

DEADLY QUIET

One hundred years after the United States Navy began using subs, the first submarine without a periscope is under construction. This is just one indication that the VIRGINIA-class attack submarine will be the most technologically sophisticated ship under the seas. Massive firepower, cutting edge

intelligence gathering capabilities, and revolutionary deck design equip these submarines for rapidly emerging 21st century threats. Joining the fleet in 2004, the subs are the first ever designed from the keel up for multimission, near-land operations. Here's a look at what's under their skins.

Dominating the seas and coastlines, the VIRGINIA-class submarines will gather intelligence, deploy special forces, and attack land targets

VIRGINIA

Displacement	7,300 tons	Length	377 feet
Beam	34 feet	Speed	In excess of 25 knots
Depth	In excess of 800 feet	Weapons	

- Tomahawk Land-Attack Missiles
- Block II Advanced Capability Torpedoes
- Advanced Mobile Buoys
- Unmanned Underwater Vehicles

■ PROPULSION DUCT

VIRGINIA's propulsor, an advanced design propeller, is shielded by a duct

SONAR ALL AROUND

VIRGINIA-class submarines will have vastly improved sonar capabilities. The first subs to employ a "chin" sonar array, the VIRGINIA-class will accurately map the ocean floor and mine fields using a combination of the chin and sail arrays. Additionally, the three sonar arrays on each side and towed arrays provide quick target location information.

○ Sonar arrays

■ BALLAST/TRIM TANKS

Tanks, both forward and aft, are flooded with water to submerge the sub. The water is ejected in order to surface. Other tanks, "trim tanks," help compensate for variations in weight, stabilizing the sub.

■ ENGINE ROOM

The rear, or aft end of the VIRGINIA-class houses the propulsion machinery, electrical power equipment, hydraulic systems, air compressors, seawater desalinization equipment and air conditioning equipment.

■ MANEUVERING ROOM

Crew in this room control the throttle to the turbines driving the propulsor. They also control the boat's electrical generators and nuclear reactor.

■ REACTOR COMPARTMENT

State-of-the-art reactor plant provides fuel for the life of the ship.

■ LOCKOUT TRUNK

VIRGINIA will be the first class of submarines to employ a built-in Navy SEAL staging area. This nine-man airlock chamber will allow an entire Special Forces team to exit and enter the sub while minimizing the chamber with water one time.

■ BERTHING

Equipped with 119 permanent bunks, an additional 51 bunks can be set up in the torpedo room for special assignments.

■ Advanced SEAL Delivery System (ASDS)

The "ASDS" is a mini-submarine designed to be deployed with a Special Forces coastal assault team. VIRGINIA can link with this type of craft or the more conventional Dry Deck Shelter.

■ MASTS

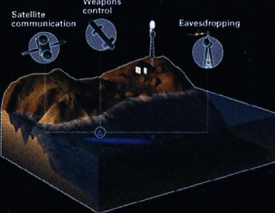
Housing for various electronics, they include:
• **ESM mast**: Electronic Support Measures mast houses the global positioning antenna and a receiver to detect radar of planes, ships, and surfaced subs.
• **High data rate mast**: Receiving and transmitting antennas.
• **Photonic masts**: Cameras mounted on masts replace traditional optical periscopes.

■ LAND ATTACK

Twelve Vertical Launching System (VLS) tubes, combined with four torpedo tubes, permit VIRGINIA to launch land attack missiles.

VIRGINIA'S BIG EARS

The ultimate eavesdropper, VIRGINIA will be able to pick up details of important signals from miles away—signals our satellites can't detect. It can also talk to satellites and control weapons.



■ HULL

High yield steel that withstands pressure at depths greater than 800 feet has a seamless rubberlike substance molded onto its surface.

■ BOW DOME

The nose cone is constructed of a composite material enabling sound to pass through it to the sonar sphere.

■ SONAR SPHERE

Hydrophones mounted on the sonar sphere make one of VIRGINIA's "ears." These hydrophones are passive sensors that can detect sound waves produced by "contacts" many miles away.

■ BOW DOME

"Chin" sonar array. See how far left "SONAR ALL AROUND."

GRAPHIC BY STEPHEN ROULETTE

The USS *Illinois*, a new attack submarine is an advanced stealth multi-mission nuclear-powered submarine for deep ocean anti-submarine warfare and littoral (shallow water) operations.

Design: The hull size is length 377ft by beam 34ft and the displacement is 7,300 tons submerged, which is smaller than the more expensive Seawolf attack submarine with displacement 9,137 ton submerged. The hull structure contains structurally integrated enclosures, which accommodate standard 19" and 24" width equipment for ease of installation, repair and upgrade of the submarine's systems. The submarine is fitted with modular isolated deck structures, for example the submarine's command center will be installed as one single unit resting on cushioned mounting points. The submarine's control suite is equipped with computer touch screens. The submarine's steering and diving control is via a four-button, two-axis joystick. The noise level of the Virginia is equal to that of the US Navy Seawolf, SSN 21, with a lower acoustic signature than the Russian Improved Akula Class and fourth-generation attack submarines. To achieve this low acoustic signature, the Virginia incorporates newly designed anechoic coatings, isolated deck structures and a new design of propulsor. Goodrich is supplying high-frequency sail array acoustic windows and composite sonar domes.

Weapon systems: The submarine is equipped with 2 vertical missile launch modules and four 21" torpedo tubes. The vertical launching system has the capacity to launch 16 Tomahawk submarine-launched cruise missiles (SLCM) in a single salvo. There is capacity for up to 26 mk48 ADCAP mod 6 heavyweight torpedoes and sub harpoon anti-ship missiles to be fired from the 21" torpedo tubes. Mk60 CAPTOR mines may also be fitted. An integral lock-out / lock-in chamber is incorporated into the hull for special operations. The chamber can host a mini-submarine, such as Northrop Grumman's Oceanic and Naval Systems advanced SEAL delivery system (ASDS), to deliver special warfare forces such as navy sea air land (SEAL) teams or Marine reconnaissance units for counter-terrorism or localized conflict operations.

Propulsion: The main propulsion units are the GE pressure water reactor S9G, designed to last as long the submarine, two turbine engines with one shaft and a United Defense pump jet propulsor, providing 29.84MW. The speed is over 25kt submerged.