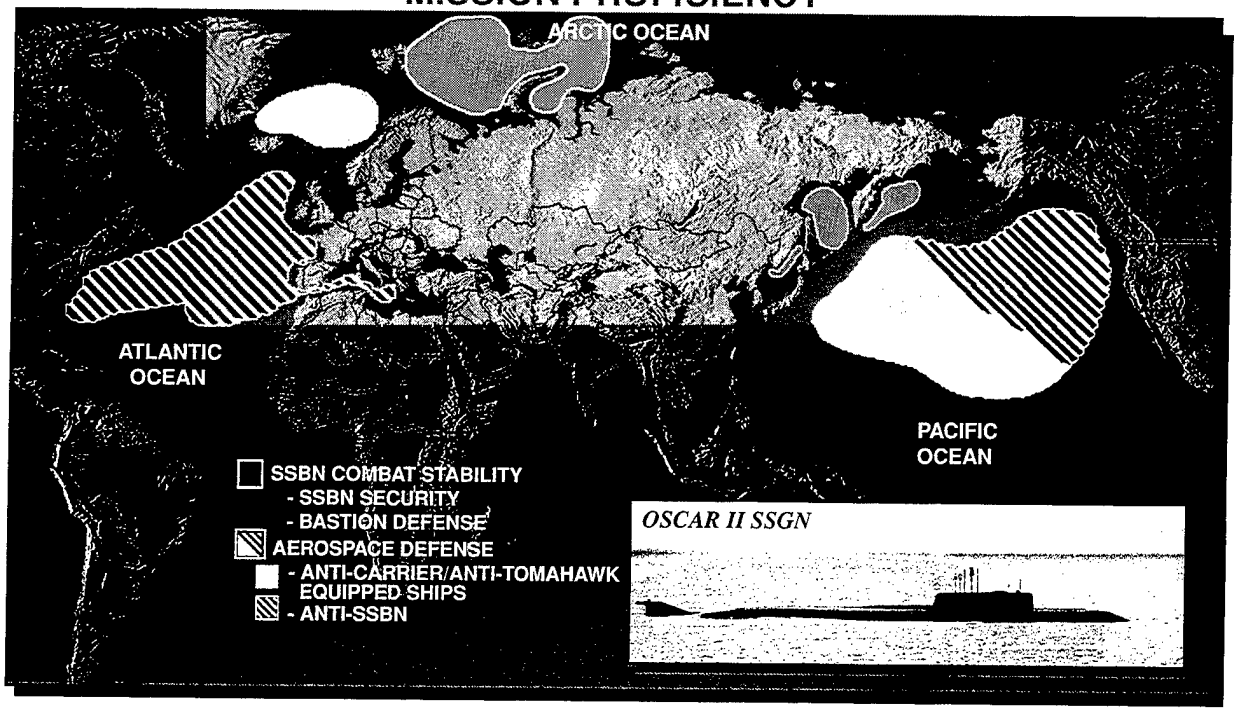
Admiral Yerofeyev
Commander of the
Northern Fleet

- **"Support the combat endurance of the SSBN"**
  - Protect the strategic missile submarine force by defending individual units on patrol and creating a bastion defense of the SSBN operating areas.

- **"Repulsing strikes . . . in conjunction with air defense units of the ground forces."**
  - Find and destroy enemy ballistic missile submarines before they can launch an attack against Russia.
  - Sink enemy aircraft carriers and land-attack cruise missile platforms before they come within range of their targets.

- **"Anti-assault Defense"**
  - Maintain local sea superiority and destroy enemy amphibious forces at sea.

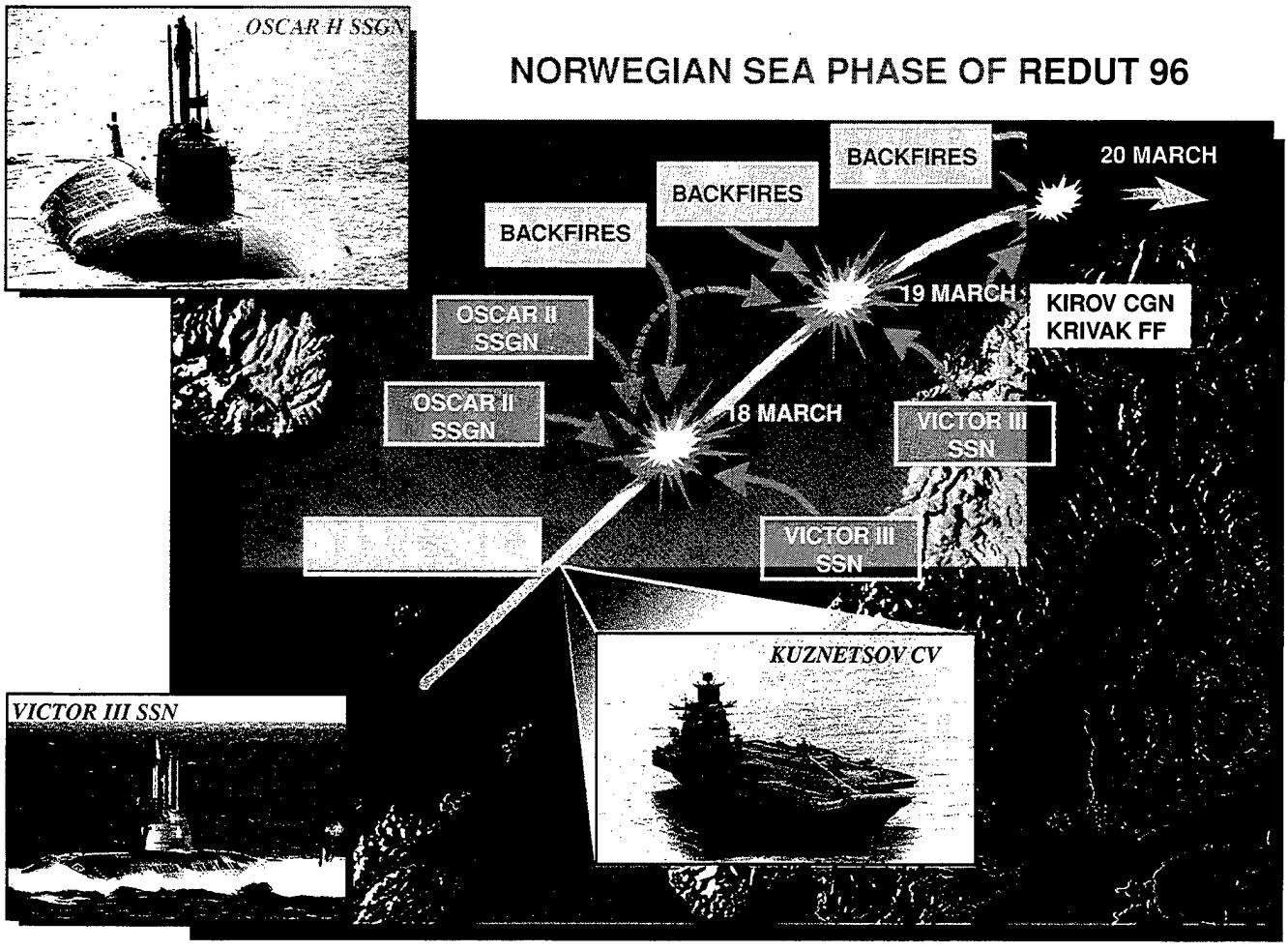
MAINTAINING GENERAL PURPOSE FORCES MISSION PROFICIENCY



RUSSIA: MAJOR EXERCISE "REDUT 96" CHALLENGES

Despite ongoing budget shortfalls, the Russian Navy still retains significant conventional open ocean strike capabilities. This was demonstrated in dramatic fashion in March 1996 when the Northern Fleet conducted the largest naval exercise since the dissolution of the Soviet Union. The exercise included 13 submarines, 16 surface combatants, and over 40 aircraft. The Russians used the aircraft carrier KUZNETSOV, returning to the Barents Sea from a Mediterranean deployment, to simulate a hostile naval task force entering strike range of the Russian homeland. Over 3 successive days, Northern Fleet submarines, bombers, and surface combatants responded by simulating closely coordinated multi-axis attacks designed to overwhelm the hostile carrier battlegroup defenses.

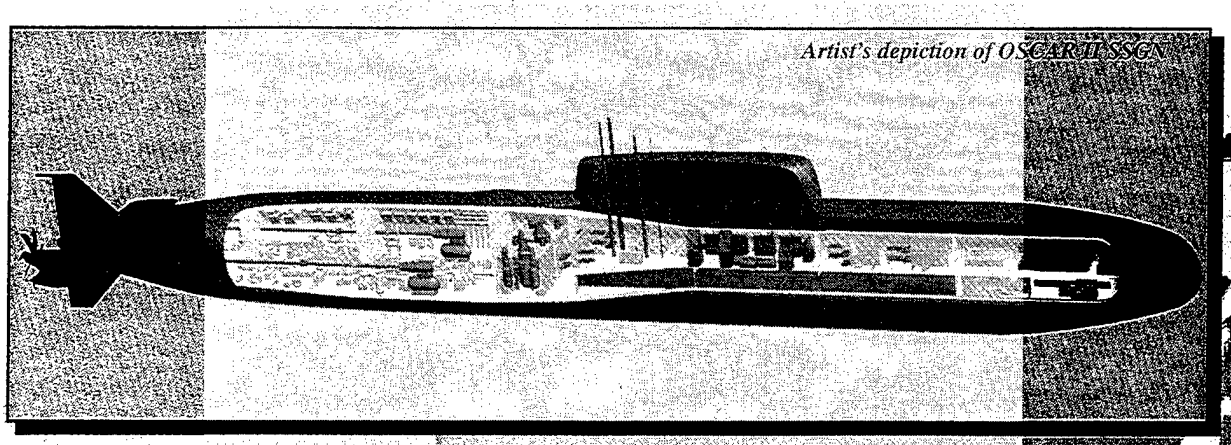
This exercise confirmed that the basic Russian maritime defense strategy—deploying multiple layers of combatants beginning at distances out to maximum foreign naval air force strike range of the homeland—remains little changed from the Soviet era. Because of perceived vulnerabilities to their air and surface forces, the Russians continue to view nuclear submarines as playing by far the most important role in this strategy. They assess that the covertness, firepower and increased survivability of classes such as the OSCAR IIs and late-model VICTOR IIIs allow them to operate for extended periods well beyond the protection of Russian land-based fighter cover. At these distances, they can effectively challenge task forces outside cruise missile and carrier aviation strike range of the Russian homeland.



RUSSIA: GENERAL PURPOSE FORCE CONSTRUCTION—THIRD GENERATION

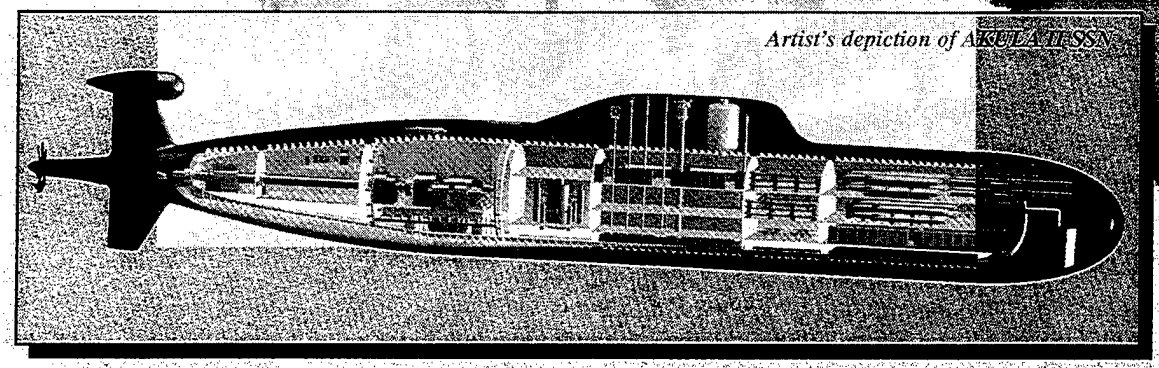
CHALLENGES

The final units of third generation cruise missile and attack submarines are still under construction in Russian shipyards. The OSCAR II SSGNs and Improved AKULA SSNs are the mainstay of the Russian general purpose submarine fleet. Units of these classes deployed near U.S. and allied operating areas in 1996 for the third consecutive year.



Artist's depiction of OSCAR II SSGN

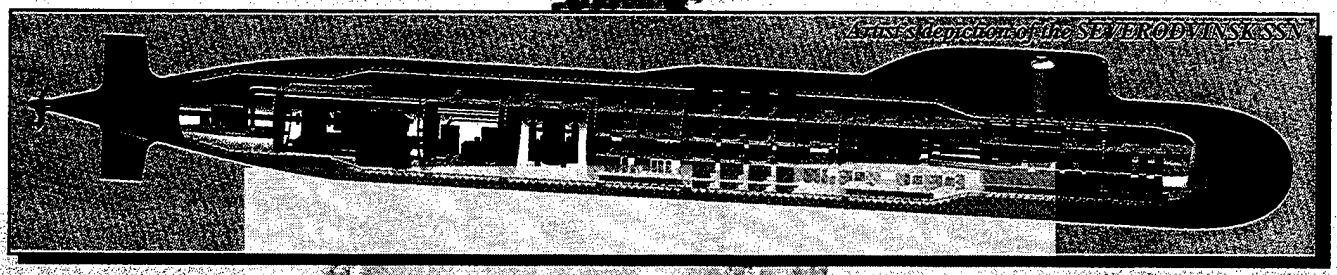
The OSCAR II SSGN carries 24 SS-N-19 subsurface-launched antiship cruise missiles with a range of 300 nautical miles. Despite displacing 18,000 tons submerged, the OSCAR II still has a top speed of over 30 knots. The eleventh unit of the OSCAR II SSGN Class, "TOMSK," was rolled out of its construction hall at Severodvinsk Shipyard on July 18, 1996. Construction of the "TOMSK" was hampered by irregular material and component deliveries. Nevertheless, the rollout did occur amid great fanfare as the Russian Navy celebrated its 300th Anniversary. A twelfth and final unit of the OSCAR II Class is estimated to be under construction at Severodvinsk Shipyard.



Artist's depiction of AKULA II SSN

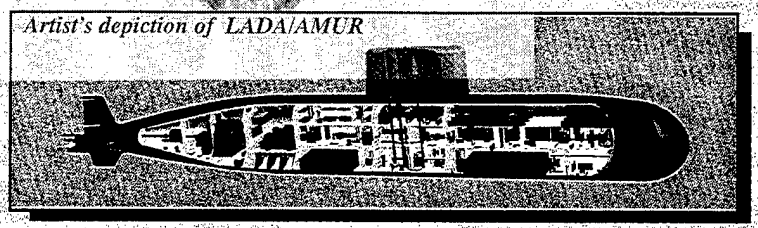
AKULA I/II SSNs are capable of firing the SS-N-21 land attack cruise missile and a variety of torpedoes and antisubmarine missiles. The first unit of the new AKULA II Class SSN was launched from Severodvinsk Shipyard in December 1994. The AKULA II is longer than the previous 12 hulls and incorporates additional fourth generation quieting technologies. AKULA production continues at two shipyards.

RUSSIA: GENERAL PURPOSE FORCE CONSTRUCTION—FOURTH GENERATION CHALLENGES


Artist's depiction of the SEVERODVINSK SSN

The SEVERODVINSK represents the Russian Navy's continued pursuit of quieter and more capable submarines. The SEVERODVINSK SSN is Russia's first true multipurpose submarine. Equipped with vertical launch tubes aft of the sail, this platform will be able to put to sea with a myriad of weapons to include land attack cruise missiles, ASW missiles, and ASUW missiles. This number and variety of weapons will allow the SEVERODVINSK SSN to assume the roles of and replace both the OSCAR SSGN and the AKULA SSN in Russia's future order of battle. Another new design feature incorporated into the SEVERODVINSK SSN is the placement of the torpedo room amidships. This new placement allows a large spherical sonar to be placed in the bow, thereby maximizing the sensor's performance. Fourth Generation quieting technologies were designed specifically for the SEVERODVINSK SSN to ensure its radiated noise levels are even lower than those of the AKULA II SSN.

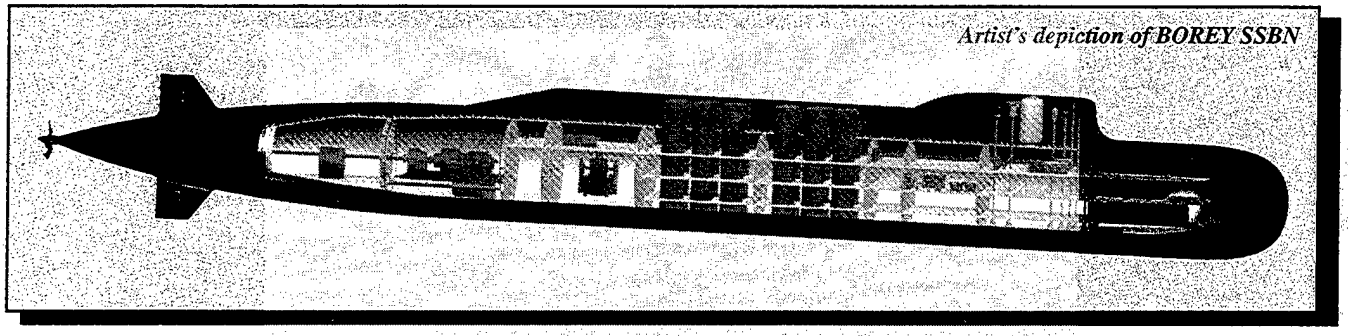
The first SEVERODVINSK SSN was laid down in a publicized ceremony at Severodvinsk Shipyard in late 1993. Construction continues at a slower pace than originally planned due to funding problems. Rollout and launch are not expected until 1999-2000.


Artist's depiction of LADA/AMUR

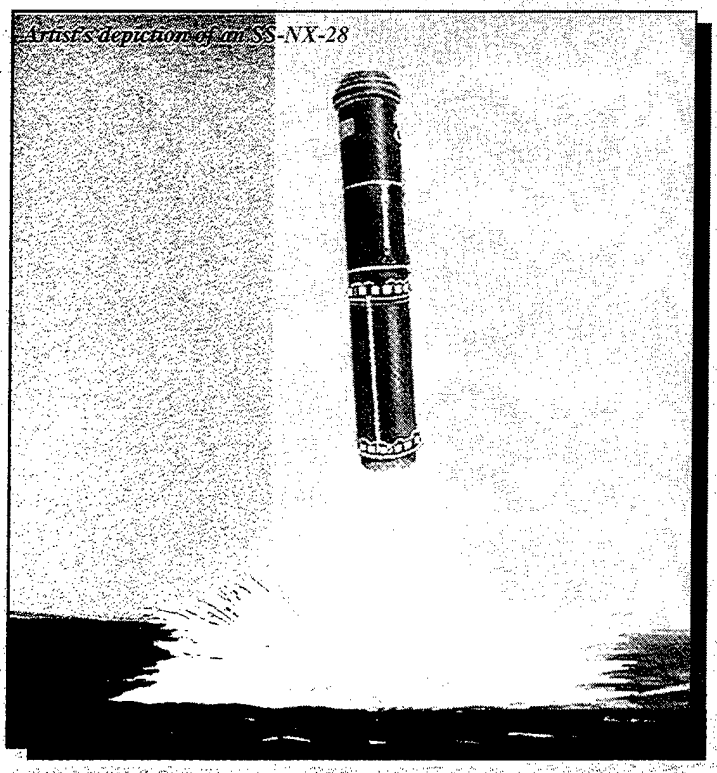
Reports from Russia indicate that, despite economic difficulties, work has begun on the first unit of the fourth generation diesel electric submarine (LADA SS). Versions of this submarine are being offered for export under the name AMUR SS. The first unit is expected to take 4 or 5 years to complete and incorporates the quieting lessons learned from the latest KILO SS design (Project 636). It will feature anechoic coating on the outer hull and a skewed 7-bladed propeller. This design is being offered on the open market in a range of sizes, including an option that incorporates Air Independent Propulsion (AIP).

RUSSIA: SSBN FORCE CONSTRUCTION—FOURTH GENERATION

As part of Russia's effort to modernize its strategic systems, the navy has begun construction of a new fourth generation ballistic missile submarine. The new SSBN project, referred to as BOREY (Arctic Wind), was approved for construction by presidential decree in 1995. The lead unit was laid down on November 2, 1996 at Severodvinsk Shipyard.



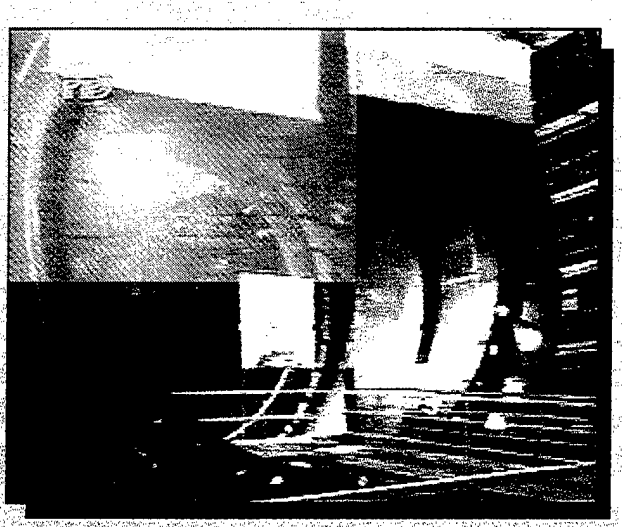
Artist's depiction of BOREY SSBN



Artist's depiction of an SS-NX-28

The BOREY will be fitted with a new ballistic missile, probably the SS-NX-28. This missile is currently undergoing land-based research and development flight testing. It is assessed the BOREY will carry at least 12 strategic missiles.

Funding for this program is crucial if the Russian Navy is to achieve its stated goal of launching the first BOREY by 2002, and constructing an additional unit each year thereafter. The cost will likely run into the trillions of rubles, but recent announcements have demonstrated a national commitment to this program. If funding is continued, the first ship of the class will reach initial operational capability in 2004.

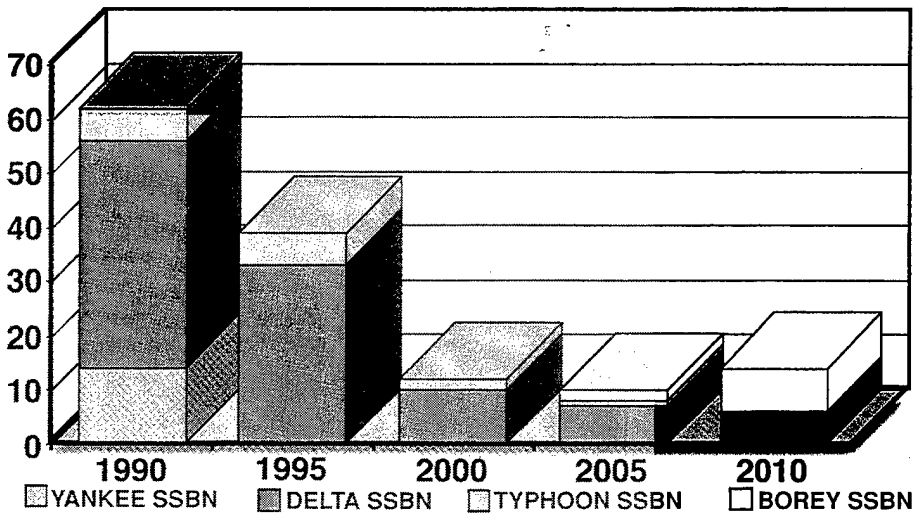


Keel laying of BOREY SSBN from Russian television

RUSSIA: SUBMARINE FORCE COMPOSITION

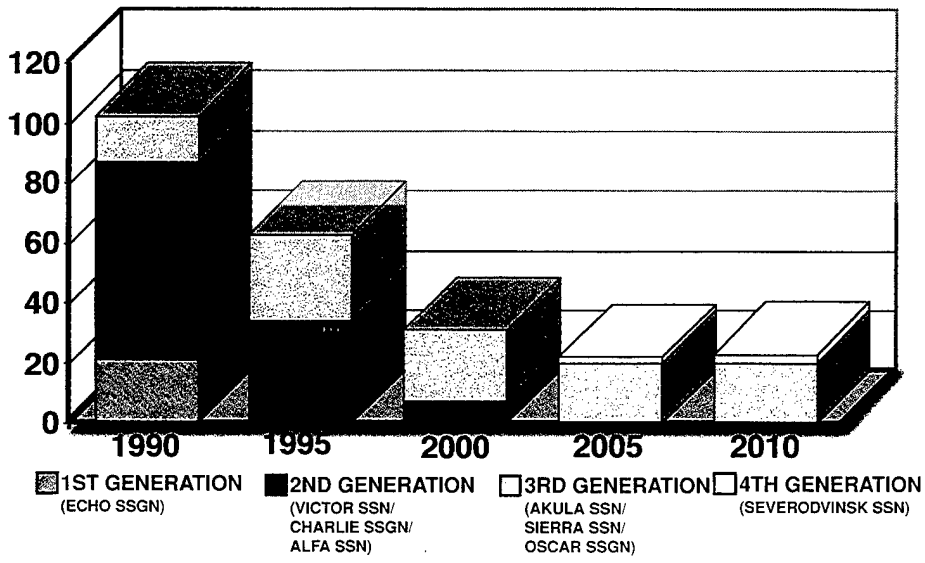
There is no debate about the importance of submarines in Russian military strategy. They are Russia's most powerful, most flexible, and least vulnerable ships. This explains the continued emphasis on constructing and maintaining the newest and most capable units, even at the expense of surface units, naval air assets and older submarines.

STRATEGIC SUBMARINE FORCE LEVELS



Despite downsizing the submarine force, the Russians are maintaining proficiency in their vital mission areas. In the national role of strategic deterrence, they deploy ballistic missile submarines on patrol and are defending them in their bastion areas. In a conventional defense role, front line cruise missile and attack submarines continue to make deployments out of their local operating areas to practice their wartime missions against foreign naval forces. The Russian General Staff demonstrated in REDUT '96 the ability to deploy large numbers of forces to defend against an attacking naval force.

GENERAL PURPOSE NUCLEAR SUBMARINE FORCE LEVELS



The Russian Navy will provide the bulk of Russia's nuclear deterrent for the foreseeable future. The need to protect this force will ensure the maintenance of a capable general purpose submarine force. This submarine force will get smaller, with fewer types and classes than before. This will improve the overall maintainability of the force and individual units, and their weapons will be of the highest quality.

CHINA: INVESTING FOR THE FUTURE—NATIONAL GOALS

CHALLENGES

"The Chinese Navy should exert effective control of the seas within the first island chain. Offshore should not be interpreted as coastal as we used to know it. Offshore is a concept relative to the high seas. It means the vast sea waters within the second island chain."

General Liu Huaqing

China is investing in its submarine technology base with an eye toward building a force capable of carrying out its national defense goals.

The effectiveness of modern long-range land-attack cruise missiles has convinced the Chinese leadership that the first line of China's maritime defense must be moved hundreds of miles out to sea. Extending China's maritime influence out to the second island chain is a goal toward which the Chinese Navy continues to work, acquiring modern weapon systems as it transforms itself from a coastal defense navy to a force capable of sustained open ocean operations. The Chinese defense budget has continued to grow since 1987 to support acquisition of this new more capable force.

The role of the Chinese submarine force is evolving as its operations move farther from the coast. The Chinese have assigned priorities to their mission areas as follows, beginning with the most immediate goal, and ending with the longest term goal:

- **Safeguard** China's territorial integrity and national unity: This includes China's claim over Taiwan and portions of the Spratly Islands.
- **Conduct** a possible blockade of Taiwan: If called upon, submarines would provide essential support to joint operations aimed at accomplishing reunification by force.
- **Defeat** an invasion: China's submarines will play a vital role in establishing blue-water presence capable of defending China's first line of defense.
- **Have** a survivable nuclear retaliatory forces: This is one of China's long range strategic goals.

"The development of nuclear powered submarines is the chief objective of this century."

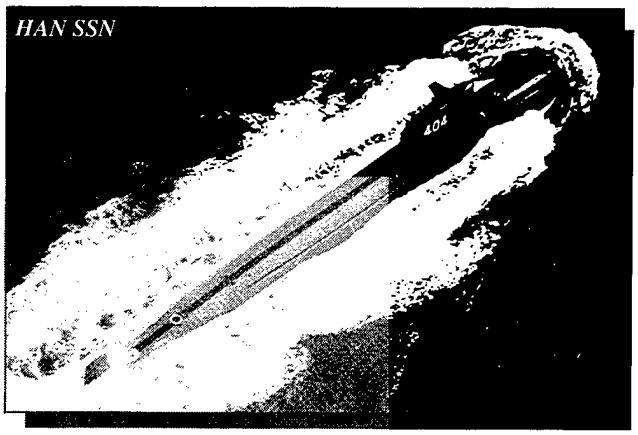
Admiral Zhang Lianzhoung
Former Chief of the Naval Command

CHINA: OPERATIONS

Most PRC submarine operations are conducted in the vicinity of their home bases, usually within 20 nautical miles of the coast. Each of the three fleets has designated areas for these operations.

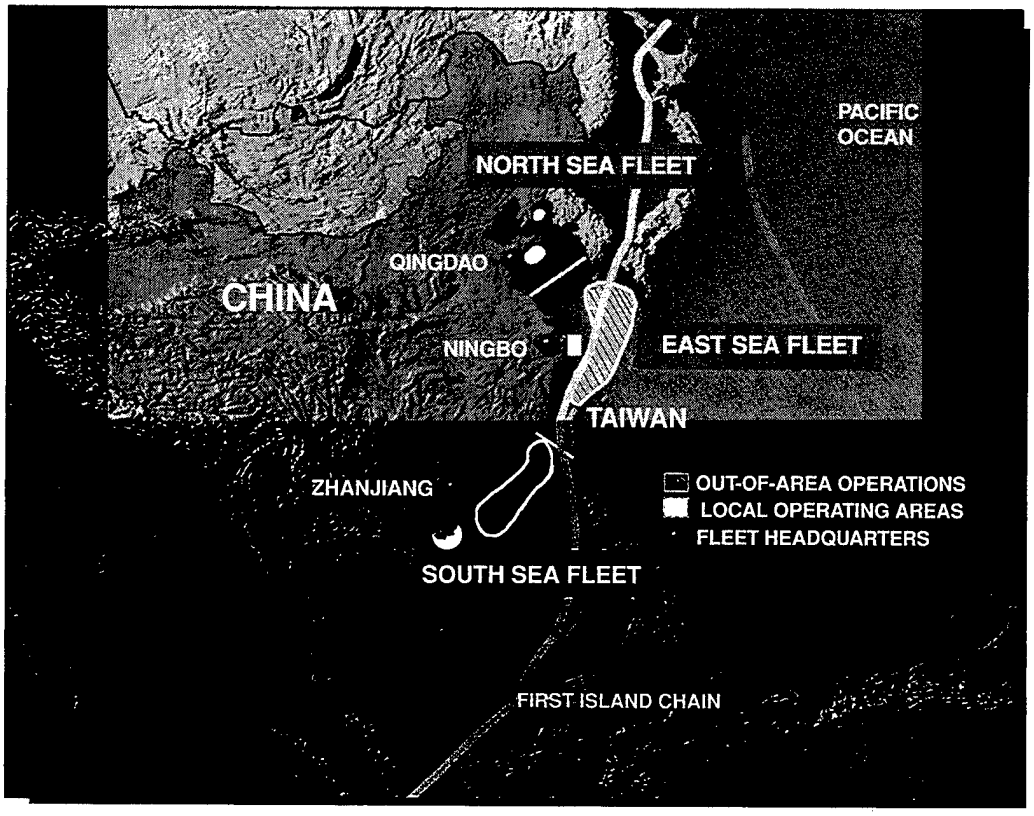
Out-of-area operations are conducted in the outer reaches of the East China Sea and in the area of the Taiwan Strait. These operations demonstrate the submarine force's contribution to the two primary objectives—control of the seas inside the first island chain and support to the national objective of the reunification of Taiwan with China.

Submarines will have an increasing role in China's deterrence strategy. Should war involving China break out in East Asia, China's nuclear-powered attack submarines would conduct merchant blockade missions and operations against surface warships. Its large diesel submarine force would be tasked with inserting special operations troops, covert mining, and merchant blockade missions.



An exercise involving some of these missions occurred during March 1996 in the Taiwan Strait. This exercise was timed to occur just before the national election in Taiwan. One of the two KILO SSs recently acquired from Russia participated in this exercise. Other participants included the HAN SSN shown above and a ROMEO SS.

CHINESE SUBMARINE OPERATING AREAS



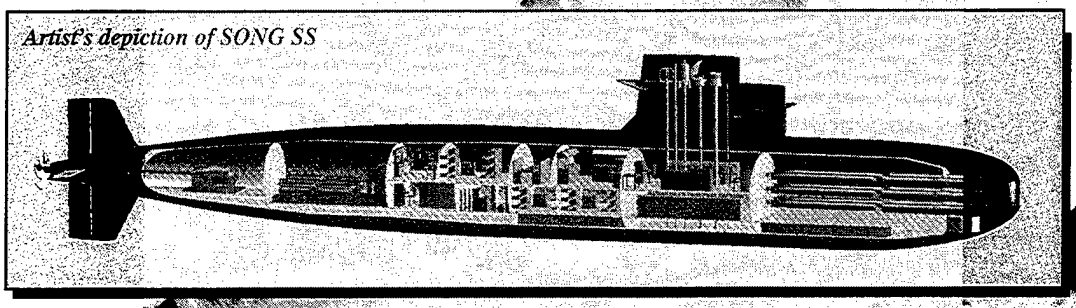
CHINA: GENERAL PURPOSE FORCE CONSTRUCTION AND ACQUISITION

CHALLENGES

China's current large force of aging ROMEO and MING diesel submarines is not capable of supporting the country's long term regional aspirations. To remedy this, China has embarked upon a modernization program to upgrade its submarine fleet with indigenously produced SONG SS diesel-electric submarines and the new construction KILO SSs acquired from Russia.

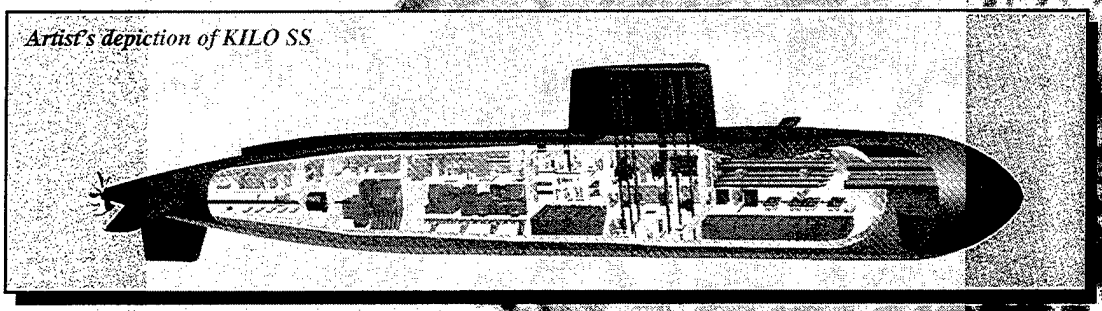
While conventional submarines do not have the global range of nuclear-powered submarines, they can be used to enforce China's claims to Taiwan and the Spratly Islands.

Artist's depiction of SONG SS



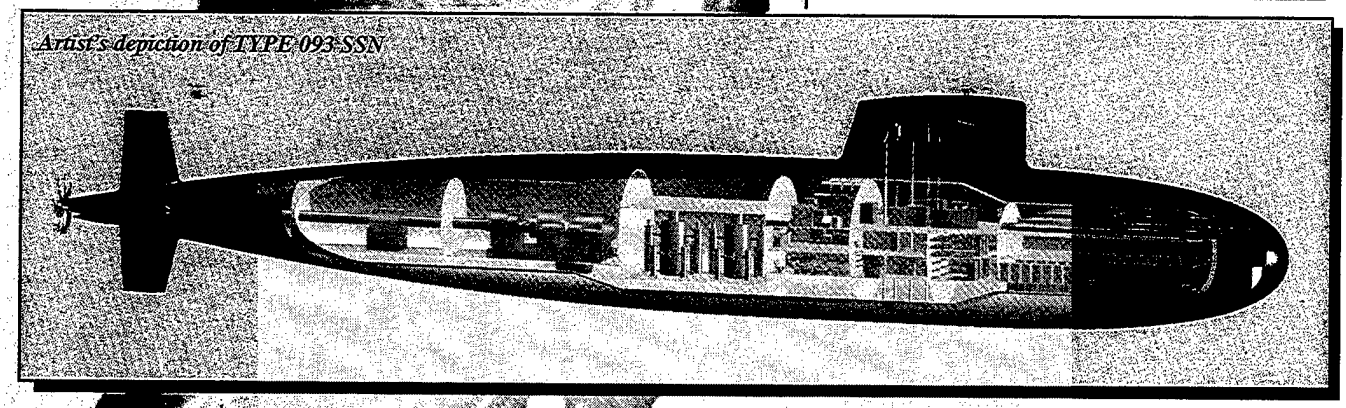
The SONG SS is China's first new design diesel-electric submarine in 23 years. It was launched from China's Wuhan Shipyard in 1994 and is currently undergoing sea trials. The SONG SS incorporates a more hydrodynamically efficient hull form, a single shaft, and a highly skewed 7-bladed propeller. It is expected to be the first Chinese submarine capable of firing a submerged-launch antiship cruise missile. Additional units of this new class are expected.

Artist's depiction of KILO SS



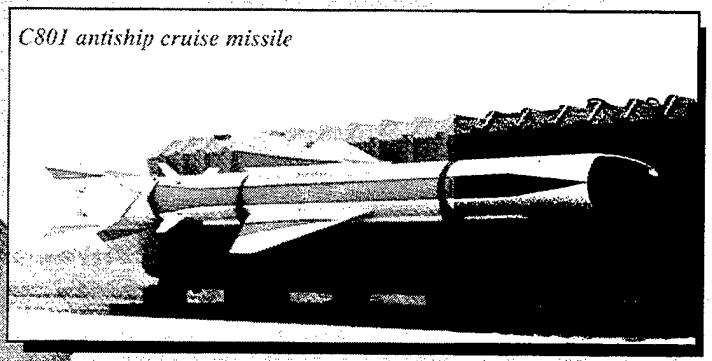
The third of four Russian KILO diesel s[illegible] launched in St. Petersburg, Russia, and sho[illegible] fourth a[illegible] final unit is expected to be delivered in 1998. The[illegible]e an upgraded variant of the KILO design known as Project 636. This upgraded KILO is one of the quietest diesel submarines in the world. The Project 636 Class previously has not been exported, and to date has only seen service with the Russian Navy. The acquisition of these improved KILOs will provide the Chinese technological improvements in the areas of sonar design and quieting. In addition, KILOs are exported with a weapons package that includes both wake-homing and wire-guided acoustic homing torpedoes.

CHINA: GENERAL PURPOSE FORCE CONSTRUCTION



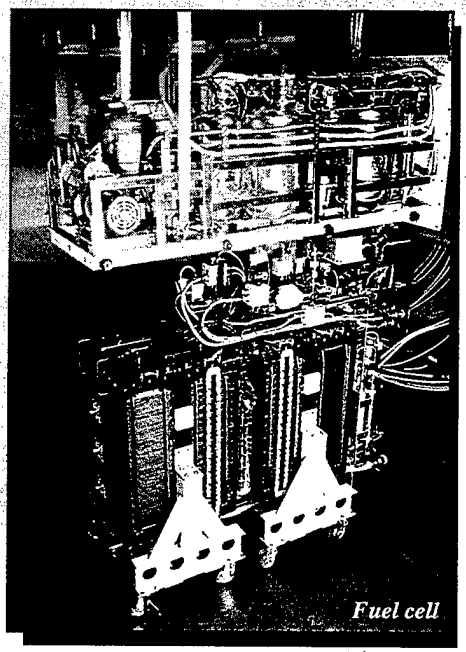
Artist's depiction of TYPE 093 SSN

Nuclear submarines are an important symbol of China's status as a regional power. The Chinese operate five HAN SSNs and are designing a new SSN for construction in the next century. This TYPE 093 SSN will be a multipurpose nuclear attack submarine with quieting, weapons, and sensor systems improved over those currently deployed on HAN SSNs. The TYPE 093 will be comparable to Russian second generation designs from the late 1970s, such as the VICTOR III SSN. Construction will occur at Bohai Shipyard, with the launch of the initial unit soon after the turn of the century. In addition to torpedoes and possible ASW missiles, the TYPE 093 is expected to carry a submerged-launch antiship cruise missile, probably a derivative-on to the indigenously produced C801.



C801 antiship cruise missile

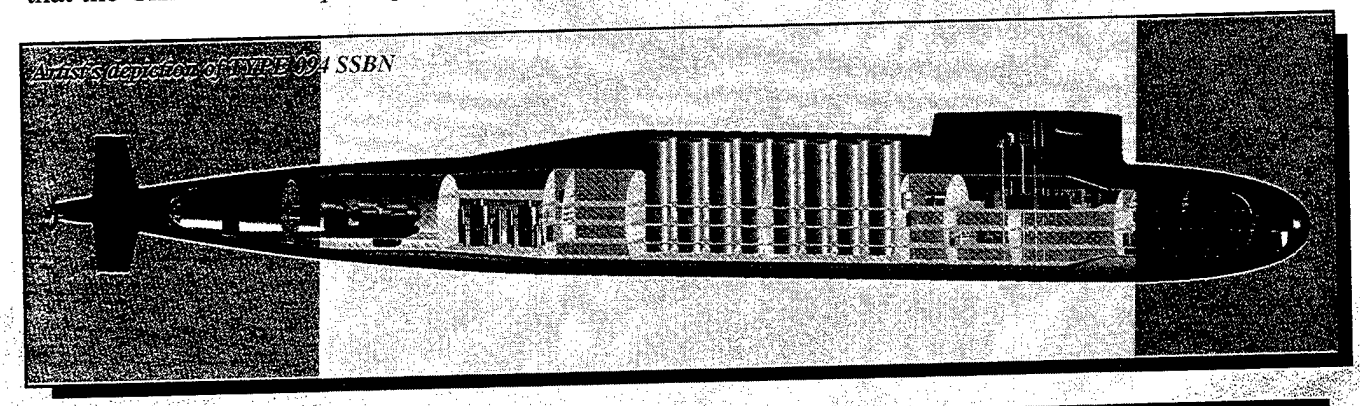
China will continue to incorporate submarine technologies imported from Russia and the West into its indigenously produced diesel-electric submarines. The next generation of Chinese diesel-electric submarines may now be under construction and could incorporate an Air Independent Propulsion (AIP) system. The Western fuel cell shown at right is the heart of a methanol fueled AIP plant being developed for submarine applications. It is one of the many AIP propulsion options potentially available to the Chinese.



Fuel cell

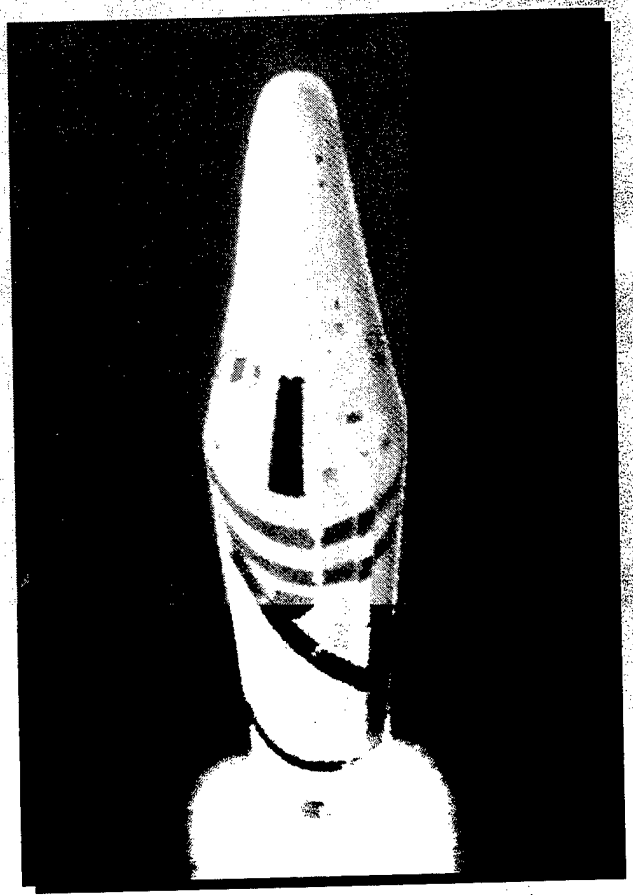
CHINA: SSBN FORCE CONSTRUCTION CHALLENGES

The XIA SSBN is currently China's only ballistic missile submarine and is expected to see service into the next century. The importance the Chinese place on SSBNs can be seen in their announced long term national goal of attaining a survivable nuclear retaliatory force. While the XIA SSBN design has fallen short of expectations, the Chinese are busy designing an SSBN designated the TYPE 094 to be constructed early in the next century. It will take advantage of the modern Russian and Western submarine technologies that the Chinese are acquiring today.



The TYPE 094 will be the largest submarine ever constructed in China. It is expected to be a dramatic improvement over the sole XIA Class SSBN, with improved quieting and sensor systems, and a more reliable propulsion system. Furthermore, the TYPE 094 will likely carry 16 newly designed missiles, which will provide a marked increase in both number and capability over the 12 missiles carried on the XIA SSBN. TYPE 094 construction will take place at Bohai Shipyard, with the launch of the initial unit occurring early in the next decade.

The TYPE 094 SSBN will carry the new JL-2 ballistic missile with a range of over 4,000 nautical miles. When deployed in the next decade, this missile will allow Chinese SSBNs to target portions of the United States for the first time from operating areas located near the Chinese coast.

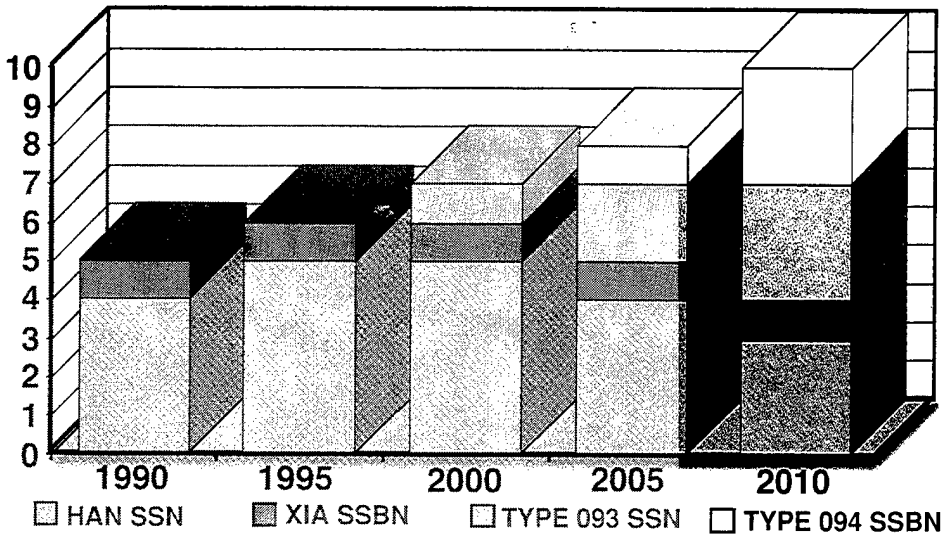


Artist's depiction of new JL-2 submarine-launched ballistic missile

CHINA: FORCE COMPOSITION

The Chinese are aggressively pursuing sophisticated undersea warfare technology to modernize their submarine force. The conservative growth rate anticipated for their nuclear submarine force reflects China's successful integration of improved technology with each new submarine.

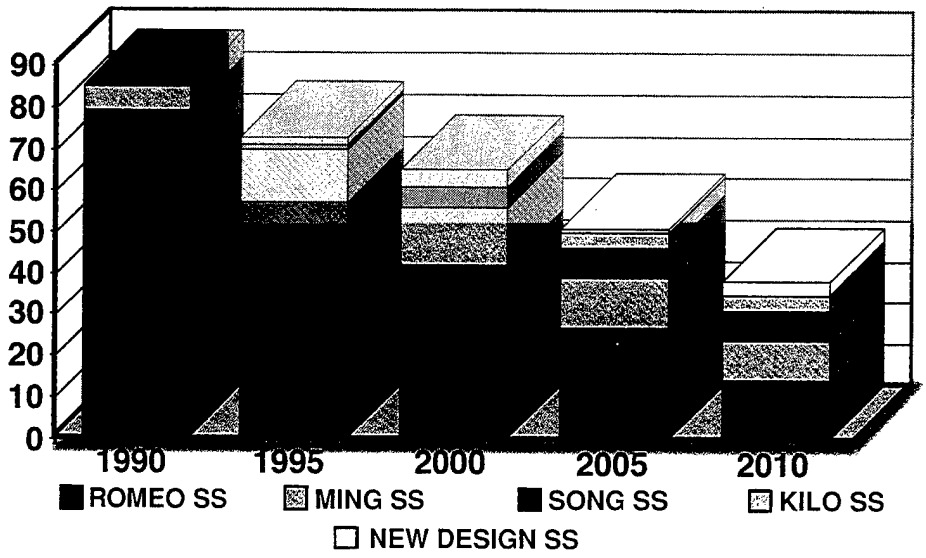
NUCLEAR SUBMARINE FORCE LEVELS



Although China possesses the largest number of conventional submarines in the world, the majority of these units use dated technology. Acknowledging this problem, China has already begun to eliminate these units and will produce smaller numbers of more capable submarines.

In the near term, the Chinese probably will continue to operate their submarines in areas near their homeports. Large scale exercises are likely to occur only once or twice a year, and long deployments will be few. Looking farther into the future, Chinese submarines can be expected to increase the number of deployments made out of local waters.

DIESEL SUBMARINE FORCE LEVELS



China has a growing economy and is conducting increasingly complex naval operations. If current acquisition and construction programs prove successful, China will possess the most challenging submarine force outside of Russia throughout the next decade.

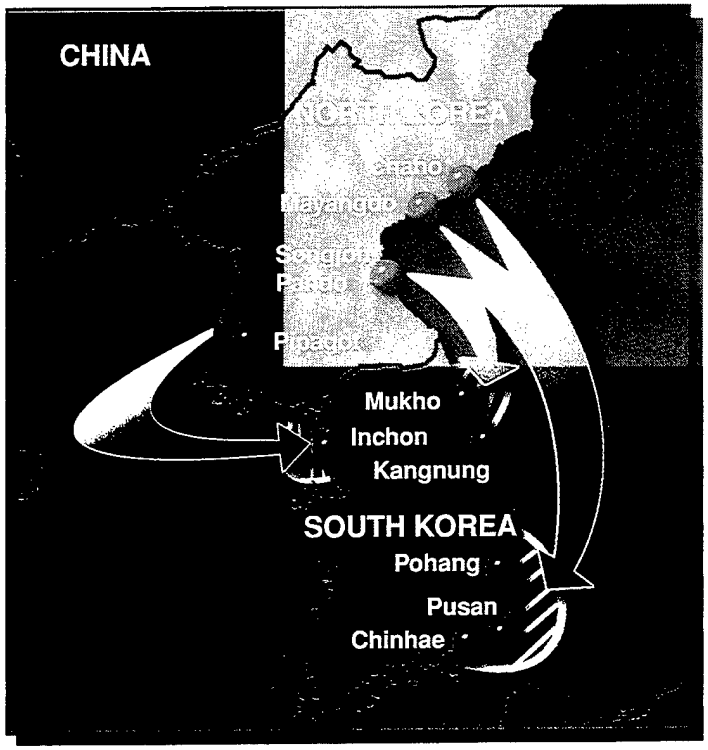
NORTH KOREA: NATIONAL GOALS CHALLENGES

North Korea retains its goal of unifying the Korean peninsula under its control. The country is economically destitute, yet it has the fourth largest submarine force in the world. North Korea lacks a sufficiently sophisticated technology base to field more advanced systems and so has chosen to emphasize quantity over quality in its submarine force.

North Korea maintains a force of over 20 1950's technology WHISKEY and ROMEO diesel submarines. These submarines are antiquated by Western standards. However, if combined with a force of over a dozen SANGO SSC coastal submarines and perhaps as many as 50 YUGO SSM midget submarines, they would complicate any attempt to conduct reinforcement and resupply operations during a crisis on the Korean peninsula.

Kim Chong-Il, Commander in Chief of the North Korean Military

WARTIME SUBMARINE EMPLOYMENT



In a war for unification, North Korean submarines would be expected to perform the following missions:

- Insertion of special operations forces
- Covert offensive mining
- Interdiction of shipping in South Korean waters
- Coastal defense of North Korean ports

The submarine force will probably play an important role in an invasion of South Korea, and it can be expected to use surprise, operational security, and the shallow water environment to full advantage.

NORTH KOREA: SANGO INCIDENT—A CASE STUDY

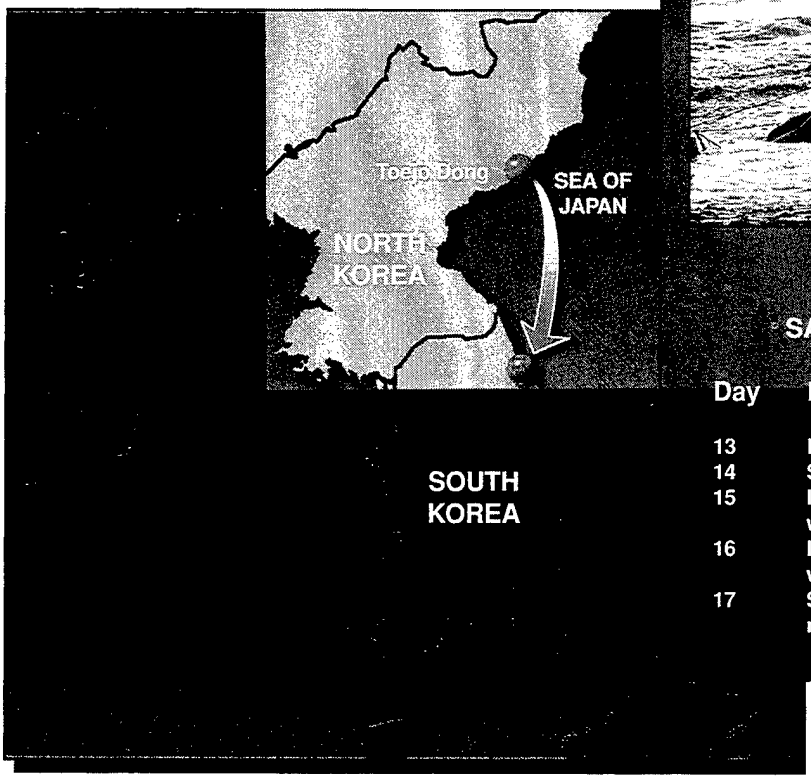
While the North Korean submarine force is obsolete by Western standards, even one North Korean submarine unaccounted for during wartime would pose a threat that could not be ignored by an allied commander. It could significantly affect the deployment of allied forces, forcing the fleet into deeper, more defendable waters, thereby hindering resupply and amphibious operations.

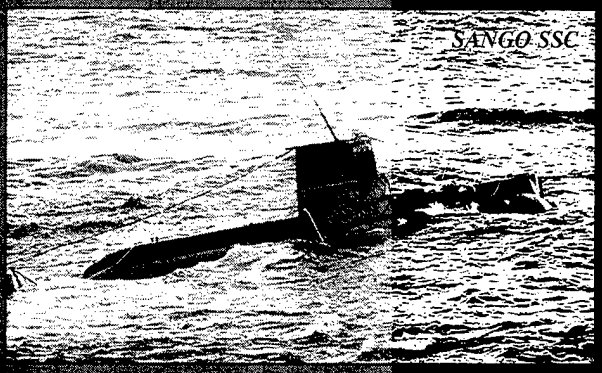
The ability of a small, slow-moving diesel submarine to operate undetected in the shallows along the coast was demonstrated by a North Korean SANGO (shark) coastal submarine (SSC) in September 1996.

The SANGO was subordinate to the North Korean Reconnaissance Bureau and assigned the mission of conducting reconnaissance against South Korea's Kangnung Air Base. On the night before they sailed, the crew celebrated at a banquet with the Director of the Reconnaissance Bureau and pledged their loyalty to North Korean dictator Kim Chong Il.

Early on the morning of 14 September 1996, the SANGO SSC departed Toejo Dong and transited at periscope depth while snorkeling to maintain a fully charged battery. The unit submerged 5 nautical miles north of the demilitarized zone (DMZ), and skirted South Korean patrollers. It arrived at its objective, an infiltration site about 60 miles south of the DMZ, on the following evening and bottomed. A reconnaissance team was disembarked through a diver lock-out chamber, and the submarine returned to international waters.

On 16 September, the SANGO re-entered South Korean territorial waters and attempted to recover the reconnaissance team. This first attempt was unsuccessful, and the submarine again returned to its waiting area in international waters.





SANGO SSC GROUNDING TIMELINE SEPTEMBER 1996

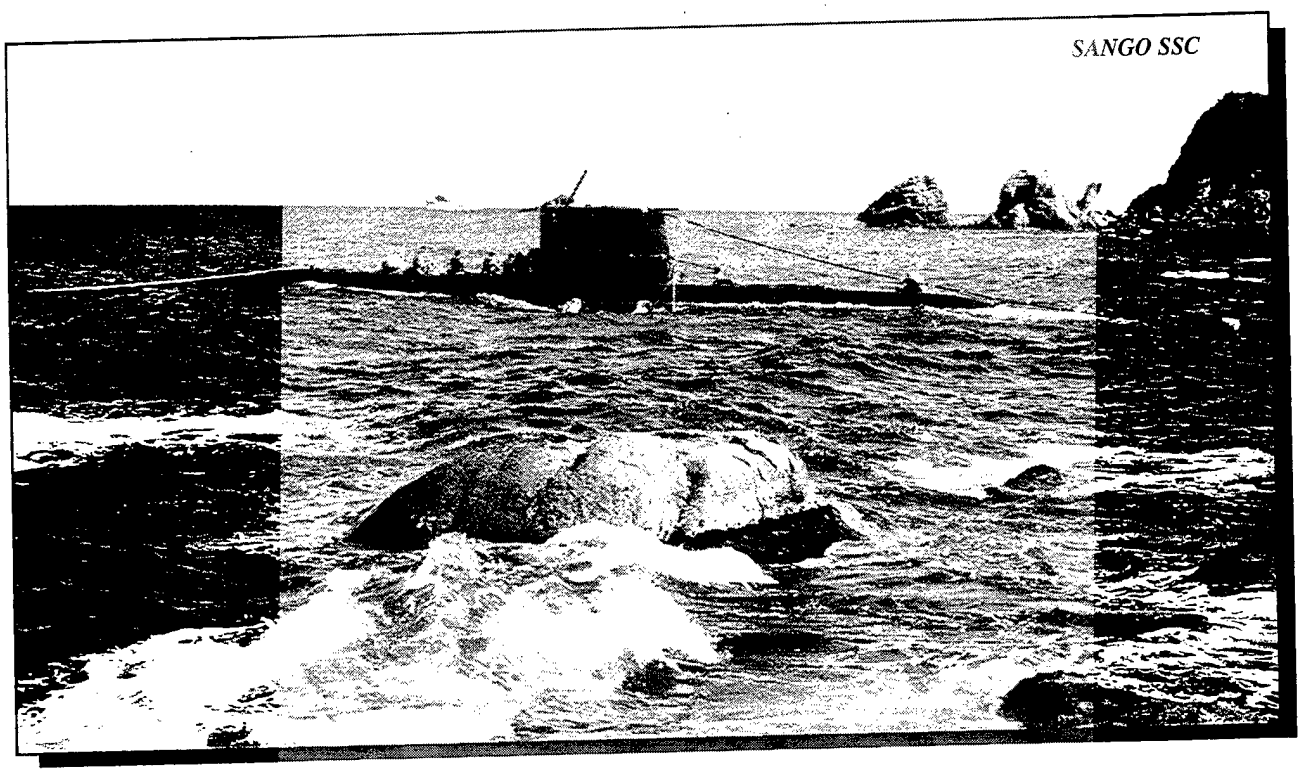
Day	Event
13	Reconnaissance Bureau Director's banquet
14	Submarine departs Toejo Dong
15	Infiltration Team disembarks and submarine withdraws to international waters
16	Initial attempt to recover team fails, submarine withdraws to international waters
17	Submarine runs aground on second recovery attempt—crew abandons ship

North Korea: SANGO Incident—A Case Study

The second attempt to recover the team ended in disaster on 17 September. The submarine sustained serious damage after running aground. The crew was no longer able to control the submarine, and it ended up stuck fast on the South Korean coastline. Repeated attempts to dislodge it were unsuccessful. Since it was impossible to scuttle the ship in the shallow water, a fire was purposely started to destroy as much of the equipment onboard as possible. The ship's crew and the infiltrators abandoned ship, fleeing into the countryside to elude South Korean forces.

To this point the SANGO had remained completely undetected. An alert taxi cab driver sighted the submarine in the surf on the morning of September 18th and reported it to authorities. South Korean forces boarded the vessel and began the process of tracking down the fleeing North Koreans. The ensuing manhunt left only 1 of the 26 North Koreans unaccounted for. One was captured, 11 were executed by the insertion team itself, and the rest were killed by South Korean forces.

The captured North Korean sailor, the helmsman aboard the grounded ship, confirmed that they were on a reconnaissance mission, contradicting initial North Korean claims that the ship drifted into South Korean waters after developing engine trouble.

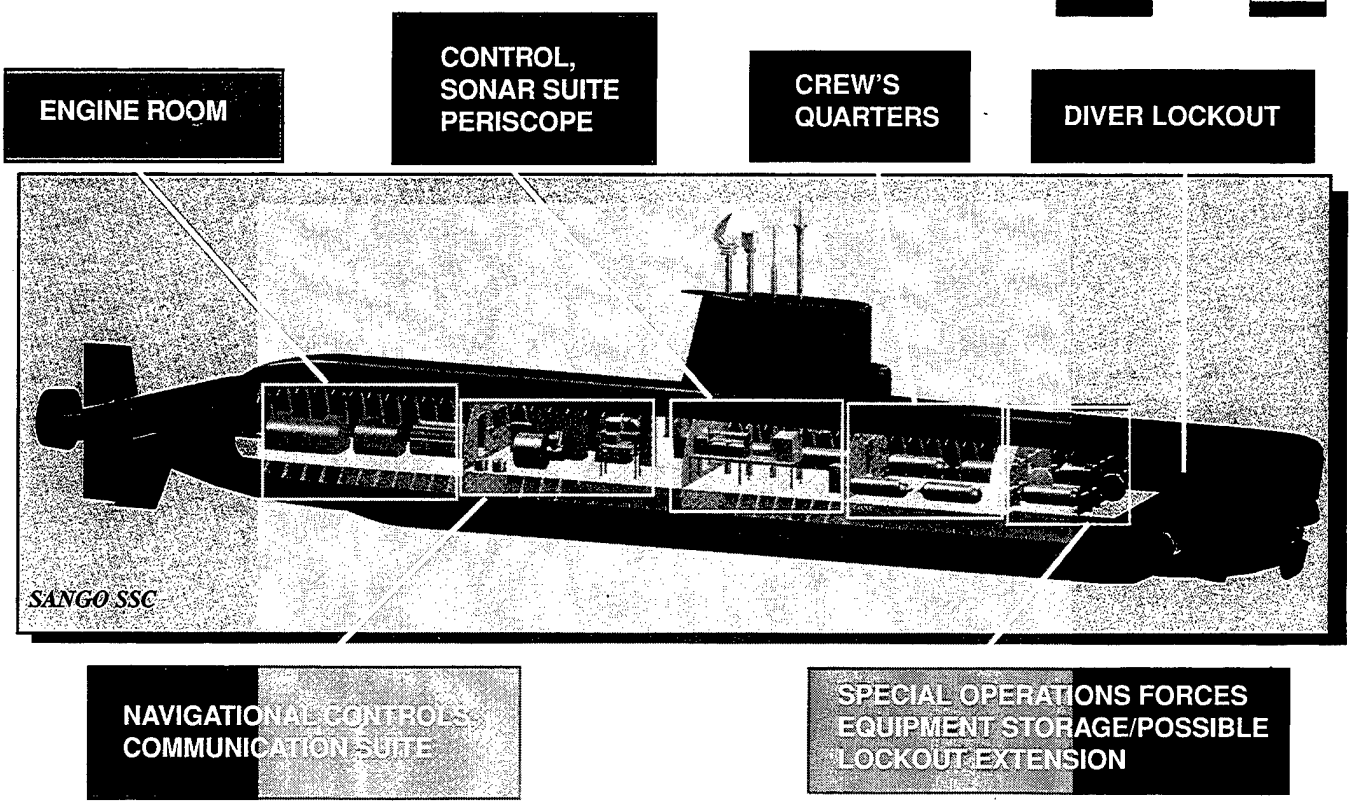


SANGO SSC

In a statement to investigators, the sailor said that the communist North had been building SANGO Class submarines for infiltration since the early 1990s.

This episode clearly shows that a prudently operated diesel submarine is a threat to allied forces in the shallow waters surrounding the Korean Peninsula. During wartime, antisurface warfare and covert naval mining would be added to the missions of the North Korean submarine force.

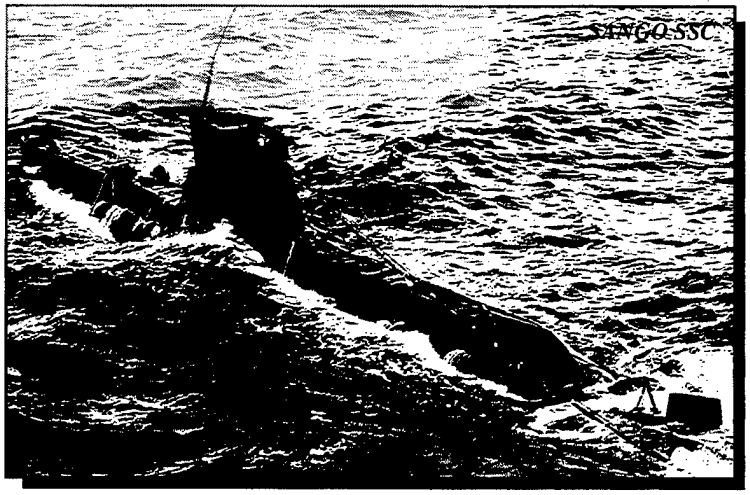
NORTH KOREA: CONSTRUCTION CHALLENGES



The SANGO SSC is a simple steel-hulled submarine design that is 35 meters in length and displaces about 300 tons submerged. It is being constructed in two variants. One has a diver lockout chamber in the first compartment for use in the covert insertion of Special Operations Forces (SOF). The other variant has a mission of antisurface warfare and has torpedo tubes in place of the diver lockout chamber.

The diagram above depicts the SOF insertion design. The interior of the submarine is divided into five watertight compartments. Despite cramped conditions, the SANGO can carry up to 30 men. At least half would be members of the crew and the rest would be part of the infiltration team.

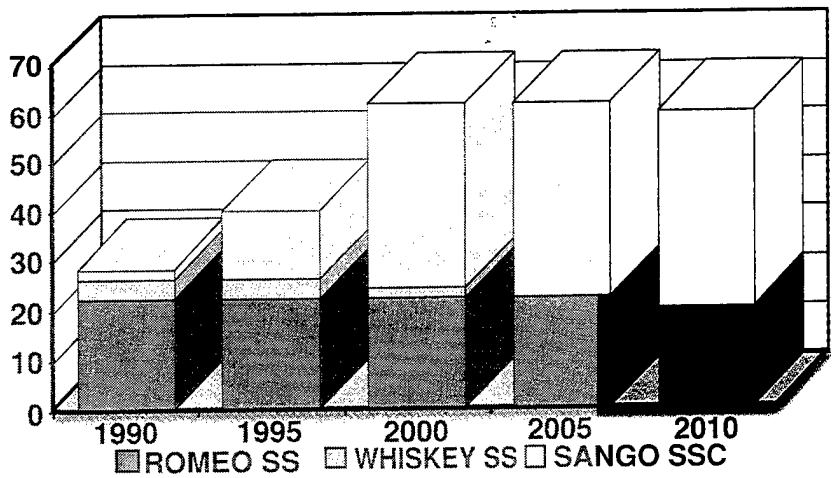
The exterior of the submarine has hard points where special operations equipment or naval mines could be attached. In addition to SOF troop insertion, SANGO SSCs may be tasked to do offensive mining at the entrances to major South Korean ports at the start of hostilities.



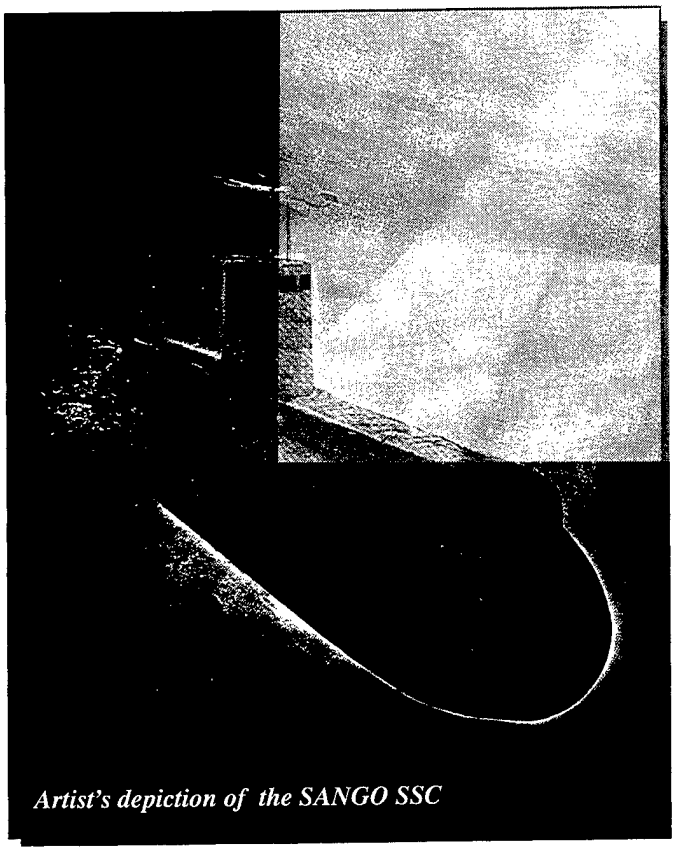
NORTH KOREA: FORCE COMPOSITION CHALLENGES

North Korea has ceased production of the vintage ROMEO SS design and is now relying on production of the SANGO SSC. This high priority naval construction program is ongoing in a country known to be suffering severe economic hardship. The two versions of the SANGO SSC are intended to accomplish all the missions assigned to the North Korean submarine force.

DIESEL SUBMARINE FORCE LEVELS



In wartime, North Korean submarines are expected to take full advantage of environmental conditions that exist off of South Korea. They will probably transit in the shallow water near the coast, snorkeling mainly at night. Heavy fishing and merchant traffic is present along the coast and will provide a cluttered environment generating high background noise levels that will help to hide a patrolling submarine's acoustic signature.



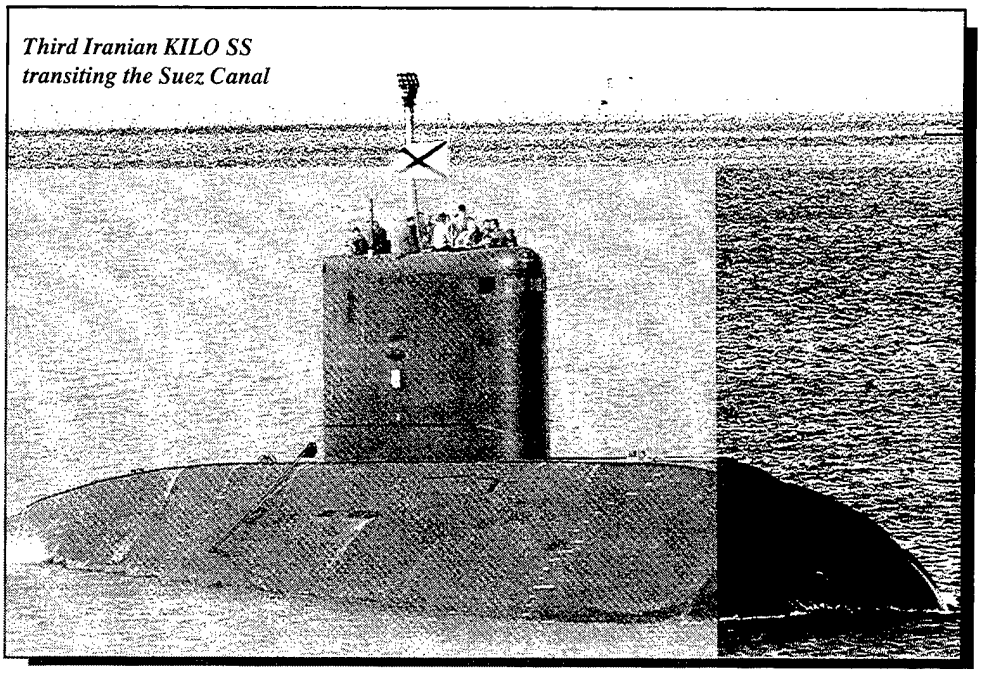
Artist's depiction of the SANGO SSC

The obsolete technology of North Korean submarines affects their tactical operations. They probably use straight-running torpedoes, which will force North Korean submarines to spend more time at periscope depth within close proximity to their intended target. The tactic is necessary to develop an adequate firing solution. Hence, North Korean submarines would be more effective against slow-moving merchant ships and amphibious craft than against warships.

Nevertheless, North Korea's strategy emphasizes employment of large numbers of low technology submarines and indicates that North Korea will attempt to saturate the defender's ASW forces during a war to reunify the Korean peninsula. While the technology is dated, the threat remains real.

IRAN: NATIONAL GOALS

Iran has publicly stated it intends to control the Strait of Hormuz and consolidate naval superiority in the Persian Gulf. It has taken advantage of its favorable geographic location on the north coast of the Gulf of Oman, Strait of Hormuz, and Persian Gulf, to develop a layered littoral warfare strategy. The strategy provides a credible defense against attack by Iran's Gulf neighbors with a mix of platforms and weapons systems. Tehran has also enhanced its ability to influence commercial shipping in the vital southern Gulf and Strait of Hormuz, through its control and reinforcement of disputed Abu Musa and the Tunb Islands, as well as Iran's Sirri Island, which sit astride the shipping lanes in the southern Gulf. To help accomplish these goals, Iran has acquired three KILO diesel-electric submarines from Russia. These submarines will play an important role in any Iranian plans to interdict surface ship traffic in the Strait or in defending their coastline from seaborne attack.



Third Iranian KILO SS transiting the Suez Canal

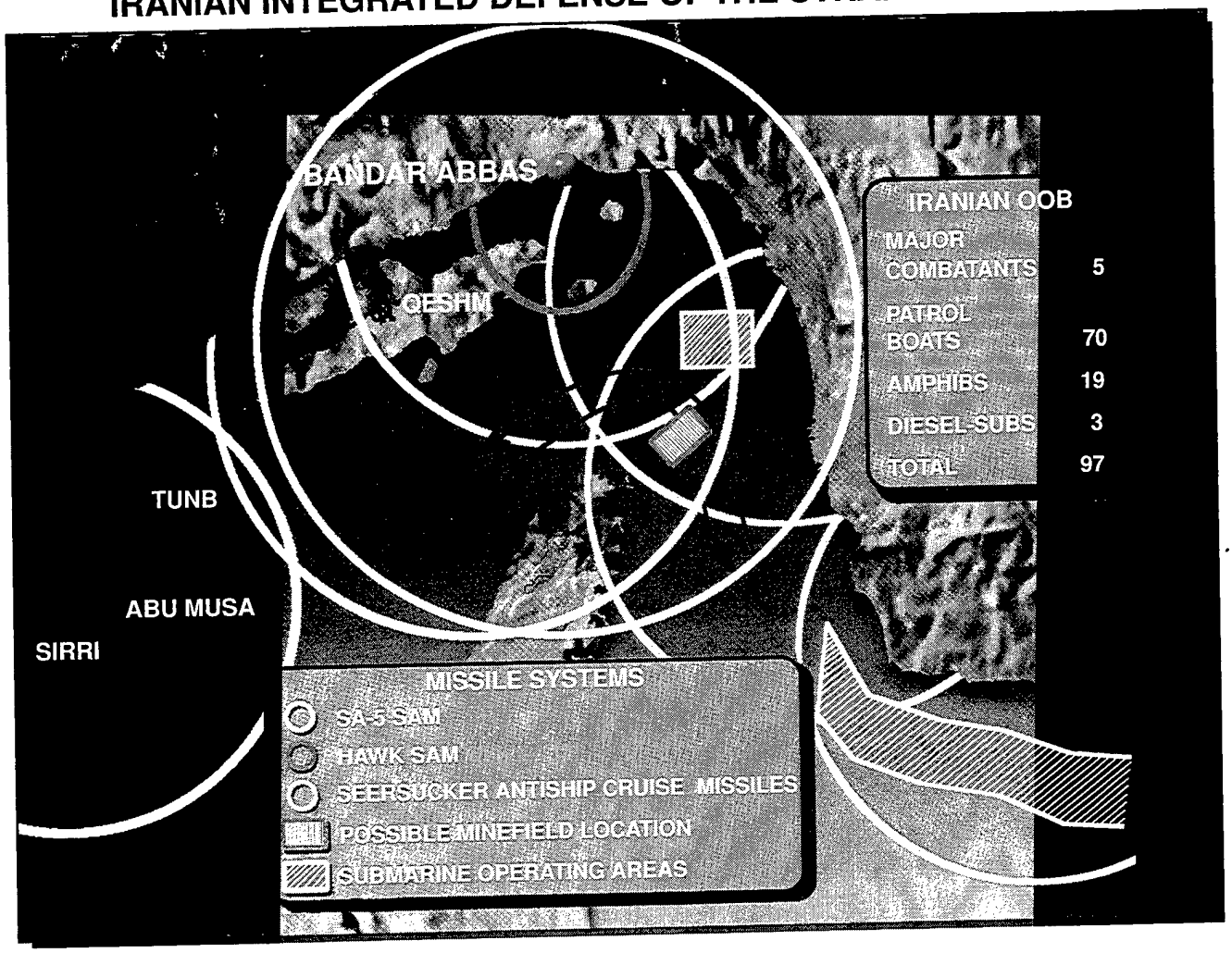
The KILO primary operating areas are in the Strait of Hormuz and in the deeper waters of the Gulf of Oman. KILO submarines carry both acoustic and wake homing torpedoes, and can lay mines. The KILOs are believed to have the following wartime missions:

- Antisurface Warfare
- Covert Minelaying
- Insertion of Special Forces

"...Submarines will allow the consolidation of Iranian naval superiority in the entire Persian Gulf and the Strait of Hormuz."

Admiral Shamkani
Head of the Iranian Navy

IRANIAN INTEGRATED DEFENSE OF THE STRAIT OF HORMUZ



Iranian submarines eventually will be integrated with other forces to establish a layered defense of the Strait. By operating with land-based strike aircraft, surface-to-air missiles, and naval mines, as well as coastal defense and shipborne antiship cruise missiles, the KILO SS will contribute significantly to the interlocking coverage.

The white arc on the chart represents an SA-5 SAM site, which can destroy high speed, high altitude aircraft at a range of 100 nautical miles. The smaller red arcs represent HAWK SAM batteries with an engagement envelope of 21 nautical miles. Yellow arcs show the SEERSUCKER ASCM batteries' threat to ships at ranges of up to 57 nautical miles. The box outlined in red represents Iran's ability to mine even in deeper water and where currents are strong. Finally, the boxes outlined in yellow delineate the East Larak and Jask submarine operating areas, where Iranian submarines might be employed.

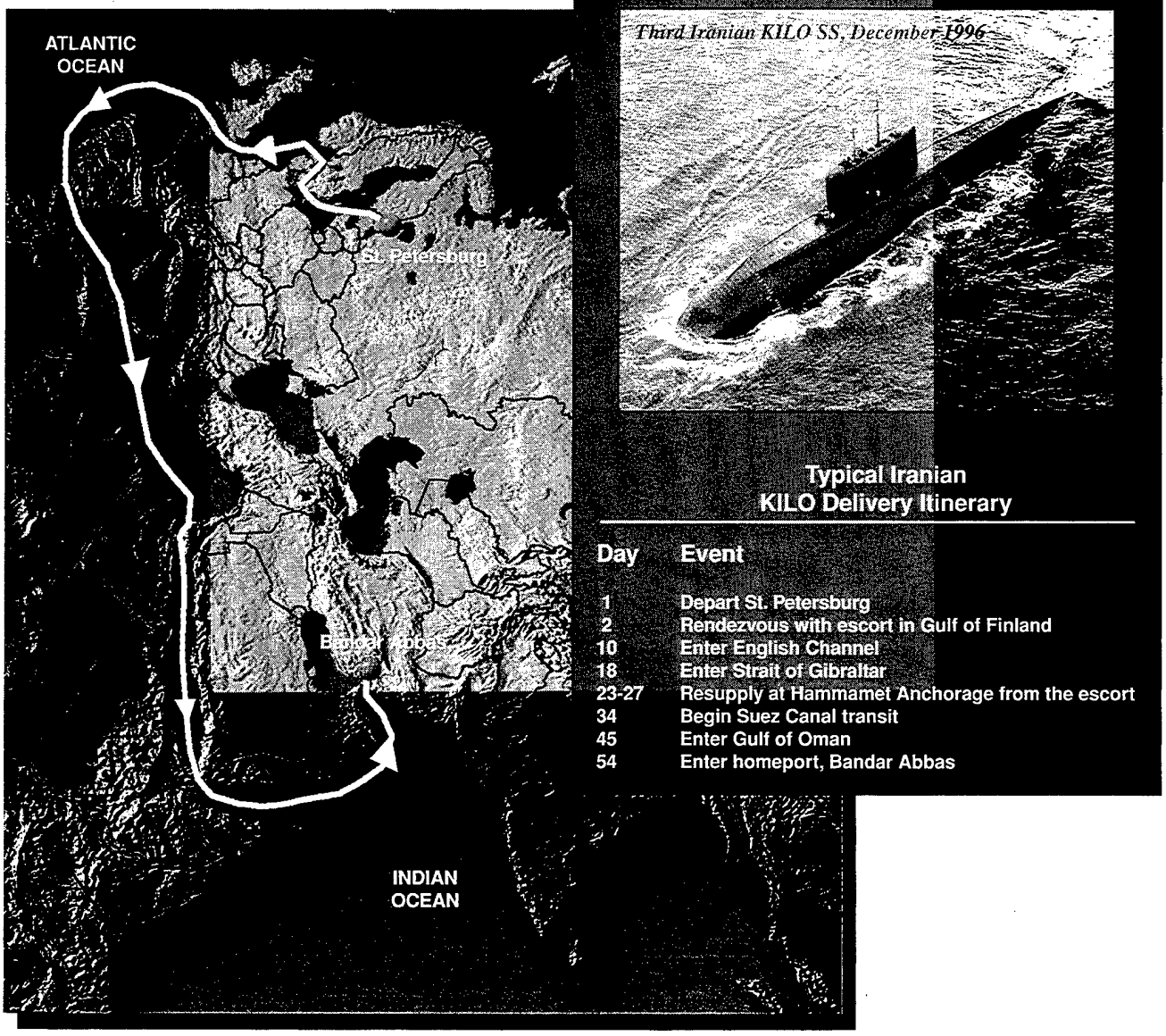
The Strait of Hormuz is critical to the West because over 20 percent of the world's oil production passes through it. In time of crisis, the Strait takes on additional importance. During Desert Shield/Storm, over 90 percent of all cargo sealifted to support the allied effort passed through the Strait.

IRAN: FORCE COMPOSITION

Iranian submarine operations were limited in 1996 due to battery and other material problems. They are working to overcome these setbacks, and are improving their infrastructure to support a more robust operational schedule.

Iran's third and final Russian-built KILO SS was delivered in January 1997. This KILO was launched in 1994 and conducted sea trials in the Baltic Sea. The KILO left Russia in late November 1996, and transited under a Russian flag with a combined Russian/Iranian crew. It arrived at its operational base in Iran in mid-January.

Eventually, Iran may have the capability to surge-deploy all three KILOs during a crisis or, alternatively, maintain a near continuous at-sea presence with at least one unit. A recent report indicates the Iranian Defense Ministry believes that after receiving its third submarine from Russia, Iran will be able to control the Persian Gulf.



OUTLOOK

"My experiences clearly show that antisubmarine warfare is an all hands evolution which transcends platform type and branch of service. The vastness of the ocean environment and the time constants involved can be leveraged by a submarine to great advantage. Countering worldwide submarine challenges requires a well trained, flexible and adaptive team that is equipped with modern sensors and weapons."

RADM E.P. Giambastiani, Jr.
Director, Submarine
Warfare Division

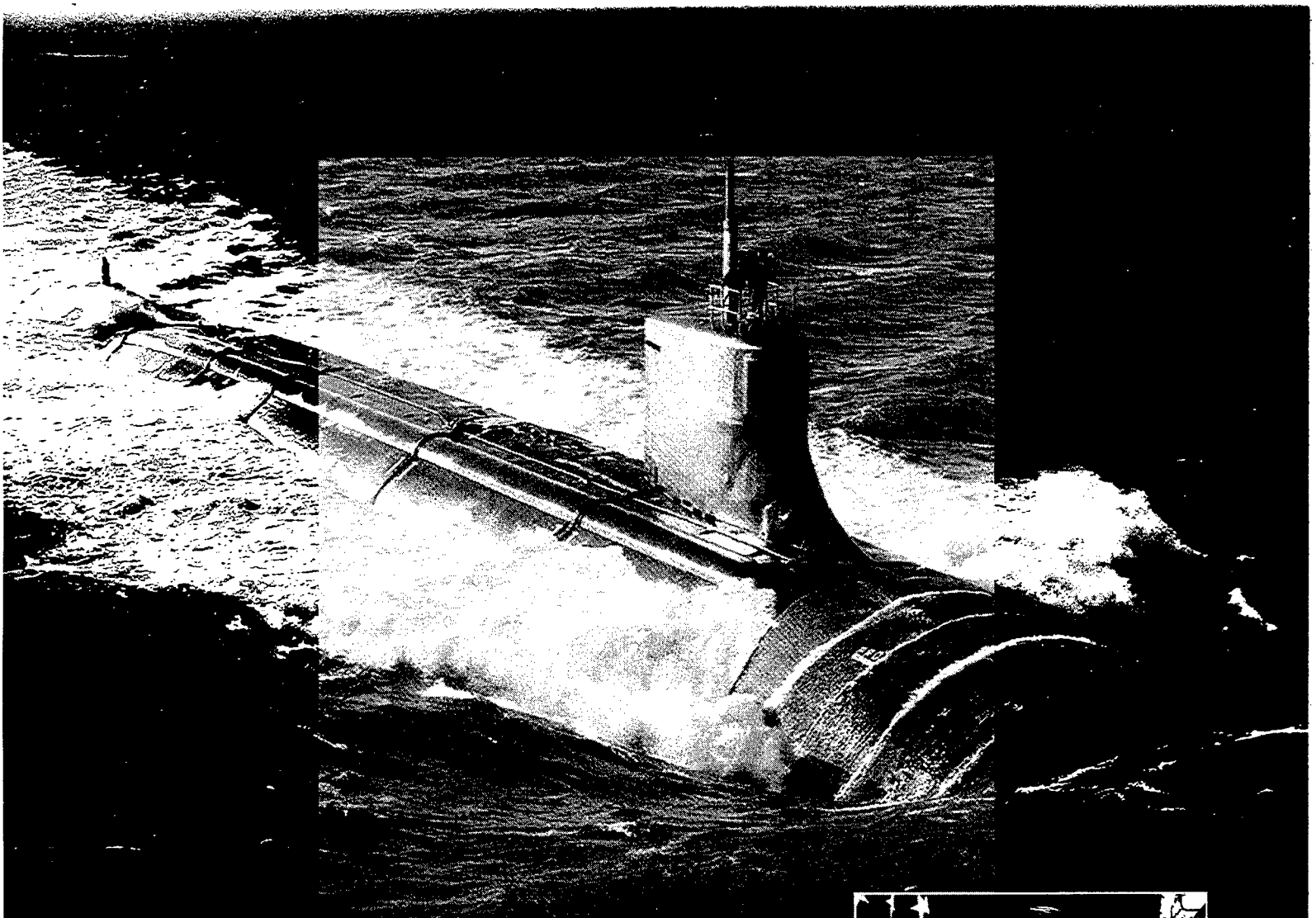
The significance of the submarine threat is evident when we look at how the United States projects military power. Responding militarily to a crisis, the United States typically must send combat forces to a distant shore, sustaining them with a continuous supply of food, ammunition, material, and replacement troops. The bulk of this resupply and reinforcement travels by sealift. In the Gulf War, nearly 10 million tons of cargo were shipped to the theater: 94 percent moved by sealift, and 6 percent by air. U. S. military power projection depends on *sea control.*

The submarine's traditional role is *sea denial.* Our dependence on sealift may offer an enticing vulnerability to a nation potentially hostile to the United States and its allies.

The United States must be able to achieve sea control, and this means ASW forces must continue to be effective against increasingly capable submarines. Our ability to project military power in response to crises depends on it.

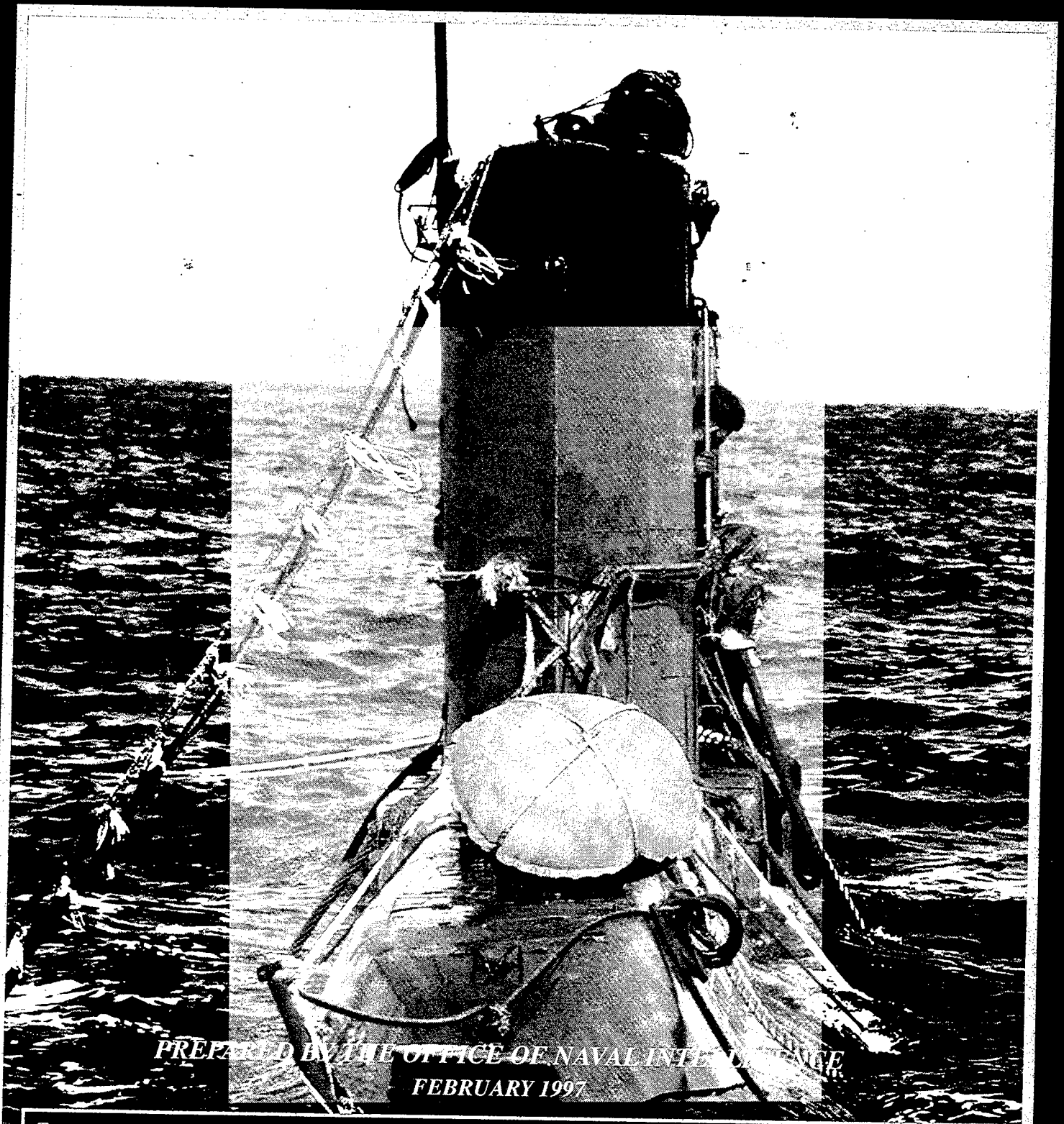
Vice Admiral Richard W. Mies
Commander Submarine Force
U.S. Atlantic Fleet

"The hard-learned, submarine-inflicted lessons of two World Wars and the Falklands must not be forgotten. As an 'island nation,' control of the seas, especially the undersea, is essential to our ability to project our power and influence across distant shores. Our Navy's synergistic capability to dominate the undersea battlespace underpins our ability to mass decisive forces "Forward . . . From the Sea."



"Undersea warfare remains a tough business where the only acceptable position is one of absolute operational primacy. This requires a team effort. We must ensure that the capabilities of our undersea warfare team are robust and effective against a full spectrum submarine threat which is increasingly diverse and technologically sophisticated."

Admiral Jay Johnson
Chief of Naval Operations



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THIS PUBLICATION WAS COORDINATED WITH THE OPNAV STAFF.

FRONT AND BACK COVER PHOTOS: REPUBLIC OF KOREA MILITARY FORCES ABOARD CAPTURED NORTH KOREAN SANGO CLASS COASTAL SUBMARINE AFTER IT RAN AGROUND NEAR KANGNUNG, SOUTH KOREA.

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