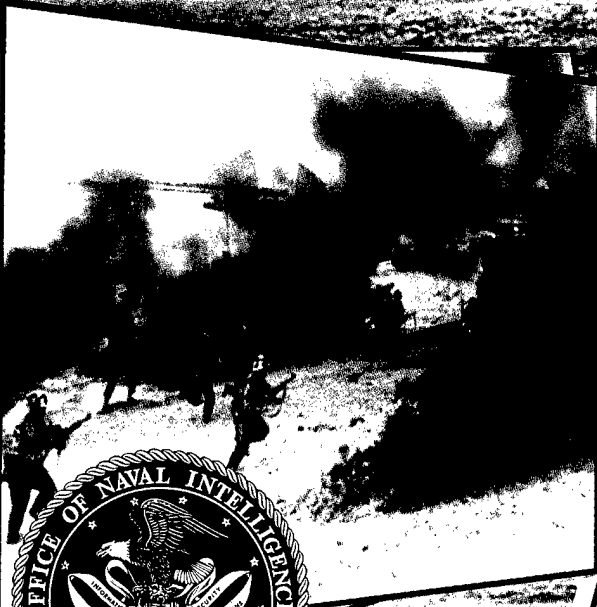
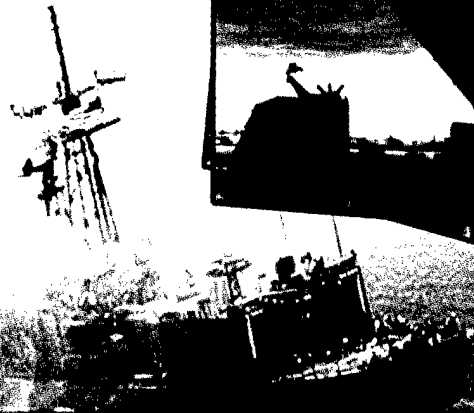
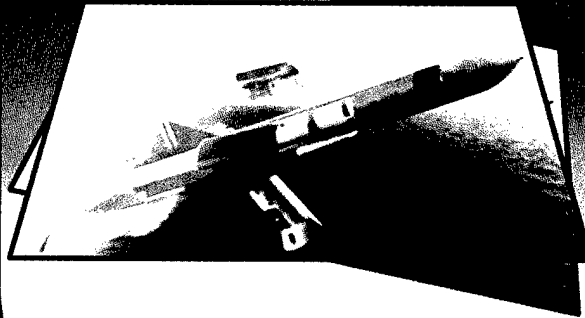
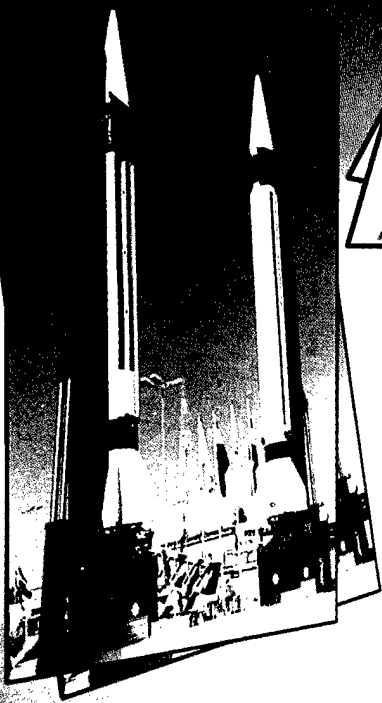


Challenges to Naval Expeditionary Warfare



1997

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PROLOGUE

***Challenges to Naval Expeditionary Warfare** identifies many of the weapons systems the U.S. Navy and Marine Corps will have to face when U.S. Naval forces are called upon to respond to crises and threats against U.S. citizens or interests around the world. It is important to understand these challenges and the difficulties present.*

Expeditionary Warfare is not new to the U.S. Navy-Marine Corps team. It is a tool, however, that has received renewed emphasis in recent years, as the U.S. moves from a superpower, bipolar, ideological confrontation with the Soviet Union, to a world where rampant nationalism, ethnic antagonism, regional conflict, civil war, terrorism, and transnational criminal activity emerge in ways which often threaten the United States or its allies. Many of these new crises occur in countries along the littoral—places where naval forces are often the first U.S. military forces on scene.

Expeditionary Warfare has several key elements. Each must succeed individually to achieve collective impact. To really understand the overall challenge to Expeditionary Warfare, you must first understand the challenges to Maritime Dominance, Firepower, Air Dominance, Maneuver Dominance, and Information Superiority separately, and then how they interact collectively.

It is ironic that while the vast majority of U.S. military expeditions take place in or near lesser developed countries, U.S. forces now face highly developed weapons, many obtained from the West. The world's arms market is now so competitive that many of the previous restrictions on weapons proliferation are simply no longer present. Much of the training and tactics that were formerly restricted to the exclusive domain of the West or Russia now routinely trickles down to lesser developed countries. Finally, it is now far easier to design and integrate new weapons systems locally by using "Western, off-the-shelf, open architecture" commercial approaches. Regrettably, each of these worrisome trends is likely to continue.

In this environment, there is little chance of returning the "genie" to the bottle, only the possibility of limiting some of its more destructive applications. The lessons of Desert Storm have not been lost on regional competitors, rogue states, or terrorists. The relevance of integrated tactics, all-weather operations, stealth, precision weapons with precision locating data, and information warfare are now appreciated by all and pursued by many.

In the years ahead, Challenges to Naval Expeditionary Warfare will become even more diverse, more complex, and more stressing. It is critical that we understand these challenges, train and equip forces to deal with them effectively, and defeat them early, forward and decisively.

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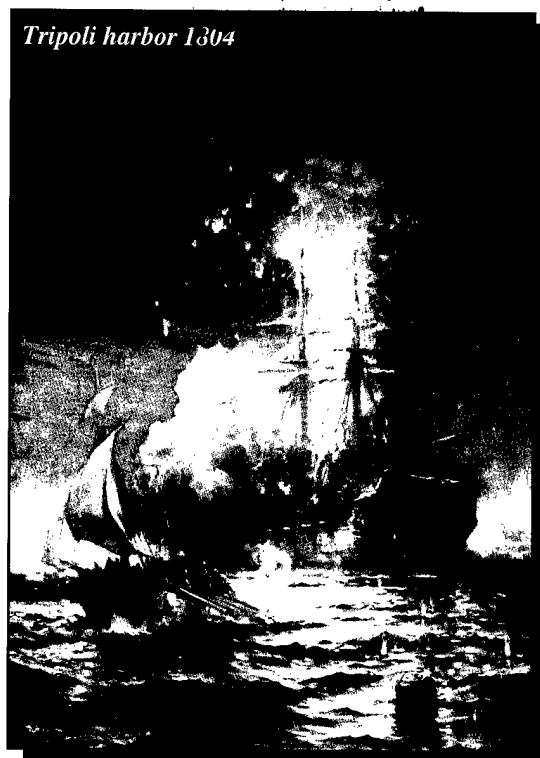
HERITAGE OF EXPEDITIONARY WARFARE

The Expeditionary Warfare tradition in the United States Navy is as old as the nation itself. On March 3, 1776, Captain Samuel Nicholas landed his Continental Marine battalion on New Providence Island in the Bahamas and seized the British fort. After independence, U.S. Navy and Marine forces successfully eliminated Barbary Coast extortion in the early 1800s, establishing the precedent for global naval expeditionary operations.

Modern naval Expeditionary Warfare had its origins in exercises conducted during the decades preceding World War II. The exercises identified unique operational and equipment requirements and developed the skills that were perfected in carrier and amphibious operations, which ensured victory in the Pacific Theater.

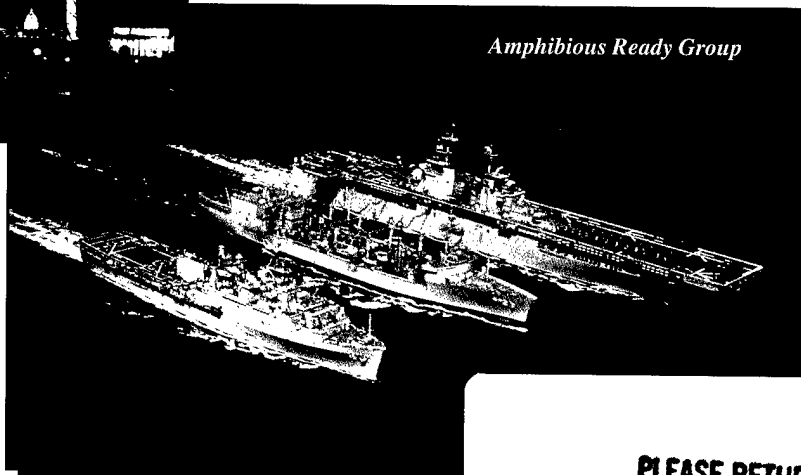


Marine Corps War Memorial



Tripoli harbor 1804

Sailors and Marines under the command of LT Stephen Decatur recapture and burn the frigate PHILADELPHIA in Tripoli harbor.



Amphibious Ready Group

Today, Amphibious Ready Groups carry the expeditionary tradition forward from the sea. They provide the nation a fully ready combat force forward deployed and able to respond at a moment's notice. Naval Expeditionary Forces were used to restore democracy in Haiti in 1993-1994 and to protect U.S. citizens and diplomatic personnel in Monrovia, Liberia, in April 1996. Strikes from the sea punished Iraq for violations in 1993 and 1996. Ready for combat, Naval Expeditionary Forces are performing large scale humanitarian operations without reconfiguration. In Desert Storm, Amphibious Ready Group Three was diverted to Bangladesh devastated by a tropical cyclone. Navy and Marine Corps Expeditionary Forces in Somalia in 1992 and covered U.N. forces in 1993 and 1995. **The heritage**

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WHAT MILITARY LEADERS SAY



"When we needed to send a strong message in the Taiwan Straits...or when, suddenly we had to rush to a chaotic place called Liberia to evacuate American Citizens; ... time after time, the Navy and Marine Corps's Expeditionary Forces have been the vanguard of our nation's power."

*General John Shalikashvili, USA
Chairman,
Joint Chiefs of Staff*



*"Expeditionary Forces form an unbeatable team with our forward stationed troops. Expeditionary Forces in EUCOM are combat multipliers!
One Team--One Fight!"*

*General George Joulwan, USA
Commander in Chief,
U.S. European Command*



"Our vital interests in the Middle East include ensuring freedom of navigation, access to commercial markets and promoting security in the Middle East peace...interests that we safeguard through continuous presence of forward deployed Expeditionary Forces..."

*General J.H. Binford Peay III, USA
Commander in Chief,
U.S. Central Command*



"Global geography and demographics, combined with America's dwindling number of overseas bases, continue to make maritime Expeditionary Forces essential tools for policy makers."

*General John J. Sheehan, USMC
Commander in Chief,
U.S. Atlantic Command*



"Naval Expeditionary Forces are indispensable in providing a means of heading off challenges to the nation's security before such challenges erupt into full-blown crises or conflicts."

*Admiral Joseph Prueher, USN
Commander in Chief,
U.S. Pacific Command*



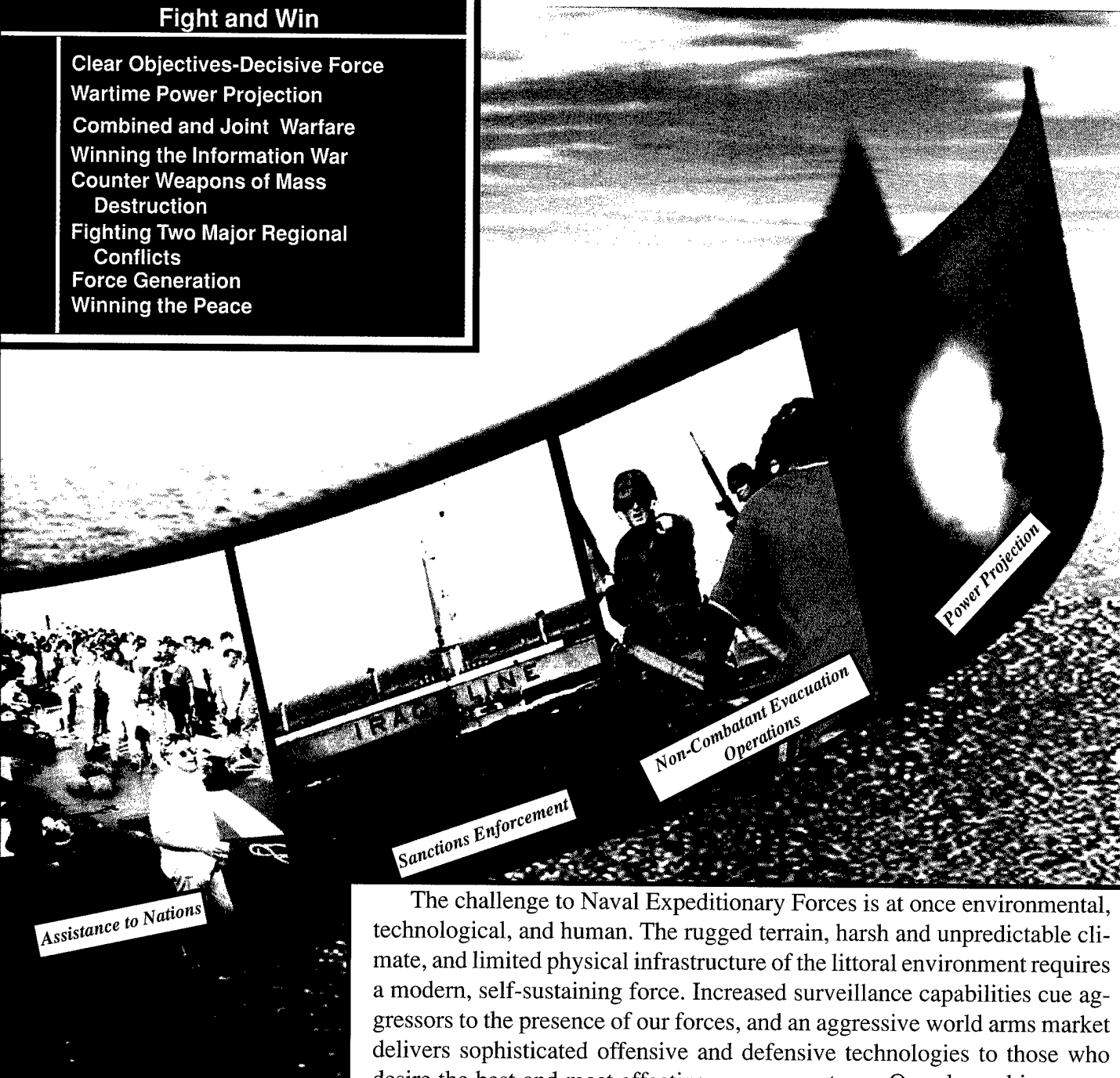
"U.S. Naval Forces can't affect events around the World if we're not there. It's why we're here in Europe; to provide regional stability. There is no better guarantee of U.S. commitment to this vital region than the Navy and Marine Corps team."

*Admiral T. Joseph Lopez, USN
Commander in Chief,
U.S. Naval Forces Europe*

ARY OPERATIONS

Fight and Win

- Clear Objectives-Decisive Force
- Wartime Power Projection
- Combined and Joint Warfare
- Winning the Information War
- Counter Weapons of Mass Destruction
- Fighting Two Major Regional Conflicts
- Force Generation
- Winning the Peace



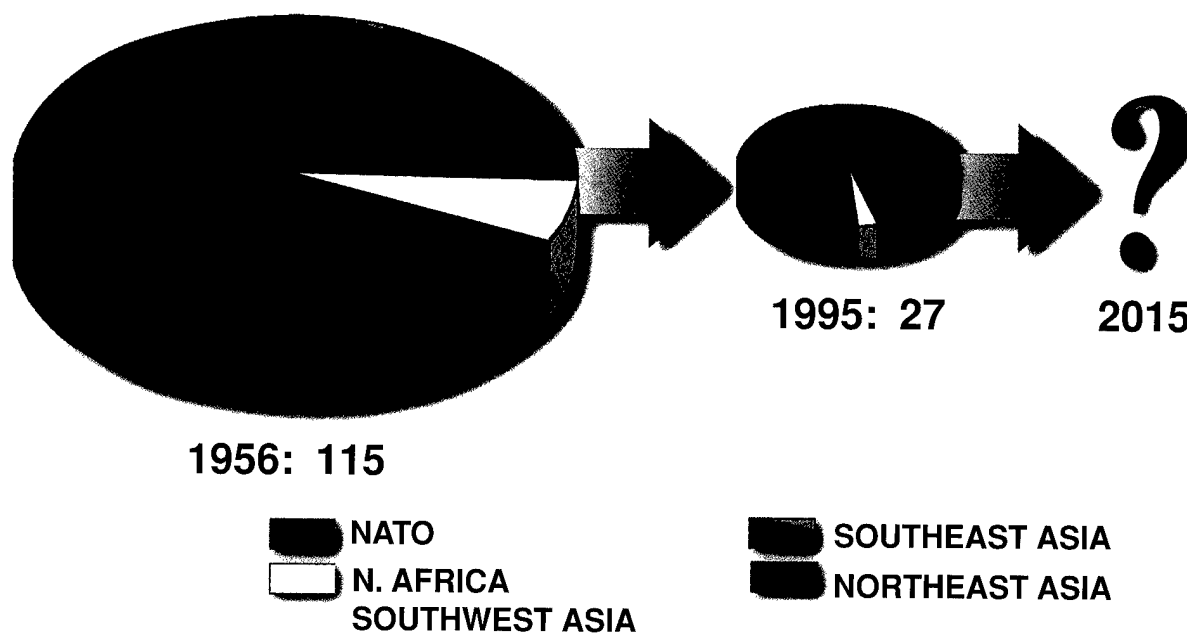
The challenge to Naval Expeditionary Forces is at once environmental, technological, and human. The rugged terrain, harsh and unpredictable climate, and limited physical infrastructure of the littoral environment requires a modern, self-sustaining force. Increased surveillance capabilities cue aggressors to the presence of our forces, and an aggressive world arms market delivers sophisticated offensive and defensive technologies to those who desire the best and most effective weapon systems. Our planned improvements in maneuver and firepower systems will positively influence events far beyond today's beachheads.

CHALLENGES TO MARITIME DOMINANCE: BASES

FEWER FORWARD BASES

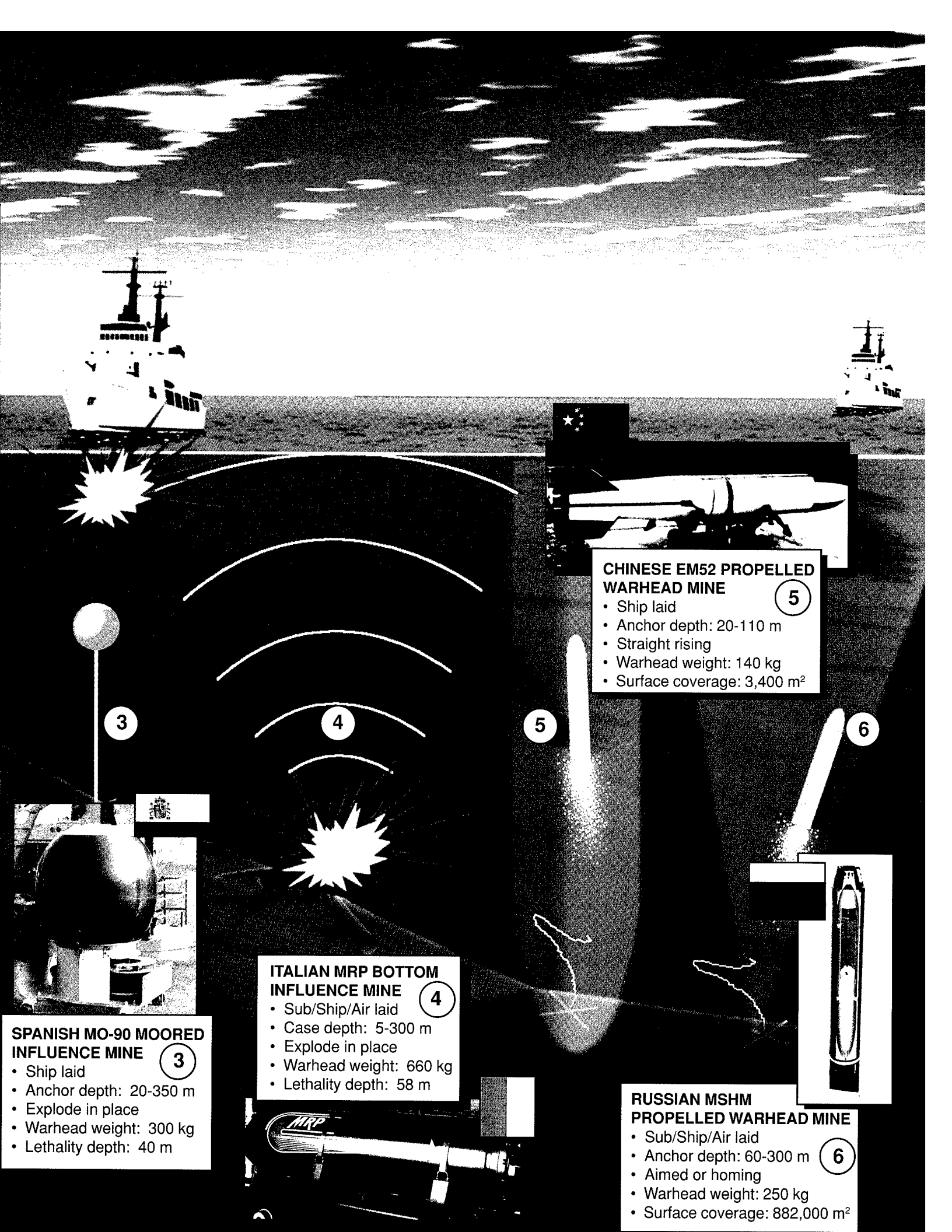
With a perception of a declining global threat, fewer countries will be willing to sponsor a large U.S. military force presence within their borders over the next decade. The U.S. has already decreased its overseas presence from 115 major bases in 1956 to 27 in 1995. The ability of the United States to rapidly move and sustain forces in times of crisis will be increasingly reliant upon sealift to meet joint overseas commitments. More and more, the first forces available in a crisis will be **afloat** and **forward deployed**.

MAJOR OVERSEAS AIR & SEA BASES



DEMANDING LITTORAL ENVIRONMENT

A U.S. warship is sovereign U.S. territory, whether in a port of a friendly country or transiting international straits or on the high seas. U.S. Naval forces, operating from highly mobile “sea bases” in forward areas, are free of the political encumbrances that may inhibit and otherwise limit the scope of land-based operations in forward theaters. However, challenges do occur. Coastal littoral areas impose environmental restrictions upon Naval Expeditionary Forces. The hydrography, with tides, currents and marine life challenges the most modern of equipment. Frequently, rugged terrain funnels ground forces into predictable and targetable areas. Population growth and migration in littoral areas is higher than inland making the littoral region, and its urban areas, an increasingly likely location for conflict. Simultaneously, the man-made infrastructure in most of the littoral environment is less sophisticated and capable than would be desired to support early on ground or air expeditionary operations.



3

SPANISH MO-90 MOORED INFLUENCE MINE

3

- Ship laid
- Anchor depth: 20-350 m
- Explode in place
- Warhead weight: 300 kg
- Lethality depth: 40 m

4

ITALIAN MRP BOTTOM INFLUENCE MINE

4

- Sub/Ship/Air laid
- Case depth: 5-300 m
- Explode in place
- Warhead weight: 660 kg
- Lethality depth: 58 m

5

CHINESE EM52 PROPELLED WARHEAD MINE

5

- Ship laid
- Anchor depth: 20-110 m
- Straight rising
- Warhead weight: 140 kg
- Surface coverage: 3,400 m²

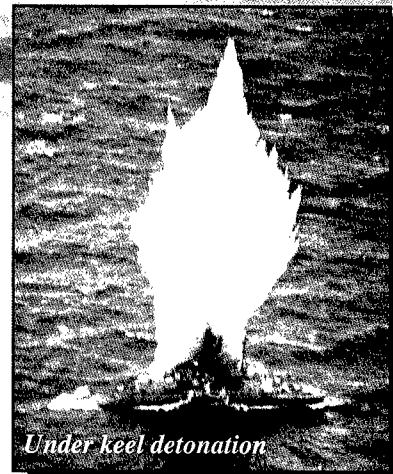
6

RUSSIAN MSHM PROPELLED WARHEAD MINE

6

- Sub/Ship/Air laid
- Anchor depth: 60-300 m
- Aimed or homing
- Warhead weight: 250 kg
- Surface coverage: 882,000 m²

Russia has offered the 65 cm (26 in) diameter DST-92 torpedo for export. It is too large to be launched by exported submarines but can easily be launched from fixed positions such as oil platforms and piers.



Wake homing technology is very effective; it is difficult for the target ship to detect and prosecute a torpedo in its wake.

France, Germany, and Italy have begun to offer wake homing as an option in their export torpedoes. This option is a German designed modification kit to backfit DM2-A3, F-17 MOD 3, A-184, and possibly NT-37 torpedoes. These torpedoes can be launched by the exported German 209 Class submarine. International competition in the expanding global torpedo market is expected to result in the proliferation of high quality, antiship torpedoes. Antiship torpedo systems will continue to explore new techniques and hardware that combine acoustics, wake homing, and wire guidance to deliver enhanced warheads initiated by sophisticated multi-sensing influence exploders.

F17 MOD 3

A184

NT37

DM2A3

WAKE HOMING TORPEDOES

SUT

UGST

53-65 KE

DST-92

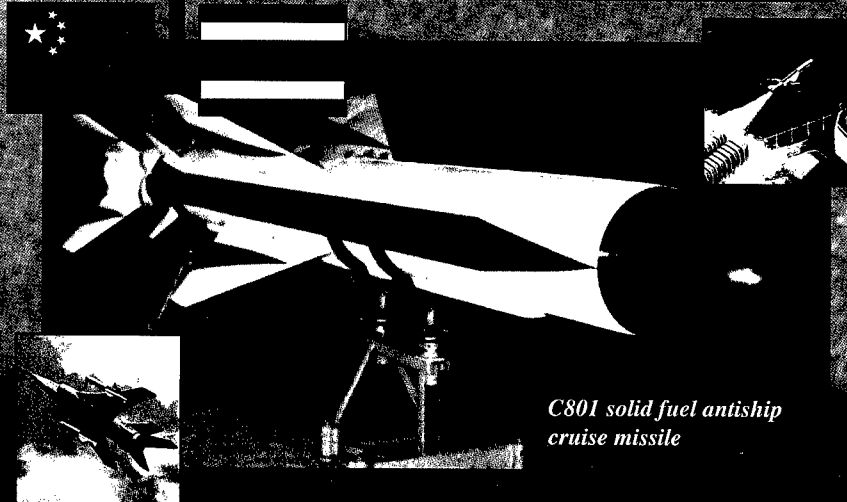
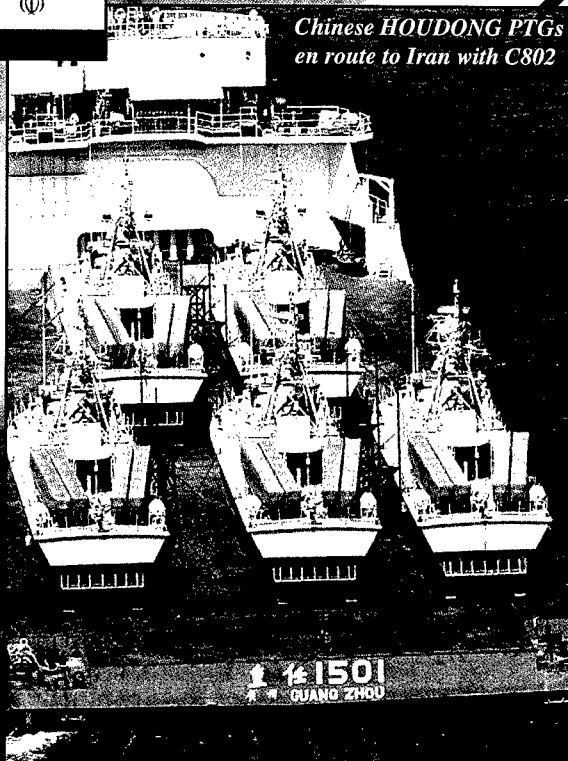
Although China has been actively marketing antiship cruise missiles for international export for nearly 2 decades, the last 2 years have indicated a clear increase in the development and sale of cruise missiles to foreign countries. The FL-1 and HY-2 are older generation missiles that remain in the inventory of several countries.



Air launched C601 in service with Iraq



C801 solid fuel antiship cruise missile



Likely customers for Chinese ASCMs include Bangladesh, Egypt, Iran, Iraq, Pakistan, Thailand and perhaps Burma. Proliferation is expected to continue, and China will be a major player in the international arms market for the 21st century. Iran has made a major commitment to the C802.

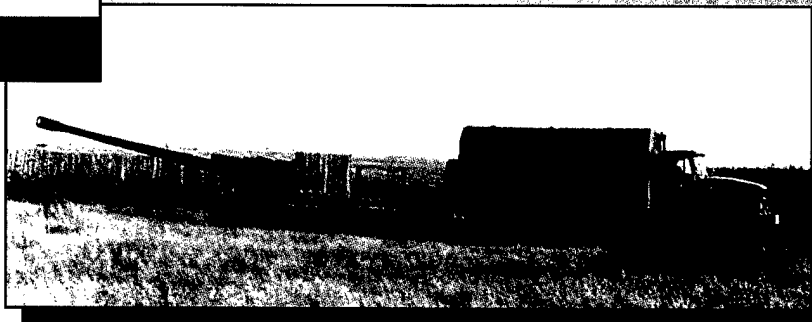
Increasing Mobility - Self propelled coastal defense artillery increases mobility and reduces long emplacement/displacement times making it less vulnerable to attack.



Russian BREDG mobile coastal defense artillery system with associated PC



South African 155-mm mobile field gun



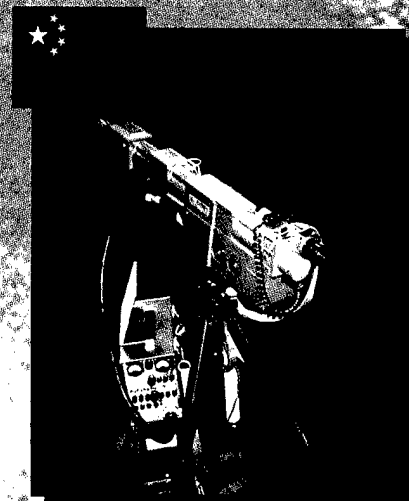
Towed coastal artillery - limited mobility

Laser weapons can be loosely categorized as high energy or low energy. Generally, low-energy laser weapons are designed to blind humans and jam or cause limited in-band damage to electro-optic sensors at short ranges. High-energy laser weapons can cause in-band damage to sensors at long ranges. They may be able to effect hard kill of airborne targets or satellites.

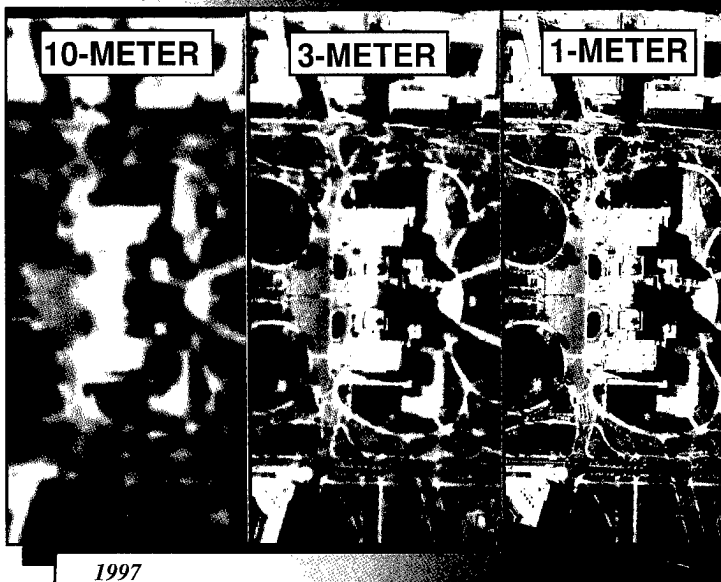
The North China Industries Corporation (NORINCO) offered for sale the Chinese-manufactured ZM-87 laser weapon in 1995. It can induce permanent eye injuries at 2 to 3 km and temporarily affect (dazzle or flash-blind) personnel at distances up to 10 km. The ZM-87 would also be effective against some night-vision systems at a range of 1.5 to 2 km.

Lasers:

- Blind
- Jam
- Hard Kill
- Challenge our firepower



Chinese ZM-87 Laser Weapon



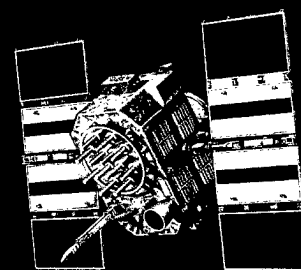
1997

The resolution of commercial satellite can be expected to dramatically improve in the next 20 years.

SURVEILLANCE & TARGETING...

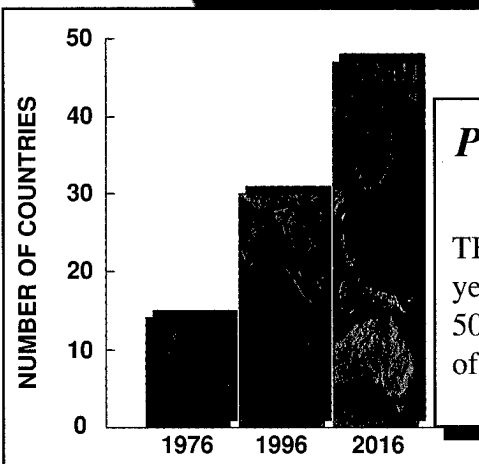
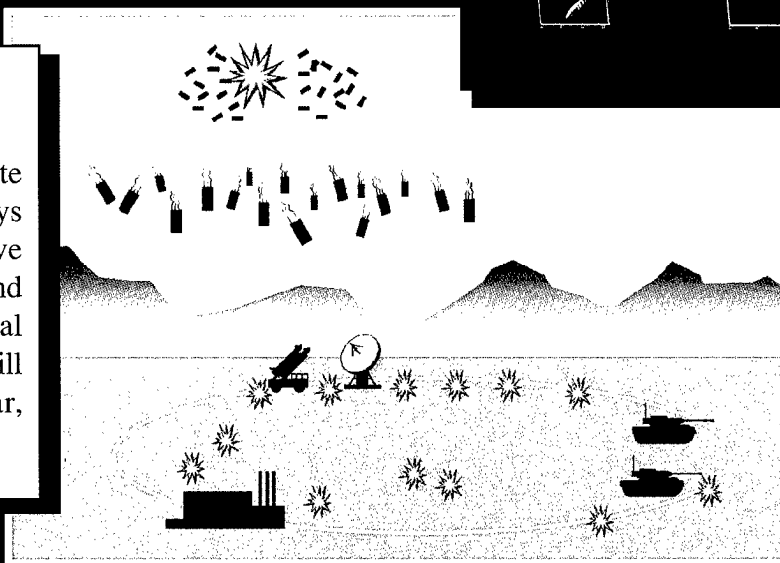
The ability to conduct surveillance from space in order to obtain intelligence has long been the privilege of only a few high technology nations. In the next 10 years, commercial satellite technology will extend the access to space based imaging systems through ground receiving stations and high data rate communications to virtually every nation in the world. It will become more difficult for U.S. Navy and Marine Corps forces to concentrate and change location in secret.

Global positioning technology will enhance accuracy.



LETHALITY...

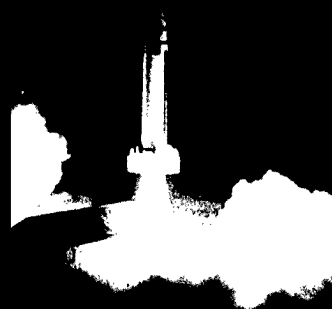
Increasingly, future payloads will separate from the missile body and will include decoys or other countermeasures. As CEPs improve due to the use of better reentry physics and improved guidance (probably using Global Positioning technology), warhead lethality will increase by using submunitions, nuclear, chemical, or biological payloads.



PROLIFERATION...

The number of countries that possess TBMs has almost doubled in the past 20 years, and the projection is that some 40 to 50 countries will deploy at least one type of TBM by 2016.

Chinese M-9 SRBM



Seventy percent of the world lives near the sea. Rapid population growth and urbanization brings high concentrations of dissatisfied potential aggressors into close contact with humanitarian missions and complicates Other Expeditionary Operations (OEO). Terrorists, guerrillas, and even regular forces can easily hide in built-up areas.



Rioting in Jakarta, Indonesia

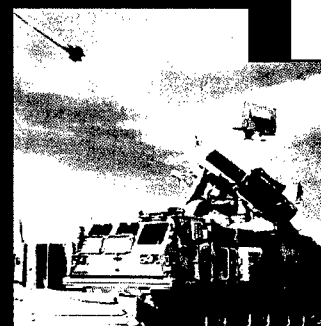


PLO guerrillas lay land mines in an urban area



Anti-personnel mines

The best landing beaches are easily identified and obstructed. Mobile air defense systems are difficult to target, but can be integrated into air warning nets as easily as fixed sites. Mobile gun and rocket artillery outrange most naval surface fire support systems, and target landing forces both in the water and on shore. Reaction forces are usually hard-hitting, all-arms armored units that know the homeland well. The Expeditionary Force is usually lighter and outnumbered.



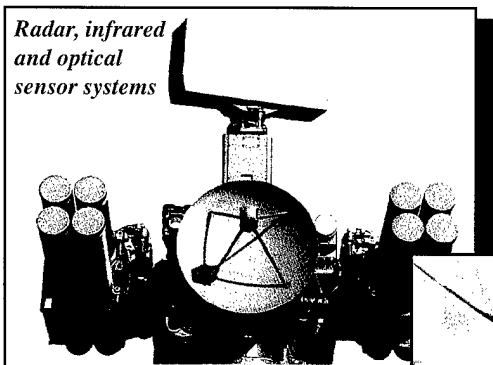
Crotale NG integrated missile system

CHALLENGES TO AIR DOMINANCE: INTEGRATED AIR DEFENSE

The French CROTALE NG incorporates many of the technologies being designed into new SAM systems and retrofitted into old ones around the world. Many systems simultaneously employ radar, optical and thermal target detection, and tracking sensors which are difficult to detect and counter. New missiles generate little smoke, are very fast, and are hard to see and outmaneuver. Computerization and automation reduce system reaction time, manpower and training requirements, and vulnerability to countermeasures. All system components are fitted on a single vehicle which can be easily concealed, deployed to defend specific areas, or moved with the troops.

MULTIPLE SENSORS

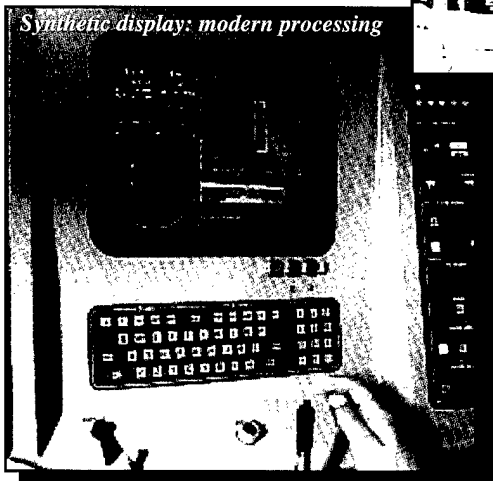
Radar, infrared and optical sensor systems



- Hard to jam
- Passive capability

AUTOMATION

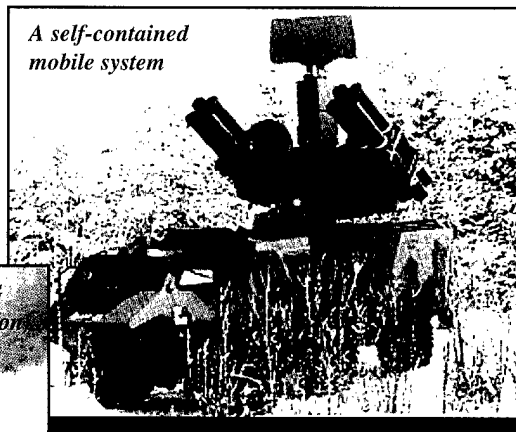
Synthetic display: modern processing



- Reduced manning
- Reduced training
- Fast reaction

MOBILITY

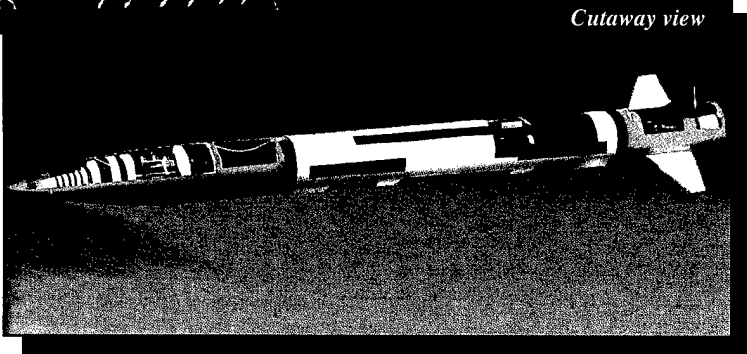
A self-contained mobile system



- Easy to deploy
- Easy to conceal
- Flexible

FAST, "SMART" MISSILES

Cutaway view



- Low smoke motor
- MACH 3.5+
- Smart fuze
- Focused warhead

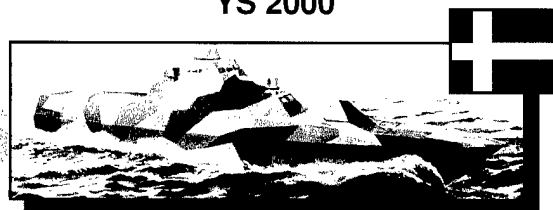
CHALLENGES TO INFORMATION SUPERIORITY: STEALTH

Stealth, or low observable technology, had been a black art practiced by high technology countries. Now the genie is out of the bottle as stealth has been revealed to be a collection of technologies. Shaping, to reflect away from the emitter, can now be done by any country. Coatings that absorb radar energy or infrared radiation are also now commercially available. Stealth technology will find increasing employment in ship, missile and aircraft design over the next 10 years.

SEA WRAITH



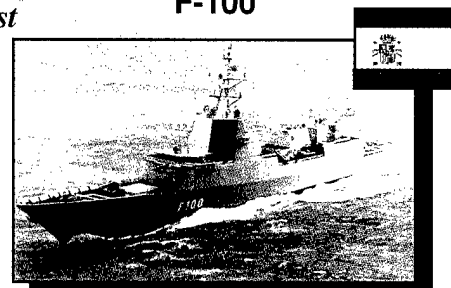
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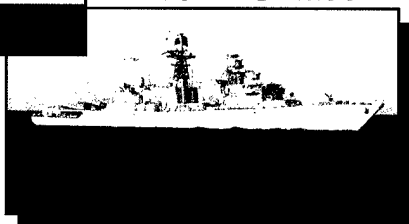
Benefits

- *Radar Cross Section (RCS) reduction lessens detection by hostile surveillance and fire control radar.*
- *RCS reduction enhances survivability against missile attack.*
- *Careful design shaping can substantially reduce RCS.*
- *IR signature reduction reduces risk of detection and attack from enemy IR sensors/ weapons.*

F-100



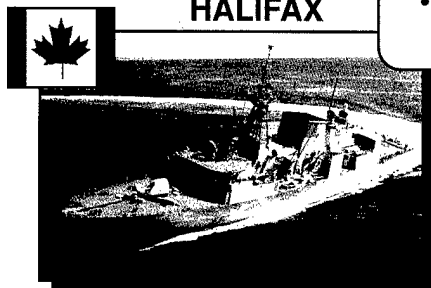
NEUSTRASHIMYY



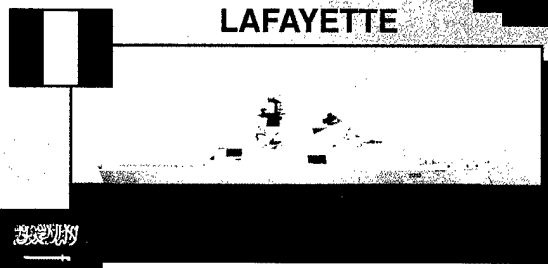
Applications...

- *Signature reduction incorporated into surface combatant designs produced worldwide*
- *Signature reduction is an important selling feature in export sales*
- *Technology levels vary significantly*
- *Most designs eliminate topside clutter*
- *Many radar absorbing materials available on world market*

HALIFAX



LAFAYETTE



LAHAV



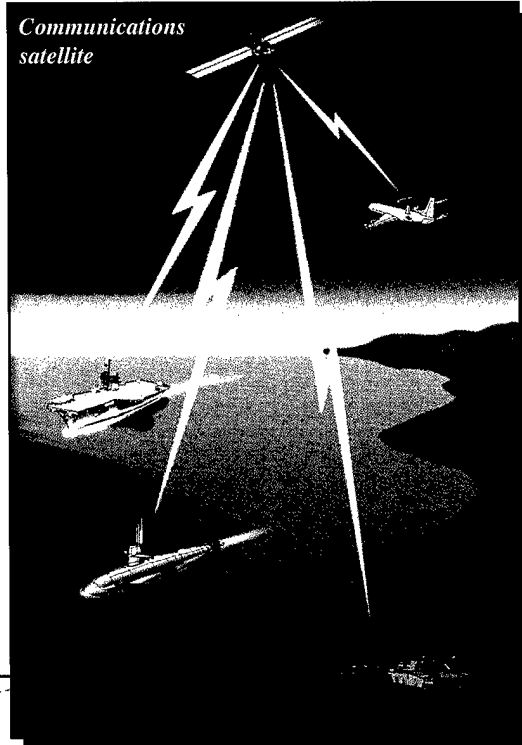
CHALLENGES TO INFORMATION SUPERIORITY: COUNTERMEASURES

A communications satellite is visible from an entire hemisphere. It is therefore vulnerable to the following:

- Foreign Signals Intelligence
- Exploitation
- Jamming

Future electronic attack systems will be capable of operating automatically against multiple naval sensors. These systems will be small, low cost, have increased jamming power, and be adaptable to a variety of platforms, including unmanned aerial vehicles (UAVs) and pods carried by aircraft. In addition, they will likely be networked to allow coordinated operation. Platform adaptability will allow flexibility in employment of EW systems, and use of EW systems on small, low observable platforms will make them survivable.

UAVs provide electronic attack systems with an inexpensive and low observable carrier. They can be sent out in numbers and the loss of one will not guarantee the elimination of the capability.



Miniaturization allows strike aircraft to carry their own electronic warfare pods. Shown is an EW pod on the wing of a Russian Su-30MK.

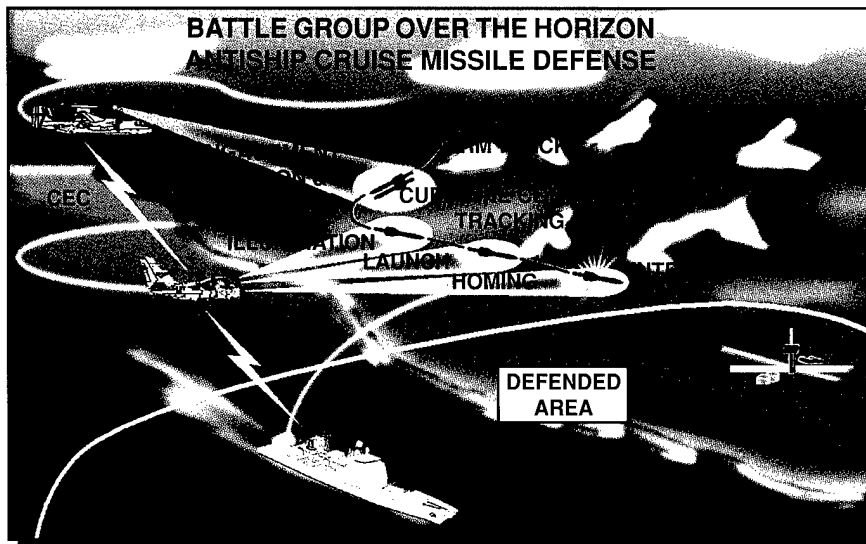
COOPERATIVE ENGAGEMENT CAPABILITIES

DEALING WITH THREATS WHILE THEY ARE STILL ON THE HORIZON:

In the *Challenge to Maritime Dominance* section, antiship cruise missiles were shown to be increasing in speed. It will take only seconds to cross the radar horizon and reach a target.

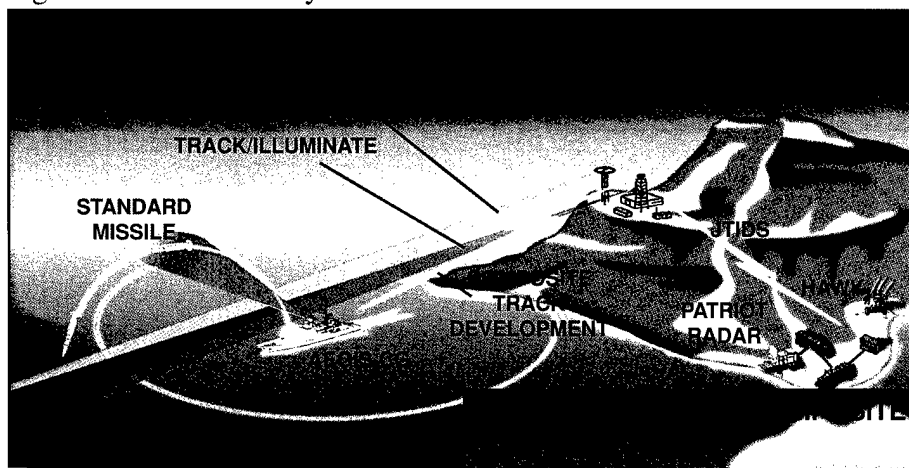
Formerly, the Navy could detect threats that are over the horizon using early warning aircraft, but not engage until the target has crossed a firing ship's radar horizon.

Cooperative Engagement Capability (CEC) effectively puts fire control accuracy tracking radars aloft and links many sensors together in a seamless synthesis.



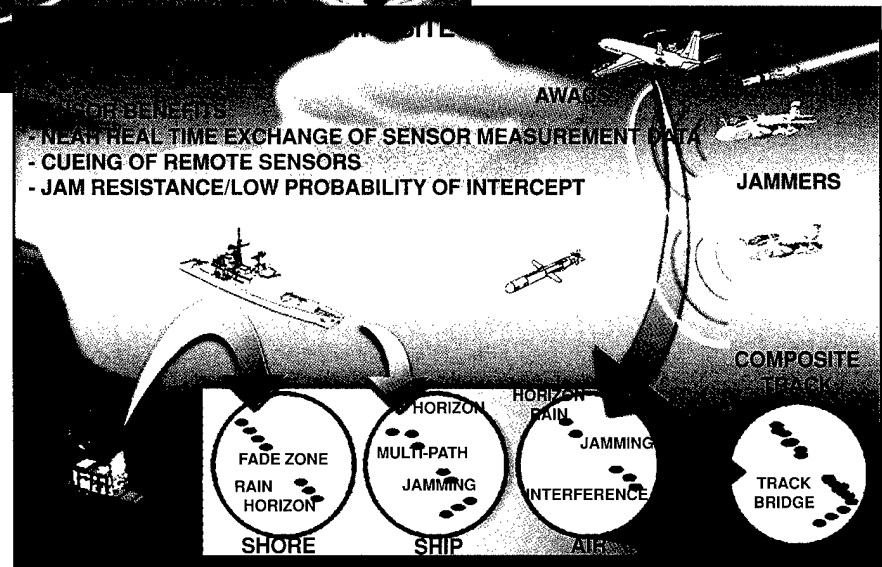
Over the horizon engagements during the Mountain Top Demo with CEC have been successfully demonstrated with an AEGIS cruiser and simulated airborne fire control illumination.

Tracking data was passed successfully to a PATRIOT battery.



Composite tracking: Data from many sensors are merged to provide a more complete picture of an incoming target.

The result is a finer continuous track that is very resistant to atmospheric and jamming.



THEATER BALLISTIC MISSILE DEFENSE

As shown in the Theater Ballistic Missiles (TBMs) portion of *Challenges to Firepower* in this publication, TBMs can now threaten fixed positions of elements of Expeditionary Forces. In the future, the increased accuracy of TBMs will allow them to hit a ship directly when it is not underway or pinpoint Expeditionary Forces as they cross the beach. Submunition

payloads will increase lethality as accuracy increases. As TBM ranges increase also, the area threatened will increase from a local littoral area to an entire region.

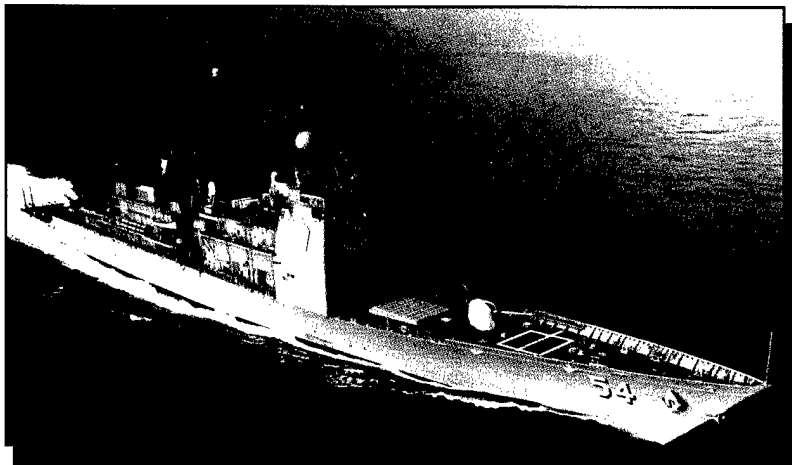
The U.S. Navy is rapidly moving to develop an area defense capability against TBMs leveraging off the AEGIS Combat System (principally the SPY-1 Radar and the Standard Missile). In the near term, U.S. Navy AEGIS ships will be able to defend the area of an amphibious landing, a sea port, a coastal city, or airfield against TBM attack. In the far term, the Navy Theater-Wide defense capability will engage TBMs at higher altitudes, thereby providing a much larger engagement envelope, and help to protect an entire theater. When integrated with the Navy Area Defense (or lower tier system), overall missile effectiveness will be significantly increased.



NEAR TERM

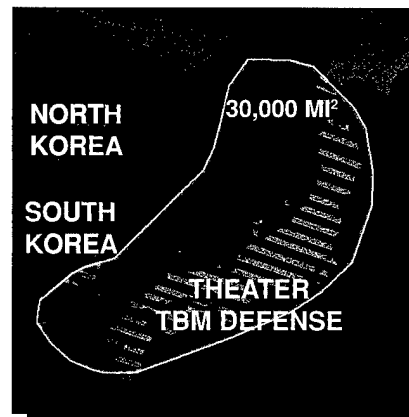


Area Defended: 7,500 square miles



AEGIS cruisers will carry improved Standard SM-2 Blk IVA missiles to provide the Navy Area Defense capability.

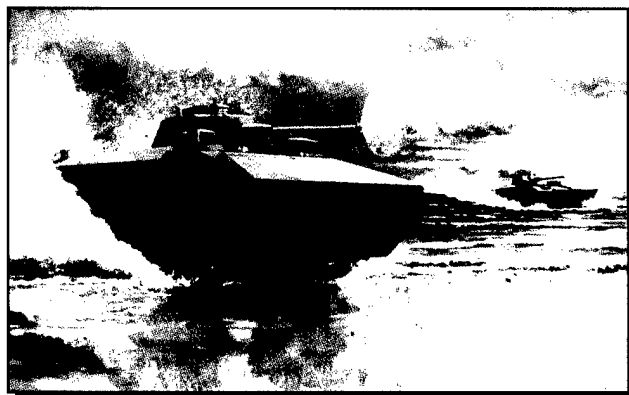
FAR TERM



Area Defended: 30,000 square miles

ENHANCING MANEUVER

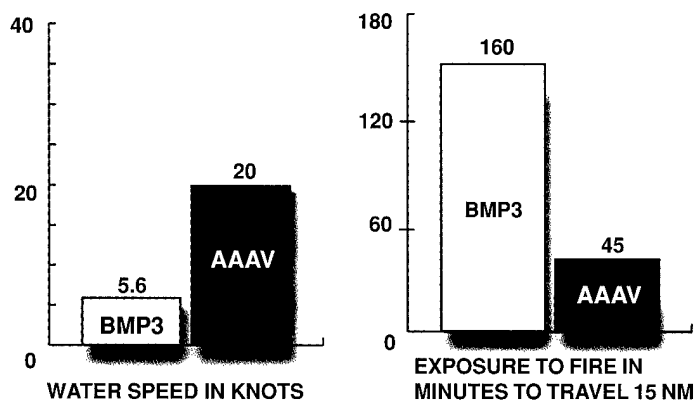
Challenges to Firepower and Maneuver Dominance include the aggressor's ability to rapidly turn any potential landing beach – or other operating area ashore – into a deathtrap of obstacles, mines, and targeted artillery and missiles. Marines have derived innovative responses before; the armored amphibians of the 1940s and helicopter vertical envelopment in the 1950s are two examples. Amphibious vehicles worldwide have long been an awkward compromise between ground mobility and seaworthiness: slow on land, slower in the water, lightly armed and armored in comparison to infantry fighting vehicles. The Advanced Amphibious Assault Vehicle (AAAV) redresses many of these shortcomings. With a water speed in excess of 20 knots, it slashes transit time from ship-to-shore by more than two thirds. Ballistic armor is increased to



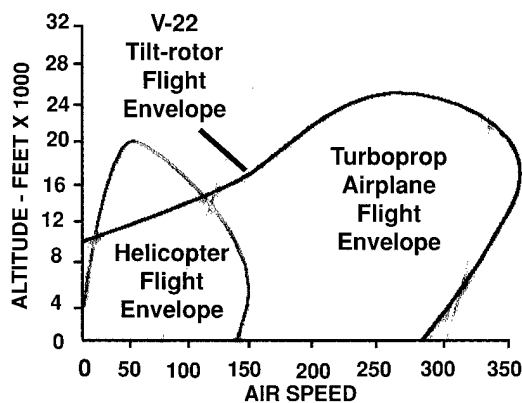
The Advanced Amphibious Assault Vehicle will reduce exposure to fire from shore and increase ballistic protection for U.S. Marines.

protect against the heaviest machineguns. Outstanding cross-country mobility preserves ashore the initiative gained by maneuvering at high speed from the sea.

AAAV PERFORMANCE

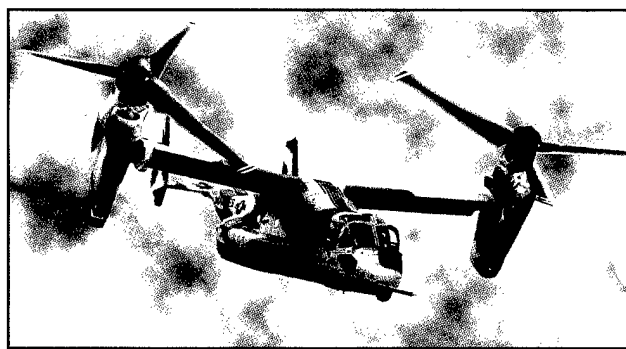


V-22 PERFORMANCE



...TWICE AS FAST AS A HELICOPTER

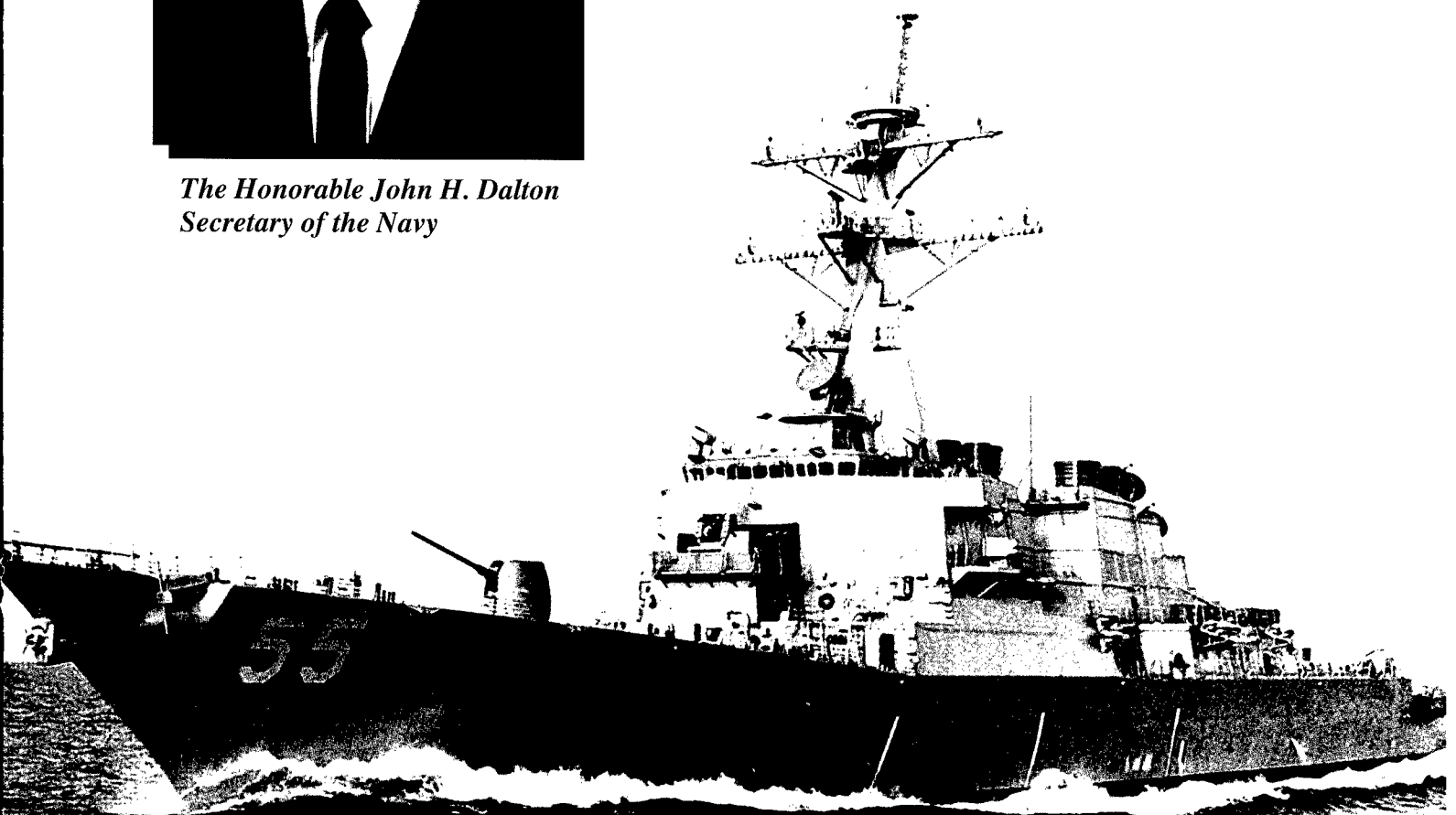
The V-22 Osprey Tilt-rotor Joint Service Aircraft adds yet another dimension to enhanced maneuver, and pushes vertical envelopment into the 21st Century. Combining the airspeed of a turboprop airplane with the flexibility in basing and operations of the helicopter, the V-22 Osprey preserves the Expeditionary Commander's initiative and enhances his ability to launch operations from over the horizon.



The V-22 Osprey Tilt-rotor Joint Service Aircraft vastly expands the range and speed of expeditionary vertical envelopment.



*The Honorable John H. Dalton
Secretary of the Navy*



"Expeditionary Forces have been key elements of our Navy and Marine Corps since the American Revolution, and they are the cornerstone of our Forward From the Sea strategy. As we approach the challenges and uncertainty of the 21st Century, the expeditionary warfare mission will demand flexible, mobile, and sustainable forces across the spectrum of engagement and crisis: from forward presence operations to humanitarian support to crisis response to war. Our success as we deploy—and fight—forward in these diverse roles will depend immeasurably on accurate, predictive intelligence reaching deployed commanders—on time and in a manner which will enhance the operations."