Get wet with submarine tech photos

By Daniel Terdiman , CNET News.com

We take a look at the inner workings of a Virginia-class fast-attack nuclear submarine built in the US.

(Credit: Daniel Terdiman/CNET)

In 2007, at the Northrop Grumman Shipbuilding yard in Newport News, Virginia — where the first of the next-generation aircraft carrier class, the Gerald R. Ford, is currently under construction — the US Navy rolled out the North Carolina, the fourth of the Virginia-class fast-attack nuclear submarines.

Today, the North Carolina (SSN 777) is stationed at the New London Submarine Base (as seen in the image above), commanded by Wes Schlauder. The Virginia is the first class of submarines to have true 21st century on-board communications, including a fibre-optic intranet, a server room and large digital screens placed throughout the ship that show what is being viewed through the periscope.

(Credit: Daniel Terdiman/CNET)

This sign greets all who come aboard the North Carolina.

(Credit: Daniel Terdiman/CNET)

Most submarine movies have created the romantic image of the skipper in a darkened room, looking through two eye holes, at what can be seen with the periscope. But with the Virginia class, that classic image is no more. Now, the imagery coming from the periscope is translated on to large digital monitors that are spread throughout the North Carolina, including here, in the main control room, as well as in the commander's personal quarters.

The photo above shows a zoomed in image of the classic submarine Nautilus, at the museum that is adjacent to the New London Submarine Base. The Nautilus is a full kilometre and a half away from the North Carolina, meaning that the image on this screen — which is very crisp — is extremely magnified.

In the lower right quadrant of the screen, the slim wedge represents how much of the 360-degree view from the North Carolina the periscope is looking at.

(Credit: Daniel Terdiman/CNET)

Here, we see a much wider angle view from the periscope, as designated by the wider wedge.

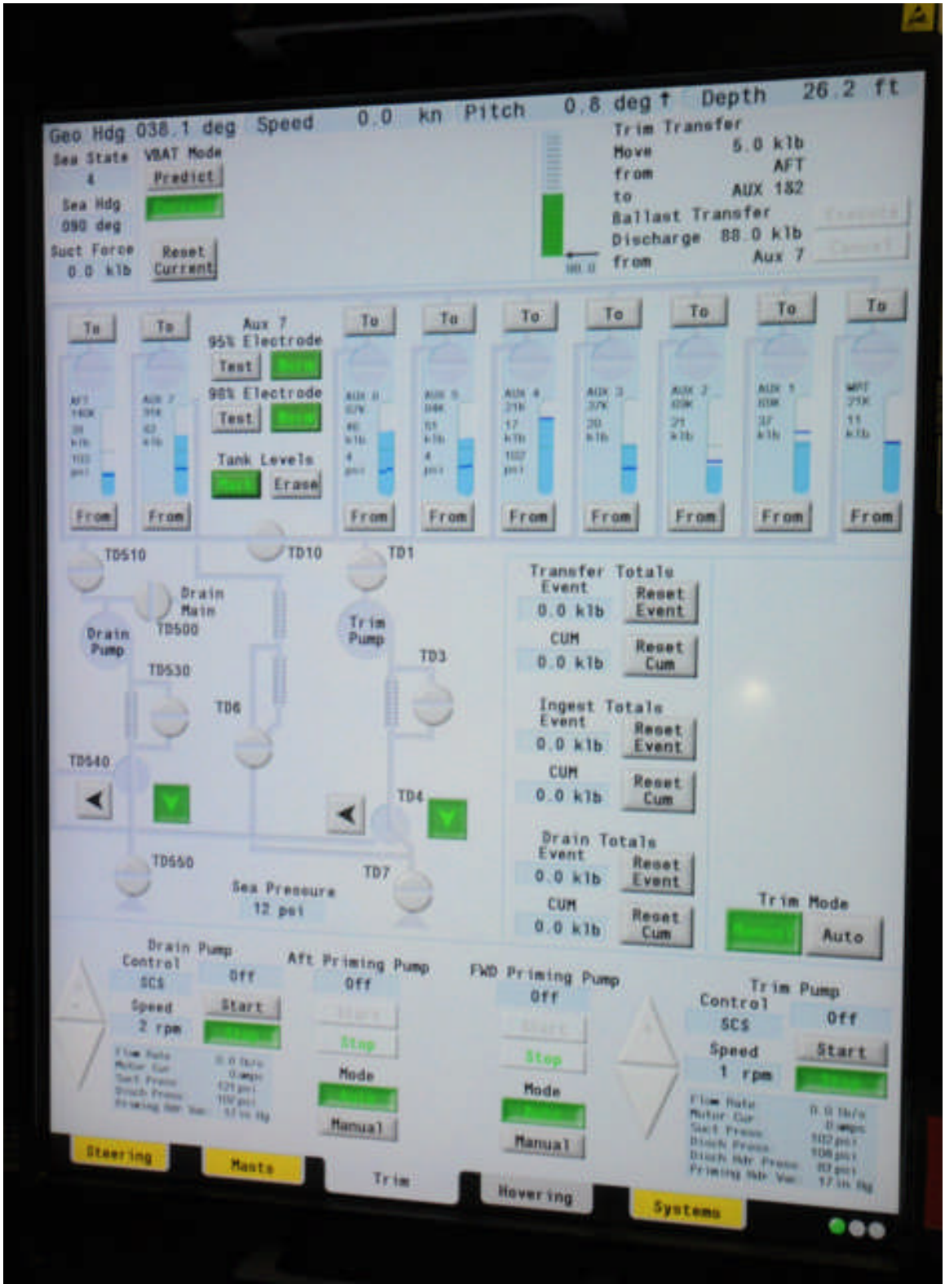
(Credit: Daniel Terdiman/CNET)

In this photo, Schlauder uses the joystick that controls the periscope's direction and other criteria. With that joystick, anyone can rotate the periscope 360 degrees, tilt the view up or down, and zoom in so that details at a kilometre away are easily discernible.

(Credit: Daniel Terdiman/CNET)

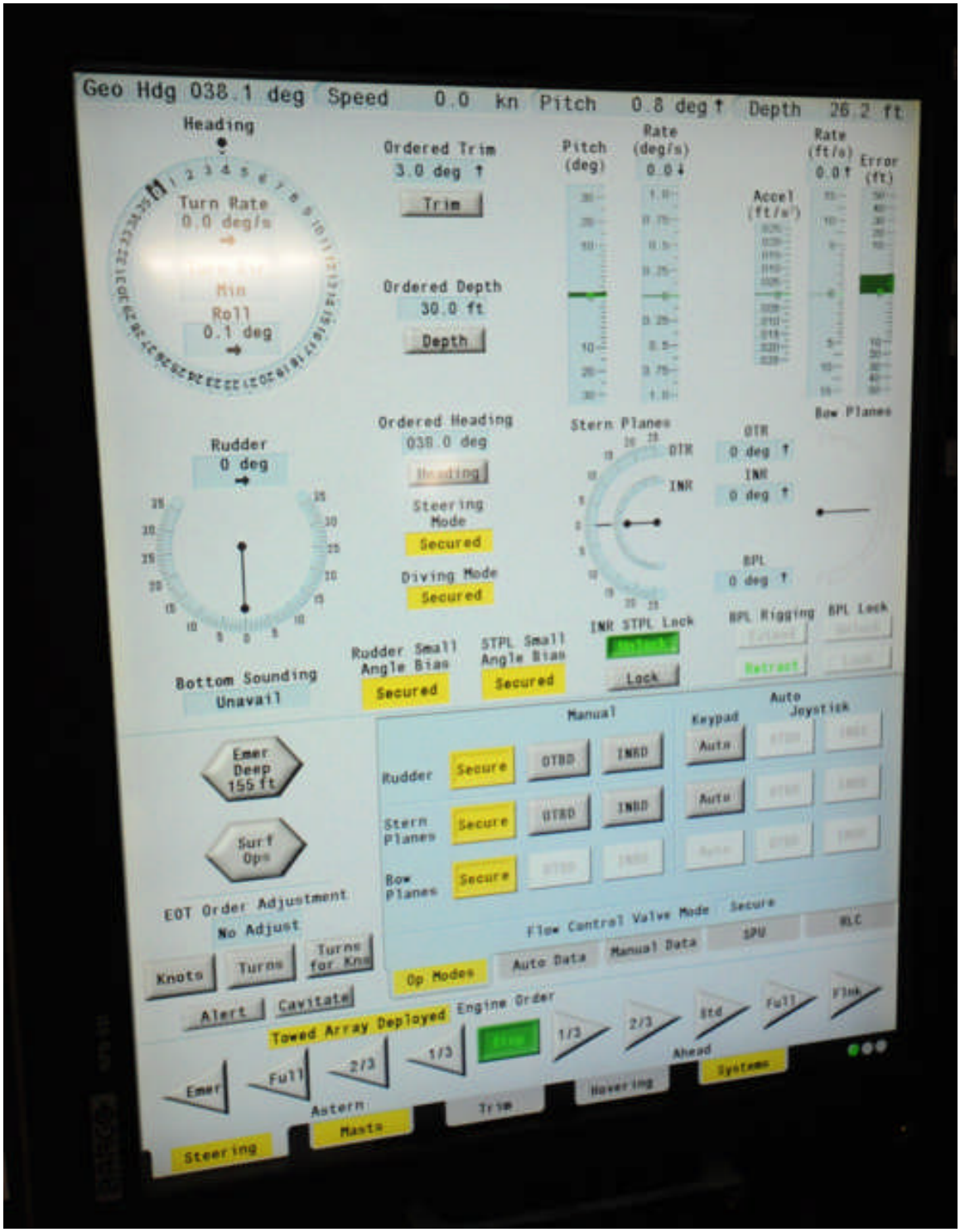
In the past, submarines had one sonar room, where the commander could look out through the periscope and where the sonar work was done; and a second room for the drivers of the sub. Now, thanks to modern communications, navigation and driving systems, those separate rooms have been combined into one, modern nerve centre.

This is a view of the pilots' station, with two seats and a full set of controls for the pilot and the co-pilot.



(Credit: Daniel Terdiman/CNET)

This screen showcases all the digital trim controls, those that are used to bring the submarine down or up in the water, based on how much air is in the ballast tank.

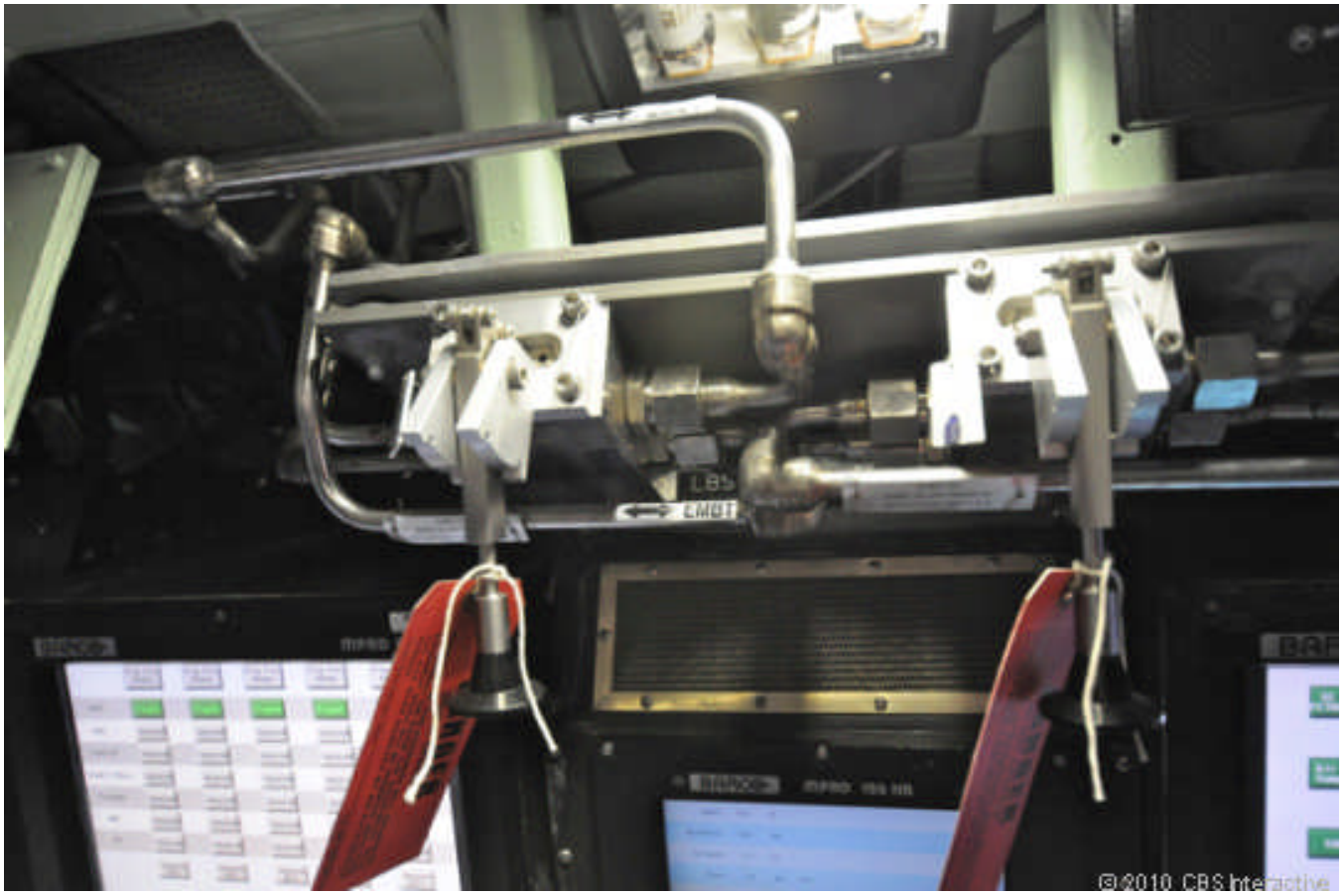


(Credit: Daniel Terdiman/CNET)

This screen has the digital controls for navigating the submarine.

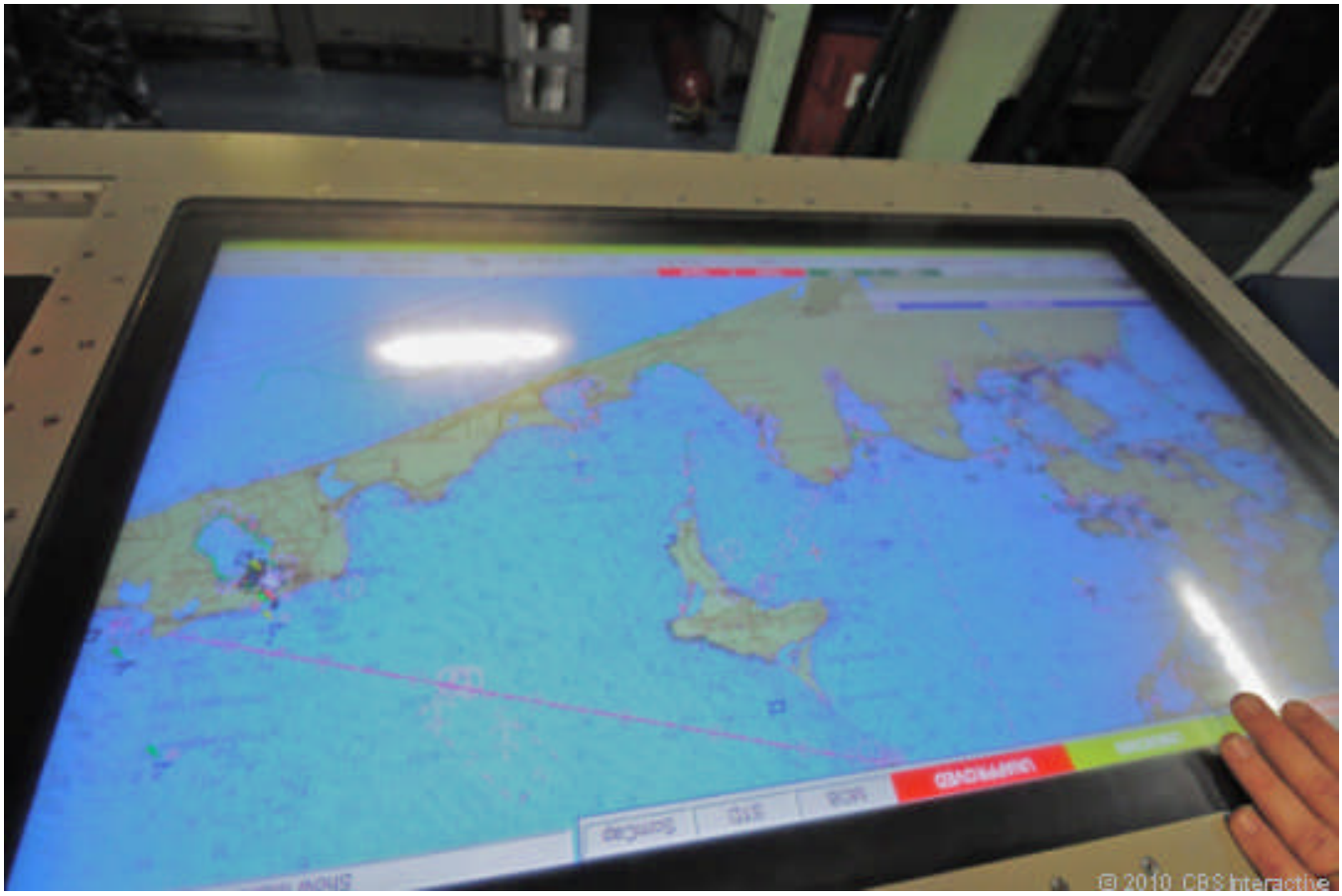
(Credit: Daniel Terdiman/CNET)

A bank of servers in the North Carolina's computer room. All the digital data on board the submarine flows through these servers.



(Credit: Daniel Terdiman/CNET)

In an emergency, the submarine can be forced to the surface in a hurry by pulling these levers, which are located just above the pilots' electronic navigation station. By pulling these levers, all water is quickly expelled from the ballast systems, which would cause the sub to shoot up to the surface, and likely break through like a whale jumping out of the water.

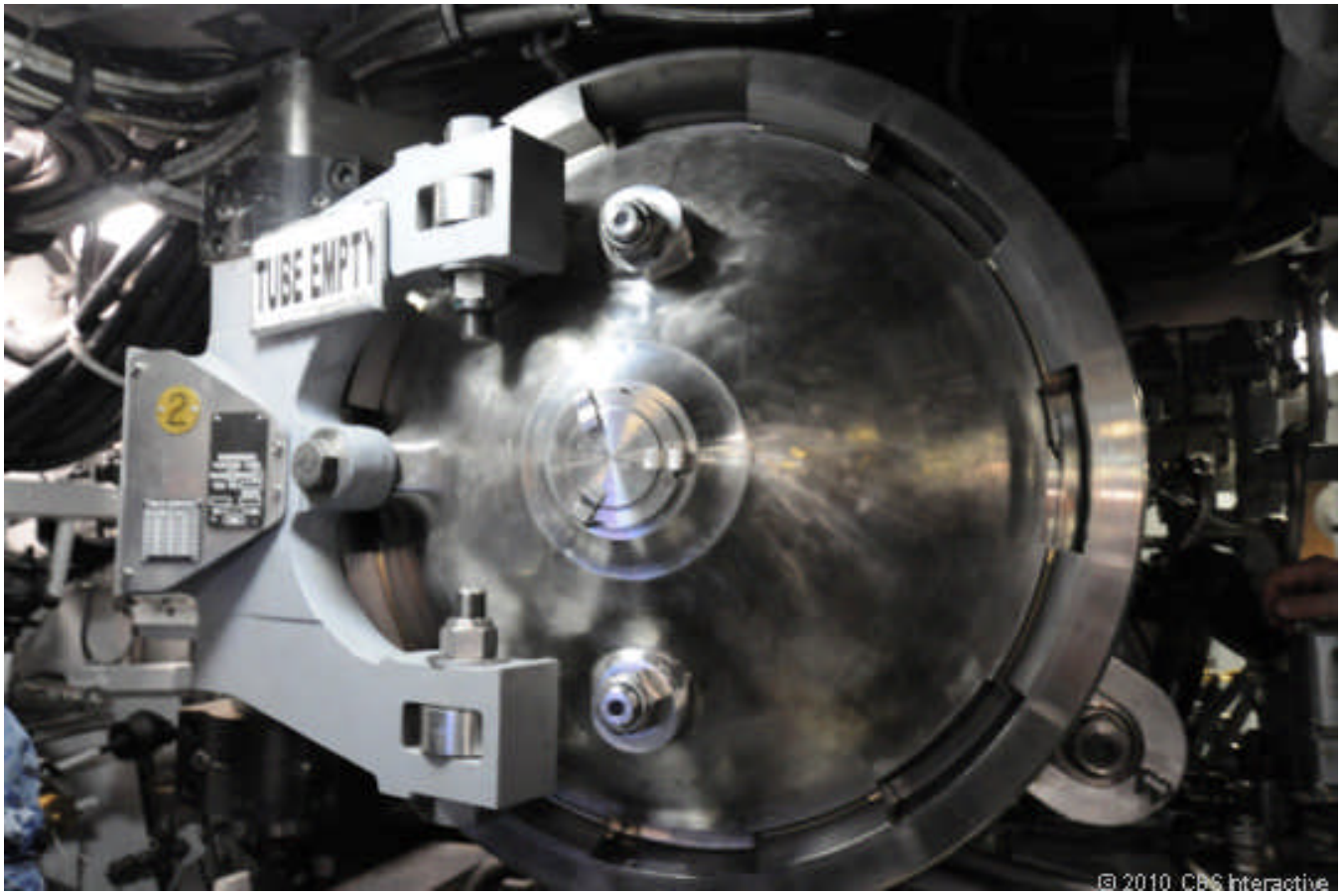


(Credit: Daniel Terdiman/CNET)

This digital screen shows the North Carolina's coordinates, or any other location, either by virtue of GPS when above water or if under water, by a sophisticated system of sensors that keep highly accurate track of the boat's movement in three dimensions.

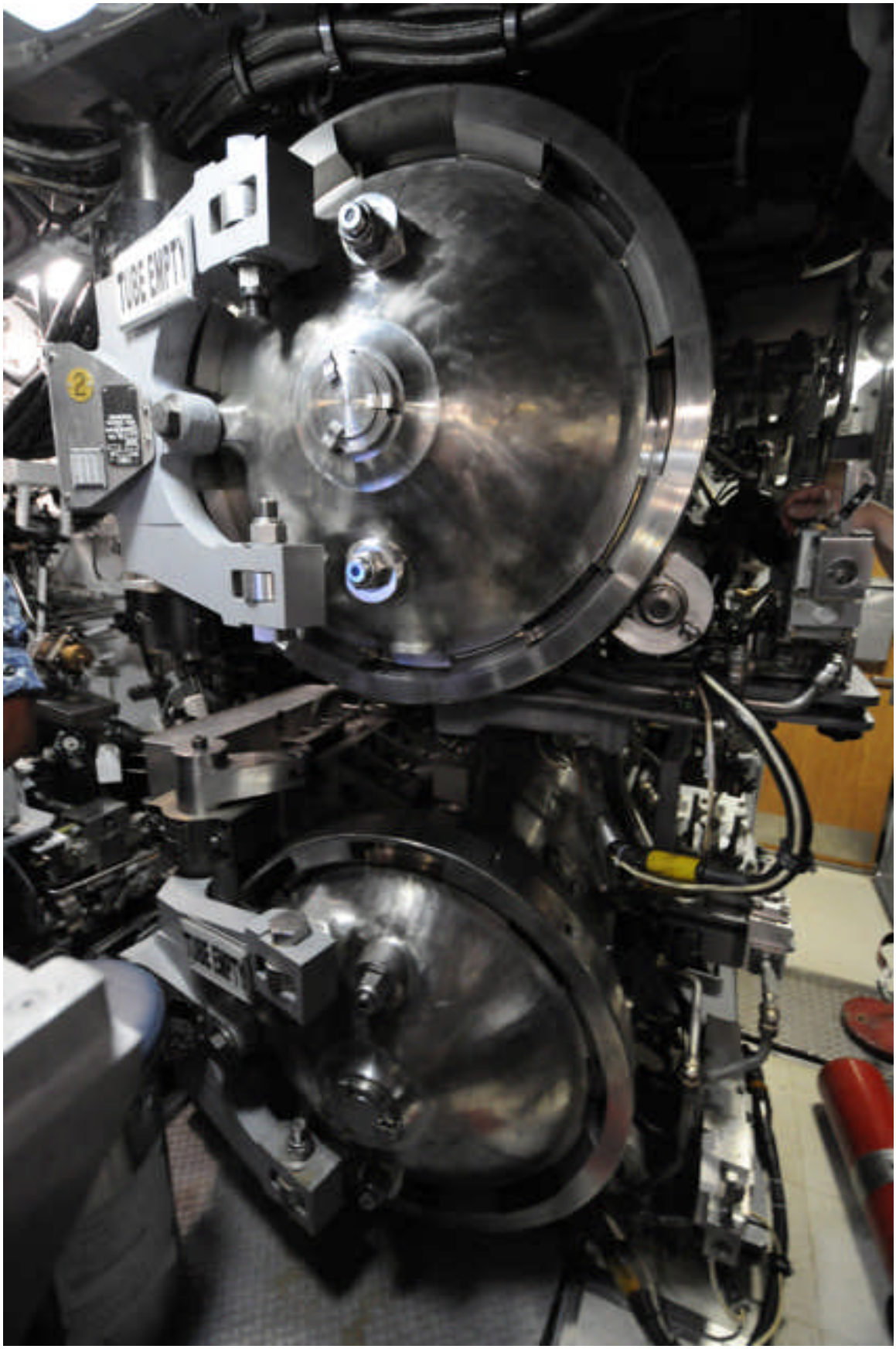
(Credit: Daniel Terdiman/CNET)

Commander Schlauder looks at two of the North Carolina's weapons, a Mark 48 torpedo (left) and a Tomahawk missile (in the sheath on the right), which are being held in cradles. The submarine can carry as many as a dozen torpedoes at any time, but if necessary, the torpedo room can be largely cleared out — it is mostly modular — and a Special Forces crew of as many as 36 can be housed here.



(Credit: Daniel Terdiman/CNET)

Using the special cradle system, the torpedoes are moved into place and then are essentially shoved at high speed out of these tubes. It takes a highly efficient crew about 10 to 15 minutes to prepare and launch a torpedo, though a crew can be working on launching multiple torpedoes in succession.

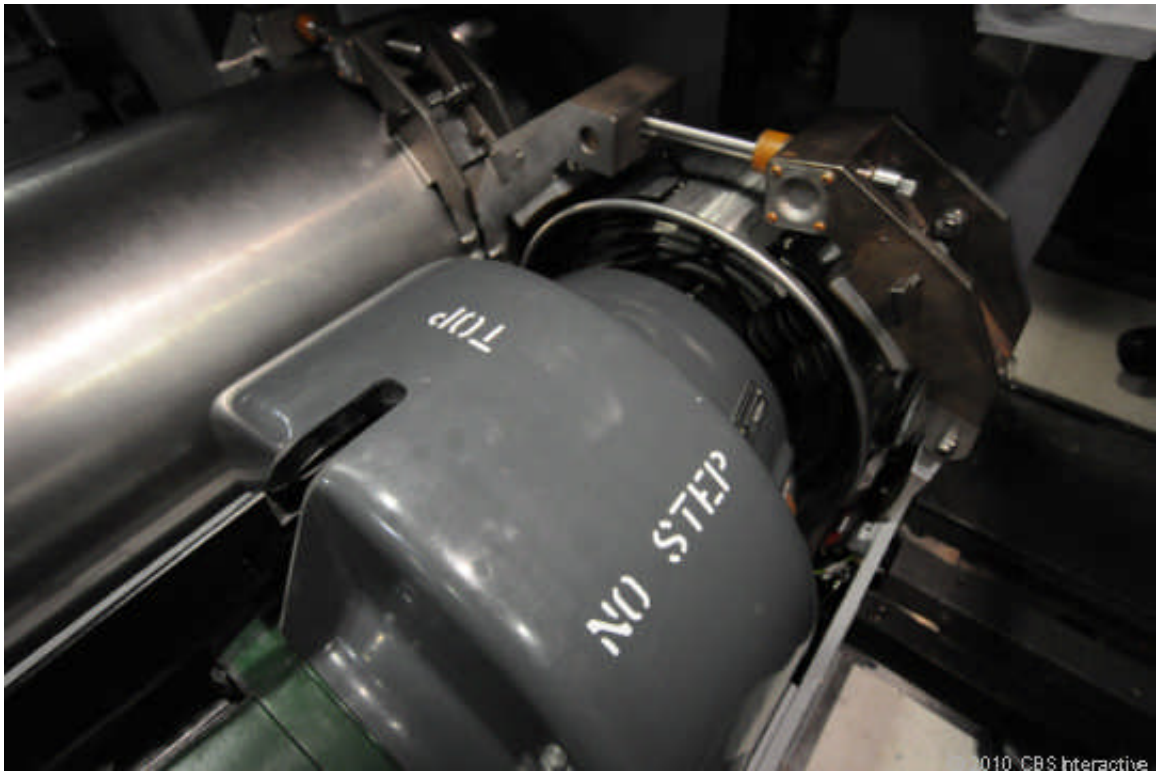


(Credit: Daniel Terdiman/CNET)

There are four tubes in the torpedo room, with two stacks of two on opposite sides of the room.

(Credit: Daniel Terdiman/CNET)

Torpedoes are hoisted on to the submarine using cranes and are brought in at an angle through hatches above. The torpedoes are then brought down through the levels of the sub at an angle via this slide.

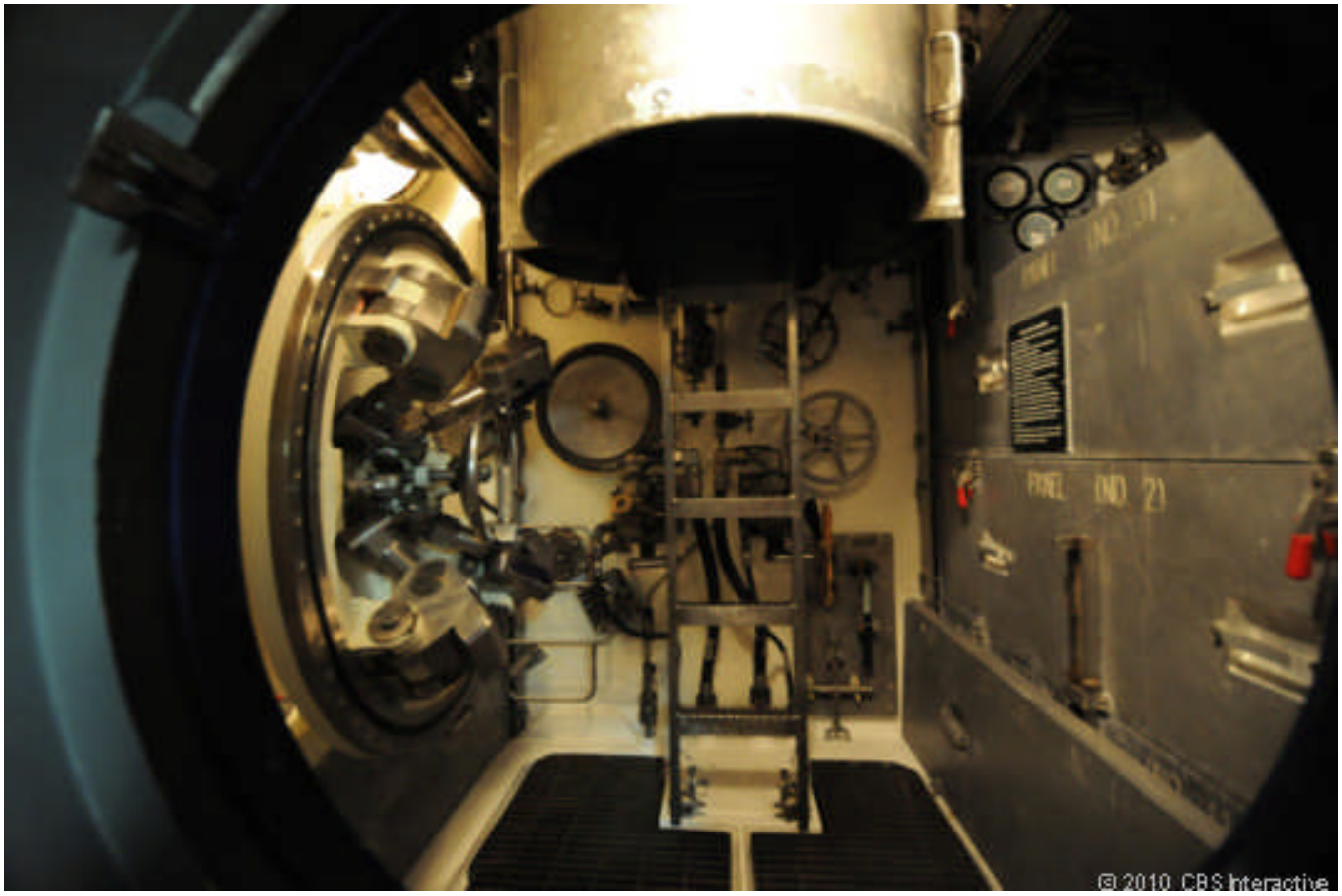


(Credit: Daniel Terdiman/CNET)

At the end of the Mark 48 torpedo, this extra device spools out up to 25,000 yards of fibre-thin cable. By staying connected to the submarine, the torpedo can keep constant communications with firing control, which can update the target profile in real time. If the fibre is broken, the torpedo still has enough information and autonomy to complete its last understanding of the target's location and trajectory.

(Credit: Daniel Terdiman/CNET)

Commander Schlauder climbs down into the North Carolina.



(Credit: Daniel Terdiman/CNET)

This is the lock-out trunk, the compartment that is used when it is necessary to put people out into the water while the submarine is below the surface. Because the North Carolina could carry Special Forces, this is where those personnel might begin their mission, leaving the boat two at a time, using special suits to protect them from the conditions.

But regular submarine crew members are also trained in escape methods, and in the case of an emergency, the crew would also leave via this compartment.

(Credit: Daniel Terdiman/CNET)

This is Commander Schlauder's personal quarters, which includes a fairly complete workstation and where he can even have the imagery from the periscope piped in if something needs to be seen and he's not in the control room.

(Credit: Daniel Terdiman/CNET)

In the commanding officer's quarters, the bed pulls down from the wall.

(Credit: Daniel Terdiman/CNET)

The commanding officer is the only one on board with a single bed. This is the executive officer's quarters, and if there are any VIPs on board, or anyone else needing special treatment, they will be quartered with the executive officer.

(Credit: Daniel Terdiman/CNET)

Most of the crew stay in six bunk rooms, and up to eight crew members can share those rooms with at least two on watch at any given time). The North Carolina is big enough that most often it is not necessary for that form of "hot cotting", which is what it is called when one crew member climbs into a bed recently vacated by another.

(Credit: Daniel Terdiman/CNET)

While the North Carolina is a nuclear-powered submarine and can power itself for as long as necessary when underwater — it can produce enough power for a small city — the reactor is deactivated when the boat is in port. Then, for power, the sub is literally plugged into the port's power supply, as seen here at the North Carolina's berth at the New London Submarine Base.

(Credit: Daniel Terdiman/CNET)

This is the North Carolina's carbon monoxide burner.

(Credit: Daniel Terdiman/CNET)

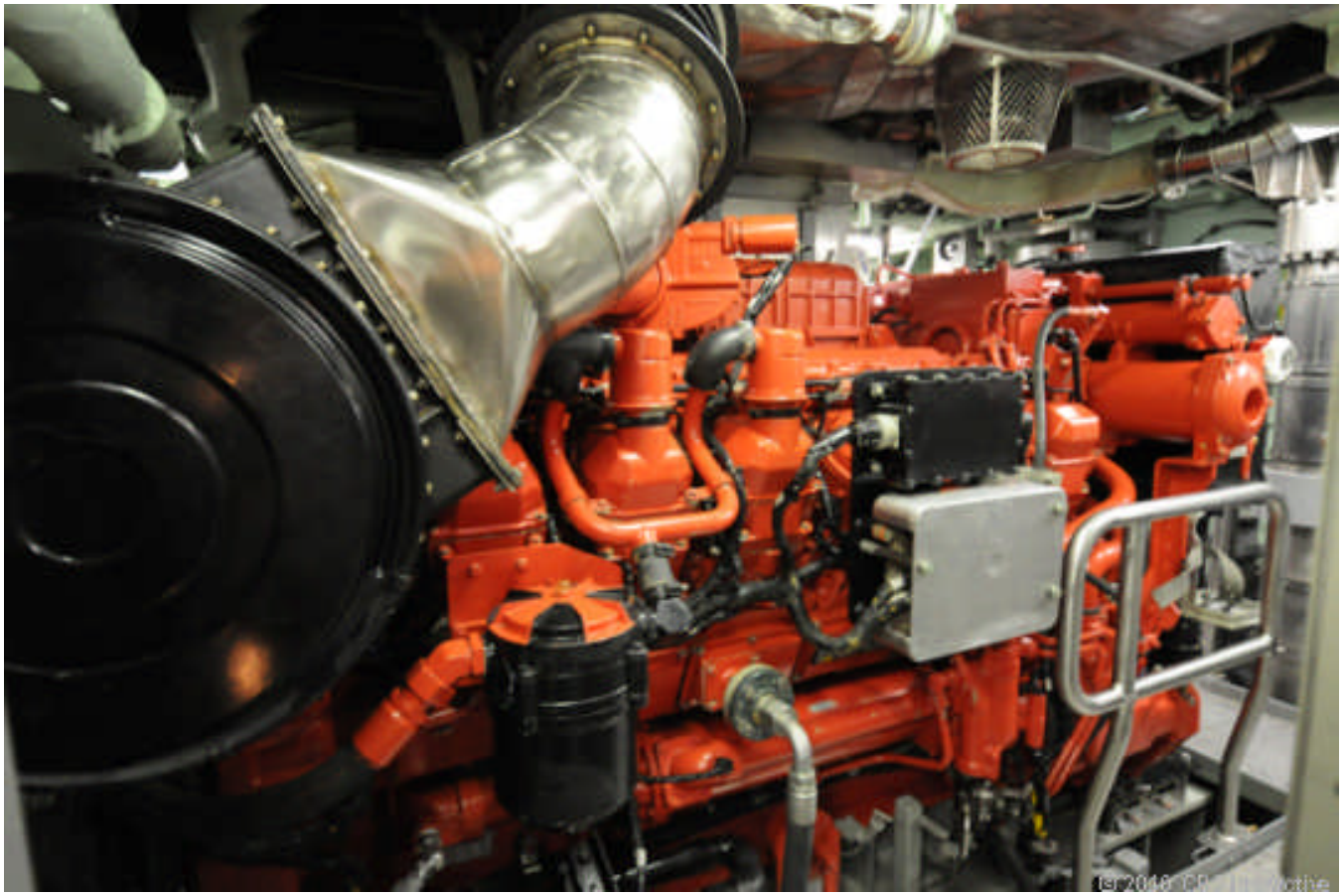
After going through the carbon monoxide burner, the resulting carbon dioxide is removed by this scrubbing machine. There are two of these for redundancy's sake.

(Credit: Daniel Terdiman/CNET)

It is said that submarine crews are some of the best fed in the military. First, that's because there is not enough room, as there would be on a surface ship, to carry thousands of pre-prepared meals, meaning that the cooks must prepare meals from scratch. And second, that's because the good food helps morale, something that's important for a crew that can be underwater for 90 days or more.

(Credit: Daniel Terdiman/CNET)

The crew's mess on the North Carolina. Each table in the mess is adorned with sports homages to one of the five major North Carolina universities.



(Credit: Daniel Terdiman/CNET)

This is the North Carolina's diesel engine, which is an emergency generator of power if the nuclear reactor stops working and the battery banks aren't producing enough power as backup.

(Credit: Daniel Terdiman/CNET)

The North Carolina is the US military's fourth with that name. Previous iterations have included an early 19th century ship of the line, and the most recent predecessor was the Battleship North Carolina. This is the silver service from the second North Carolina, an armoured cruiser launched in 1908.

Via CNET.com