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VEXATIONS IN VULCANIA

SUBCOM MI FUNRUN

CARMEL FUNRUN

SUB BOOKS



by Tom Dougherty

USS Clamagore The End of the Line for the Last Guppy III?

In the early 1960's, the U.S. Navy faced a shortage of submarines to keep an eye on the growing Soviet Navy. The U.S. nuclear submarine program had delivered a relatively small number (one off *Nautilus*, *Seawolf*, four *Skates* and six *Skipjacks*) of different classes of nuclear SSNs. Priority was focused on construction of the Polaris SSBN subs, with the new *Thresher*-class SSN still under development. Meanwhile, in addition to their nascent nuclear submarine programs (Project 619 - the November SSN, Project 659 - the Echo SSGN, and Project 658 - the Hotel SSBN) the Soviets were fielding large numbers of conventional submarines, such as the Foxtrot SS, the Juliett SSG and Golf SSB. The U.S. was employing the aging WWII vintage fleet submarines, many of which had been upgraded and converted in the Greater Underwater Propulsive Power (GUPPY) programs covered recently by Jim Christley in these pages. But the early Cold War Guppy I & II variants had basically "run out of room" to place the newer sonar suites coming into play in the early 1960's. These new, more powerful and sophisticated sonar suites were still analog devices, but they vastly outperformed WWII and early Guppy sonar systems.



Initially, a decision was made to update all 24 of the Guppy II submarines to Guppy III. But budget problems intervened, and only nine (6 *Balaos* and 3

The Guppy III fleet boat conversion Clamagore, as she now resides at Patriot's Point in Charleston, SC.



Close up of bow region, showing the distinctive Guppy rounded bow modification (from original fleet sub sharp "bull nose") and extensive corrosion at the waterline. The triangular limber holes of the Guppy class are also evident..

Tenches) of the Guppy IIs were converted to Guppy III configuration as part of the FRAM (Fleet Rehabilitation and Modernization) program. The submarines were cut forward of the control room and a 15 foot long "plug" was inserted into the hull (the prototype *Tiru* received only a 12.5 foot plug). This created a compartment for a dedicated and integrated sonar suite space. In addition, the conning tower was lengthened by five feet to accommodate a Mk 101 fire control systems and enclosed in new, high glass-reinforced plastic sail with internal metal support (sometimes referred to as an "Northern Sail" or "Atlantic High Sail"). This moved the bridge (and bridge crew) up higher than in the earlier "step sail" Guppy conversions, a distinct advantage in the very rough weather of the Northern Atlantic runs to the Barents Sea. A variety of masts

were housed in the sail, including periscopes, ESM antennas, communication antennas and search radar. At the extreme rear of the sail was the snorkel induction and exhaust. Also prominent in the Guppy III conversion were three fin mountings that contained the hydrophones of the AN/BQG-4 PUFFS passive ranging sonar. The PUFFS hydrophones and associated electronics employed differential times of arrival of sound at the three sets of hydrophones along the length of the boat to passively determine range and bearing of a target. In tests, PUFFS could track a snorkeling submarine out to 20,000 yards, measuring range to within 5% and bearing to within 0.1 degree. A not readily visible addition consisted of a "chin" mounted sonar under the forward torpedo room which had a BQR-2B passive sonar and a BQS-4 active pinger. The BQR-2B was a passive sonar with 48 vertical hydrophone staves arranged in a 6-foot diameter circle. A commutator serially scanned the individual hydrophones and the detected sounds were plotted

on a horizontal bearing-time recorder with a stylus that marked a vertical paper roll. This was an early, mechanical version of the later electronic "waterfall" sonar displays.

With the exception of *Tiru*, the other Guppy III submarines retained four diesel engines. Each 2-cycle diesel engine had a coupled 1200 kilowatt DC electrical generator, with electricity fed to either the batteries for charging as needed and/or to the main propulsion motors. The Guppy III all had four sets (vs. the original two sets) of 126 cell Guppy battery cells (504 cells total). The space for these was achieved by below deck rearrangements including changes in the pump room in the forward battery area and elimination of the ammunition storage, and moving the chill (refrigeration) and freeze (freezer) boxes of the



Guppy III Northern sail and amidships PUFFS. Again, the waterline corrosion from years of being in the salt water of Charleston Harbor is evident.

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Bow BQG-4 PUFFS fin installation, which sits flush with the deck. Again, corrosion is evident.

aft battery room. The Guppy batteries were improved versions of WWII fleet sub batteries. The individual cells had thinner plates, which allowed more plates per cell. The batteries also had an electrolyte agitation system to prevent density layering of the electrolytes. Actively circulating cold water around the terminals cooled the batteries. The result was cells weighing 2000 lb. with higher charge capacity that could propel the submarine at 16 knots underwater for 1/2 hour and longer times at slower speeds. The two main propulsion double-armature electric motors each had 2700 h.p., and were directly coupled to the propeller shafts. The ability to recharge the batteries with the diesels by snorkeling meant these submarines could stay submerged for extended periods.

All of the Guppy boat variants (Ia, Ib, IIa, II and III) served through the 1960's and into the early 1970's. Despite their significant role during the Cold War and the Vietnam conflict, their contributions are often not recognized by the general public, and many are almost totally unaware of their existence. Although

several WWII fleet submarines are museums, relatively few Guppy boats have survived as museum boats, and the only Guppy III remaining in the U.S. is *Clamagore* in Charleston SC. Unfortunately, the exterior of *Clamagore* has deteriorated badly over the years, and the current plan is to sink her as a reef off of Florida, directly east of the Juno Pier off Juno beach, just south of Jupiter. It is estimated that it would cost \$6 million to restore her and that money is just not forthcoming.

I had the opportunity recently to visit Charleston, SC for the Change of Command ceremony for the U.S. Navy's SPAWAR Systems Center Atlantic. Captain Scott Heller (aka my nephew) was stepping down from command as well as retiring after 30 years in the Navy. I used time in the trip to go over to Patriot's Point equipped with my 24.5 megapixel Nikon D7200 to thoroughly photograph *Clamagore* in her fading days. I have assembled a small series of the roughly 150 photos, along with descriptive captions, to take you on a tour of this unique Guppy III submarine. I was particularly interested in *Clamagore* because I have one of the very rare Yankee Modelworks resin models of this submarine awaiting assembly. Some of the subtle



Photo above: Forward section of the High Atlantic sail with the deadlights for the navigation area and the ship's whistle in the center above the deadlights.

Photo left: GRP Northern sail details. The faint outlines of the underlying metal frame can be seen. The hull slopes downward from the bow, so the amidships PUFF is slightly raised to make it level with the bow installation.

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Far left photo: View from the stern. Sections of the decking have been removed, exposing the pressure hull curve in the center and part of the port fuel saddle tank.

Photo left: Aft PUFFS Installation near the stern, raised up to be at the same height as the other two fins. Important detail for modelers of Guppy IIIs! Corrosion and bird guano add to this sad scene.

Photo below: Aft view of sail, with grab irons along the aft sail end, and with amidships and forward PUFFS fins visible.



details (such as the PUFFS installation differences) can only be appreciated after a visit to the submarine. If you want to see *Clamagore* in person I would hurry, as the future is very uncertain, and the decision of Naval Sea Systems Command will play into the final disposition. There is a veteran's organization trying to save *Clamagore* from being sunk. They would like to move her across the harbor and bring her out of the water to display alongside the recently restored Civil War *Hunley*. I hope they succeed.

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Photo top: Top of Northern sail with masts and whip antennas.

Photo left: Bow on view of Clamagore. Overall weathering is evident.



Over the next several pages are some additional photos of *Clamagore*, along with accompanying legends to describe the details.

-Tom



Let's go below. The forward torpedo room, which regained stowage space with the addition of the new sonar room amidships and removal of the sonar gear from here.



Heading aft, we come to the (glass walled off) officers' wardroom, above the forward battery area.

One of the officer's staterooms. Tight quarters, as always on a submarine.



Looking to the bow in the forward passage of "officers' country". The stateroom are starboard; wardroom and pantry to port. Forward torpedo room is through the hatch; the forward battery is below the deck.

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Photo above: The unique Guppy III 15 foot hull plug, containing the updated sonar suite. The center console s the BQG-4 PUFFS controls and displays.

Phot right: A closeup of this panel with the three input feeds at the top. The small, orange window on the left appears to be part of the BQH-1 depth measuring system.



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Another view of the sonar suite shows the BQR-2B "chin" sonar console, with the handwheel for manual searching and the recorder with the paper and stylus above the handwheel. To the extreme right is the BQS-4 active pinger console with the PPI display (orange, partially hidden).

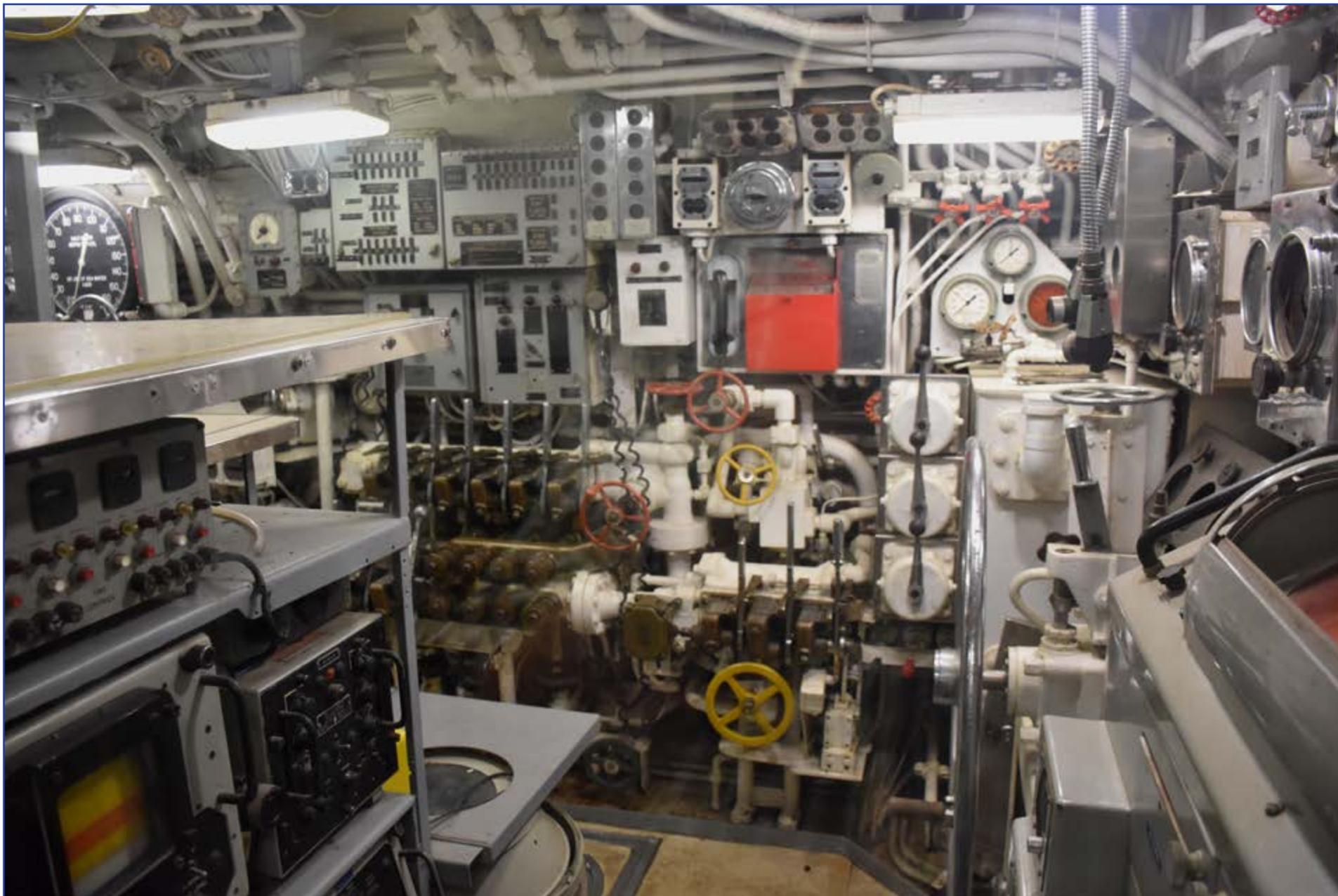
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The control room, looking to port. In addition to the "standard" fleet sub controls, this room had a large suite of additional electronics installed. These were ESM receivers, search radar and other items. Ship's wheel (silver, edge on) is center, right. Diving controls are at center and left on back hull.

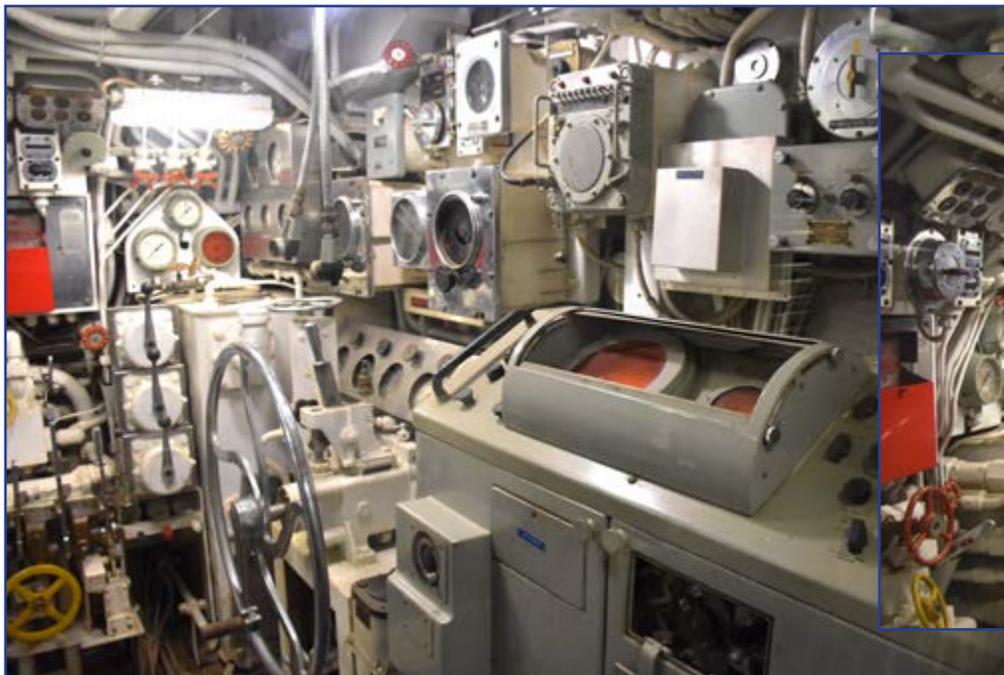


Photo top: Another view of control taken from another angle than on the previous page. Console with orange display scopes is to the starboard of ship's steering wheel, which faces forward.

Photo above lefg: Third view of control area facing forward. Ship's steering is center; diving controls on the left. Electronic consoles and plotting table area on the right.

Photo below right: Various air high pressure manifold controls for ballast and trim tanks on starboard side of control room.

Photo below: Some things don't change-keep a zero bubble.



Unique view, looking through starboard passageway forward from the back of control room. Air pressure manifold is on the right, control area on the left. Passage goes through sonar area and into officer's country to forward torpedo room hatch.



Radio room, just aft of control. A selection of radios of various frequencies.

Cooking galley aft of radio room. Hatch in floor leads to after battery area.



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Photo above: Crew's mess on port side of the boat. Storage spaces in the wall as well as in the benches the crew sits on to eat.

Photo above right: A view forward through the passageway on the starboard side. Crew mess at left. Through the closer hatch I control room, through the distant hatch is forward torpedo room. Similar view to Fig. 24, but from further aft.

Photo right: Crew shower and sinks. This is just aft of the crew bunk area (not shown) and forward of the diesel engine compartments.



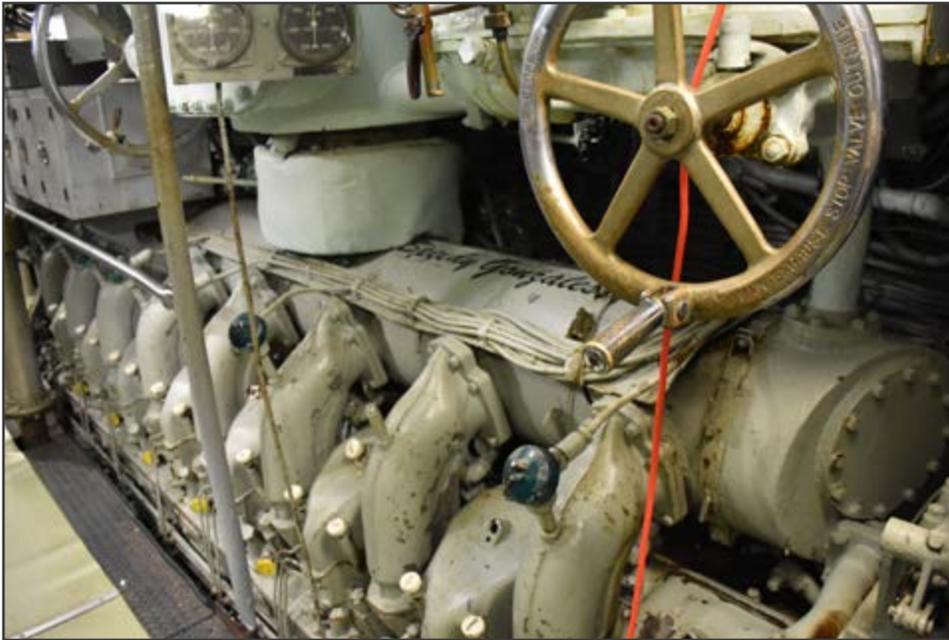
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Phot above left: One of the four 2 cycle General Motors Model 16-278A, V16 diesel engines. These drove the attached GE DC generators that charged the batteries and/or powered the DC propulsion motors.

Photo above right: View looking forward from the after diesel room into the forward diesel room.

Photo left: One of the two "split" control consoles in the maneuvering room, just aft of the diesel compartments. This is the starboard control console. Gauges monitored electrical generation and battery levels, as well as electrical use. Large levers shunted power to either propulsion and/or batteries as needed.

Photo right: The all important aft head, so you don't have to run forward. Just read the instructions...



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Photo above: Portside maneuvering room console. Passage way is in the center between the consoles. Heavy-duty electrical bus bars and shunting gear is in the steel perforated cabinet behind the control console. The two electrical propulsion motors are beneath maneuvering.

Photo right: The last compartment: After torpedo room. Aft escape trunk has ladder leading up to it. Torpedo at left sits above one of the bunks with green cover.



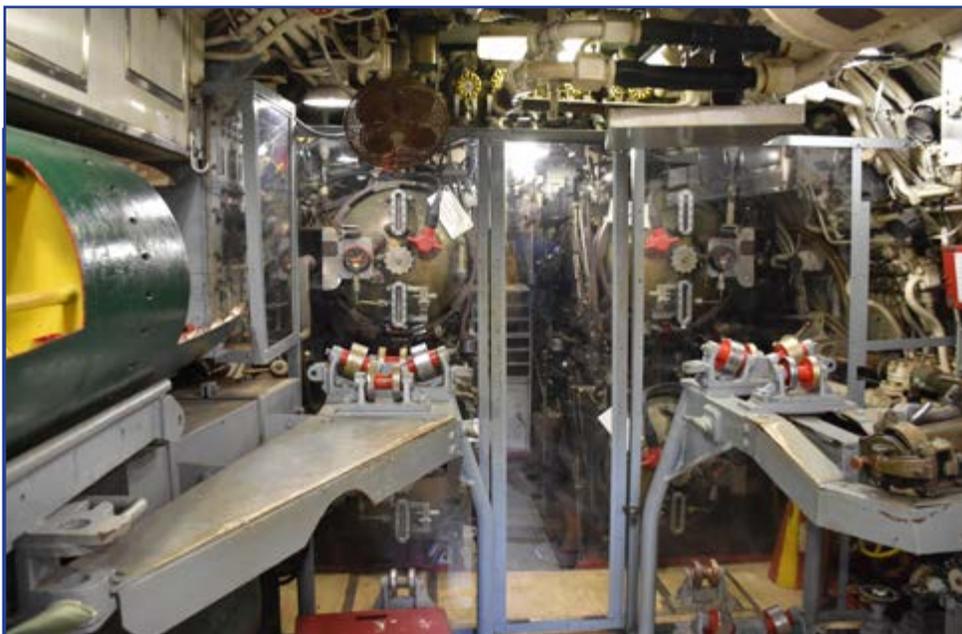


Photo left: Close up of aft upper torpedo tubes (2 of 4). Rollers (top and bottom) help to move torpedoes into the tubes..



One last view of Clamagore. How long she will be at Patriot's Point and her final fate is still a question

