

**revised bow design  
and solar array**

- new water-tight, large aperture bow for good access at any sea level
- improved "ring" design, attachments + ease of "service" are proven
- rings + struts in intermediate panel structure (see design)

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# **VIRGINIA-Class Submarine: Two for Four in 2012 (A)**

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# objectives:

- overview of current technology (ssns 774-783)
- DISCUSS new features for block III (ssns 784-791)
- How does it help the navy?

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# CURRENT VIRGINIA CLASS

- S9G reactor
- photonic masts
- 12 VLS (Tomahawk and Harpoon missiles)
- 4 533mm torpedo tubes (MK-48 ADCAP)
- Low and high frequency towed sonar arrays
- pump jet propulsors

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www.theb...  
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**GENERAL DYNAMICS**  
Electric Boat

**NAVY** NEWPORT SHIPBUILDING

**VIRGINIA**

Displacement	7,700 tons	Length	377 feet
Beam	34 feet	Speed	In excess of 20 knots
Depth	In excess of 800 feet	Weight	Over 7,000 tons

- Tomahawk Land-Attack Missiles
- Mark 48 Advanced Capability Torpedoes
- Advanced Mobile Mines
- Unmanned Underwater Vehicles

**SONAR ALL**

VIRGINIA-class submarines have advanced sonar capabilities. The first submarine of the class will accurately locate targets using a combination of the three sonar arrays. This allows for quick target location in the dark.

Towed arrays eliminate much of the blind spot behind a sub.

©2000 by Stephen Rountree, U.S. Navy

class subs

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**All HANDS**

See the Submarine Centennial website at [www.navy.mil](http://www.navy.mil) and select the button, "Submarine Centennial"

**GENERAL DYNAMICS**  
Electric Boat

**NEWPORT NEWS SHIPBUILDING**

# DEADLY QUIET

One hundred years after the United States Navy began using submersibles, 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.

VIRGINIA	
Displacement	7,700 tons
Length	377 feet
Beam	34 feet
Speed	In excess of 25 knots
Depth	In excess of 800 feet
Weapons	<ul style="list-style-type: none"> <li>• Tomahawk Land Attack Missiles</li> <li>• Mark 48 Advanced Capability Torpedoes</li> <li>• Advanced Mobile Mine</li> <li>• Unmanned Underwater Vehicles</li> </ul>

## 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.



(2004) By Stephen Bourne, U.S. Navy, Electric Boat Corporation, and Newport News Shipbuilding

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

### 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 filling the chamber with water one time.

### BERTHING

Equipped with 119 permanent bunks, an additional 41 bunks can be set up in the torpedo room for special assignments.

### COMMAND & CONTROL

Use of an electronic fiber optic imagery system instead of a traditional periscope allows the control room to be located on the second deck level. The room features large screen displays and a wide open layout to improve information flow and decision making.

### TORPEDOES

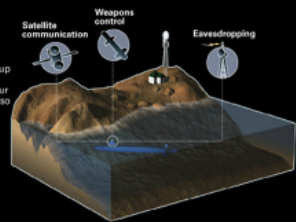
Torpedoes, mines, and missiles are ejected from four torpedo tubes by an air turbine pump (ATP). The ATP draws in water, forcing it into the torpedo tube. The weapon leaves the ship through rotary shutter doors.

### 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 masts**  
 Receiving and transmitting antennas.  
**Multifunction masts**  
 House radio receiving and transmitting antennas.  
**Mission reconfigurable mast**  
 Photonics masts  
 Cameras mounted on masts replace traditional optical periscopes.

## 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.



### LAND ATTACK

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

### 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.

### "Chin" sonar array

See box, far left, "SONAR ALL AROUND."

GRAPHIC BY STEPHEN BOURNE

# revised BOW Design and sonar Array

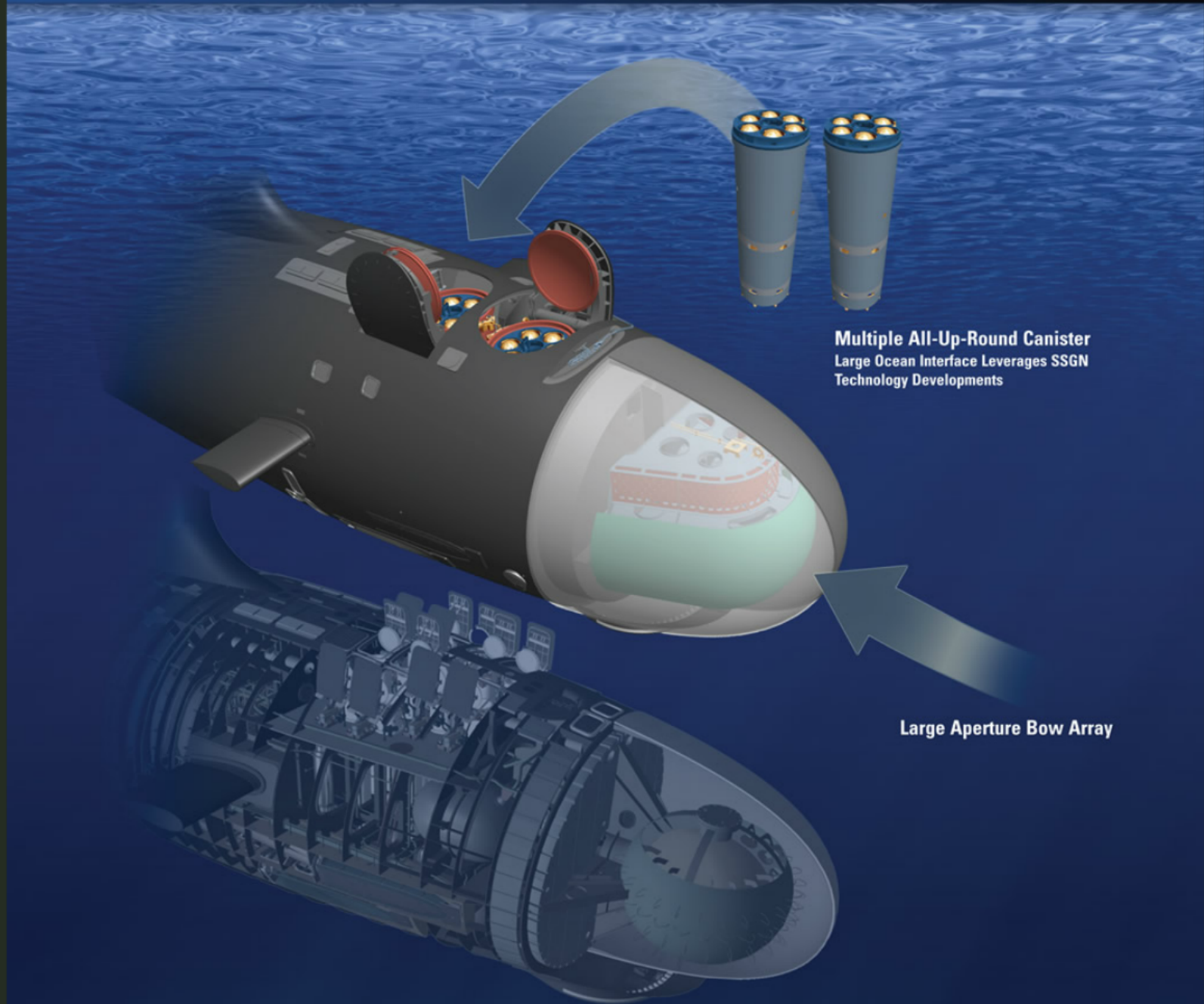
- new water-backed Large Aperture BOW incorporates passive array as well as medium frequency array
- Eliminates many SUBSAFE penetrations = ease of maintenance, more room
- improvements in urethane panel structure and design

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# **VIRGINIA Class Bow, Redesign For Affordability**

**Reduced Cost, Increased Flexibility**



**Multiple All-Up-Round Canister**  
Large Ocean Interface Leverages SSGN  
Technology Developments

**Large Aperture Bow Array**

# New Launch System

- Submarine missile canister (SMC)
- Takes up less space with "6-shooter" design
- More room for storing missiles

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# Saves Money

- overall goal is \$200 million saved per boat by FY2012
- With current improvements, \$42 million saved thus far (approx 20% of goal)
- Bow design is still being developed

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