

A VISUAL GUIDE TO THE S-CLASS SUBMARINES 1918-1945

PART 3: THE ELECTRIC BOAT SERIES

(2nd Edition, June 2011)

BY

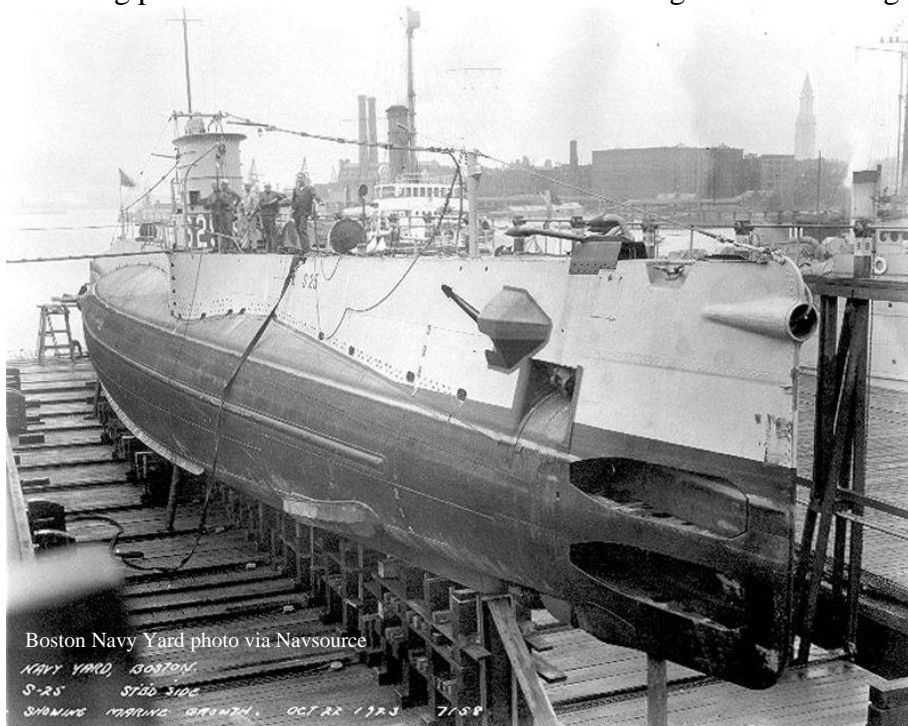
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The Electric Boat Company (EB) of Groton, CT. won the majority of the construction contracts for the S-boats. Not that their product was necessarily superior to the Government or Lake designs, it was that EB had a much greater construction capacity and simply had the capability to build more boats faster. Ironically, EB themselves had never built a submarine before. Construction of all of the company's products had been contracted out to other firms, mostly the Fore River Shipbuilding Company of Quincy, MA. and Union Iron Works of San Francisco, CA. (Both companies would be later bought out by Bethlehem Steel). EB's Groton facilities consisted only of their New London Ship & Engine Company (NELSECO) engine subsidiary. They would not have a shipbuilding yard there until 1924, too late to build any of their S-boats.

ORIGINAL CONFIGURATION

S-18 through *S-29* would be the first group and were built by Fore River. They were straight forward follow-ons of the *S-1* single hull design with just minor differences. The following photos of *S-25* illustrate the as-built configuration for this group.

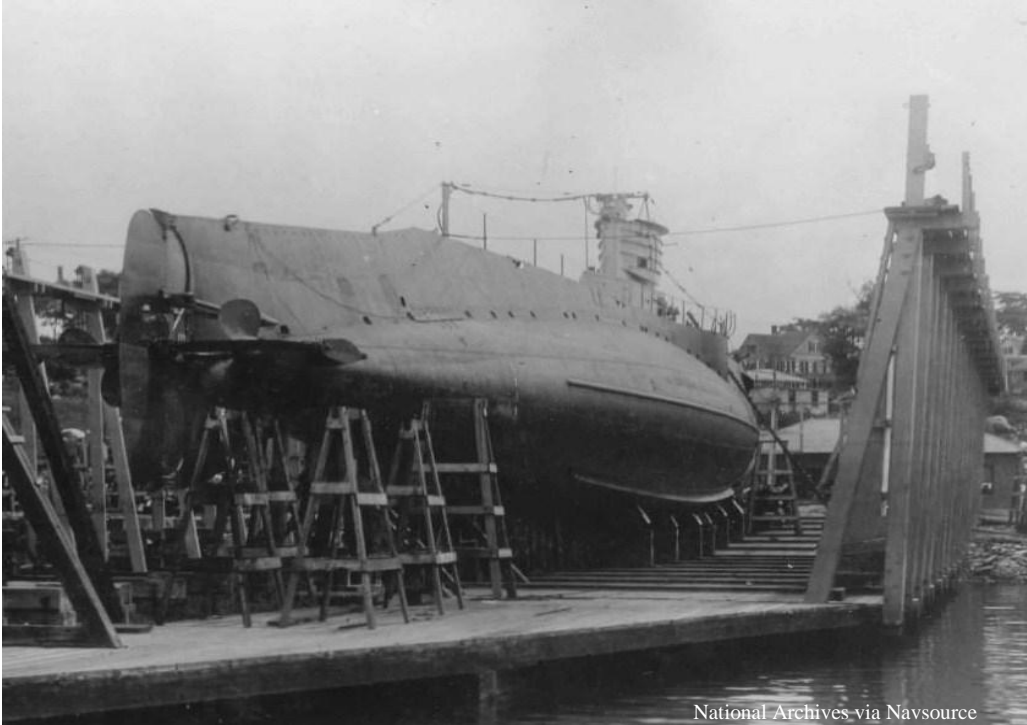




USN photo courtesy of Navsource

The drydock photo shows the towing fairlead pipe through the upper edge of the bow (a unique feature of the EB design), the starboard side anchor, and the angular cover for the bow plane pivots. The bow planes retracted into

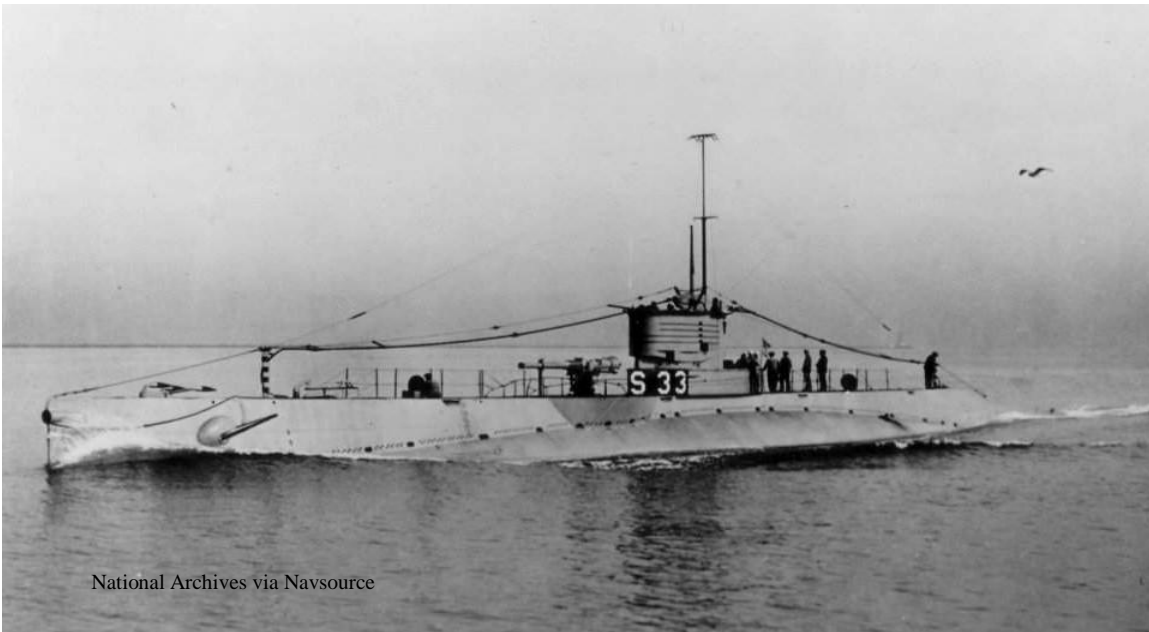
the hull at an upward angle. Note also the three “rats” for the Y-tube sound gear on the top of the forward deck, and how prominently the superstructure bulges outward at the gun deck. The second photo gives a port side perspective and was taken at a later date, evidenced by the replacement of the Y-tube rats for the T shaped, trainable SC sonar (covered by a protective cage). It can be seen on the deck between the torpedo room hatch and the bow plane slit. Underwater and out of view just aft of the bow planes were small bulges for the MV passive sonar.



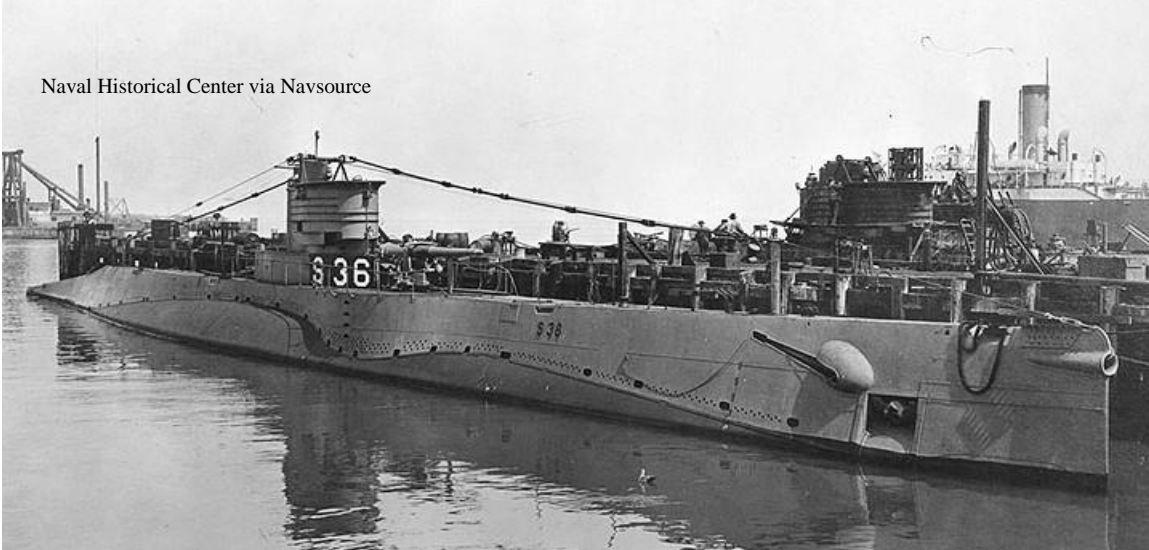
National Archives via Navsource

The stern dry dock view shows the axial mounted rudder and the original configuration of the superstructure “skeg” which ran from the end of the deck and tapered down to the rudder.

The second group consisted of *S-30* through *S-41* and these boats were built by Union Iron Works. They were virtual duplicates of the 20 series boats. The only noticeable difference between the groups was the different shape of the housing for the bow plane pivots. The 20 series had a prominent angular cover, while the 30 series had a smaller, rounded cover. This may indicate a change in bow plane operating mechanisms for the 30 series. The following photographs of *S-33* and *S-36* give good views of this group. Note the aft, raised extension of the conning tower fairwater. This extension covered a hatch that led to the after battery compartment. It also covered a ventilation intake. Later modifications designed to improve ventilation raised this intake, and thus the extension became higher as well. This had the added benefit of keeping the hatch drier in rougher waters. The small bulge at the forward base of the fairwater also covered a ventilation intake. This one serviced the forward end of the boat and it helped to improve living conditions on board.

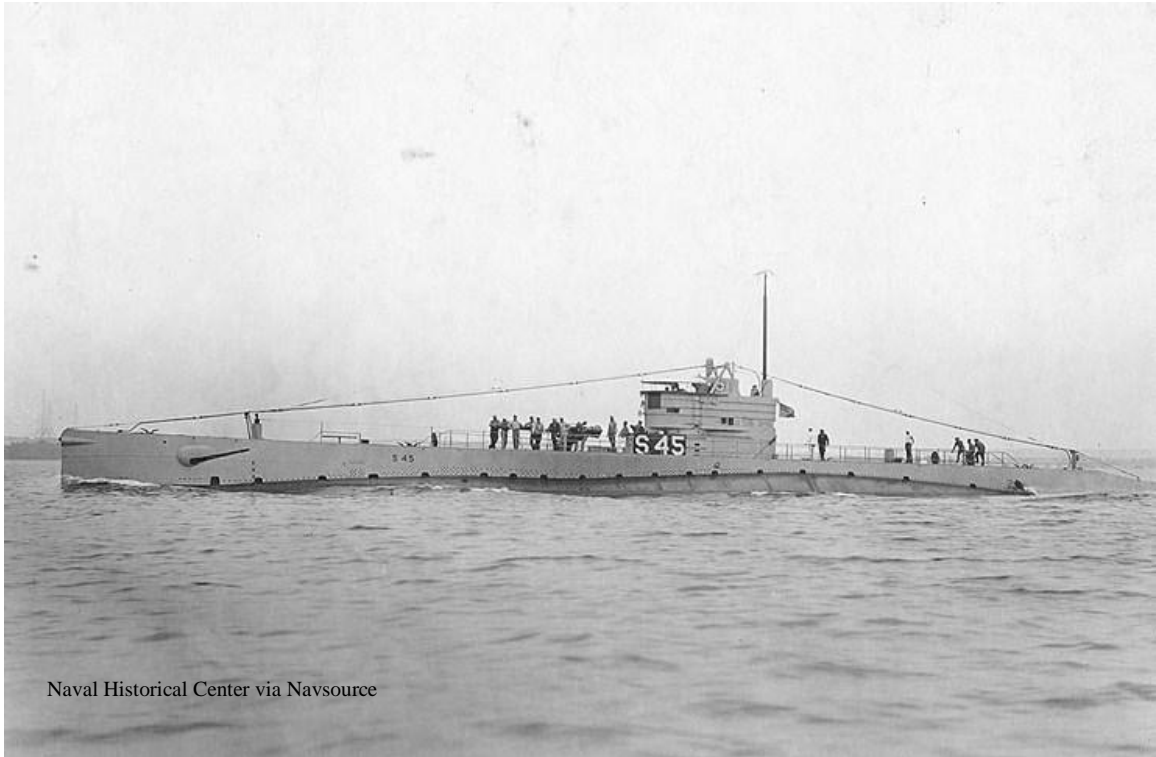


National Archives via Navsource



Naval Historical Center via Navsource

Group three of the EB boats was made up of S-42 through 47, all built by Fore River. The EB designers tinkered with the design somewhat and these boats were built with several important and distinctive modifications.



Naval Historical Center via Navsource



Naval Historical Center via Navsource

Lengthened by six feet and weighing in approximately 33 tons heavier, these boats had a rearranged ballast and fuel tank arrangement, and had modifications to their duct keel and Kingston valve installations in an attempt to make them faster divers. Note that these boats had a slightly modified but distinctive version of the rounded bow plane pivot covers of the 30 series. Taking advantage of the extra length in the middle of the boat, a full gun access trunk was installed at the forward edge of the conning tower fairwater, replacing the smaller ammo-passing scuttle on the earlier boats. This hatch allowed quick crew access to the deck gun. The previous boats had a hatch aft of the conning tower, hidden by an extension of the fairwater. This group lacked that aft extension and the hatch, and along with the gun access trunk at the forward end of the fairwater made this group easy to spot.

USNHC photo courtesy Darryl Baker via Navsource



SAFETY MODIFICATIONS

The multiple sinking disasters of the *S-5*, *S-51*, and the *S-4* and the inability of the Navy to rescue crewmen trapped inside a sunken boat prompted a thorough review of the safety features onboard our submarines. The EB design was found seriously wanting in this regard. A list of desired modifications was drawn up based on this review and the Secretary of the Navy ordered all Battle Fleet S-boats be modified no later than June, 1932. These modifications included strengthened internal bulkheads, Momsen Lung escape device installations, salvage air lines to each main ballast tank, air supply valves installed in each compartment, and an air bubble holding skirt installed on the torpedo room hatch inside the torpedo room (this enabled an escape from the room without completely flooding it). A new escape hatch was added in the motor room and this required the cutting away of the superstructure skeg that ran from the aft deck down to the rudder. Just forward of this hatch a marker/messenger buoy with a telephone inside was installed. The cutting away of the aft skeg resulted in a dramatic change in the visual look of the boats, giving the impression of shortening the boats quite a bit. This was an illusion however, as the remainder of the pressure hull and the rudder were out of sight underwater. The skeg had actually given these boats a bit of trouble, as its' interior was difficult to access for maintenance. On several of the boats the interior bracing of the skeg had rusted so badly it broke loose and fell off at sea. Thus its removal for the safety modifications was rather fortuitous.



Courtesy Ed Cwalinski & Barry Litchfield via Navsource

You also could not see the aft escape hatch itself, as it too was under water. This photo also shows how low the stern light sat (which was mounted on the rudder, unseen below the surface), making it very hard to see in anything except glass calm waters. The removal of the skeg and the addition of the messenger buoys were the only externally visible parts of the safety modifications. Notice the extra length of the *S-47* (the outboard boat) and the slightly different configuration of her messenger buoy as compared to the *S-*

32 (middle) and the S-26 (inboard). These three boats are moored outboard of the big fleet boat *Argonaut* (just visible on the far right) in Pearl Harbor in 1936.



This excellent 1935 shot of *S-39* shows off the “stubby” look of the EB boats after the removal of the skag and the incorporation of the safety modifications. On the far left the messenger buoy is just visible in its housing. The rest of the stern back to the rudders and propellers is underwater and out of view.



S-22 was taken in hand and made a test boat for extensive (and as it turned out, unique) safety modifications. These included a buoyancy tank and a large telephone/marker buoy in the bow, a large escape trunk in the torpedo room which protruded above the main deck, an aft messenger buoy, and an aft escape hatch with a bubble skirt in the motor room. She also got all of the internal changes made to the other EB boats.



Her aft escape hatch is just visible on the right in the above photo. It sat right at the waterline and would not have been used for routine access to the boat. Note also the unique configuration and placement of the aft messenger buoy. This photo also shows

temporary lifting padeyes attached to the upper edges of the pressure hull. These were used for lifting experiments while alongside the pier and were not intended for operational use. They were later removed. These expensive modifications were not carried out on other S-boats, although the large escape trunk was incorporated into the later fleet boats.

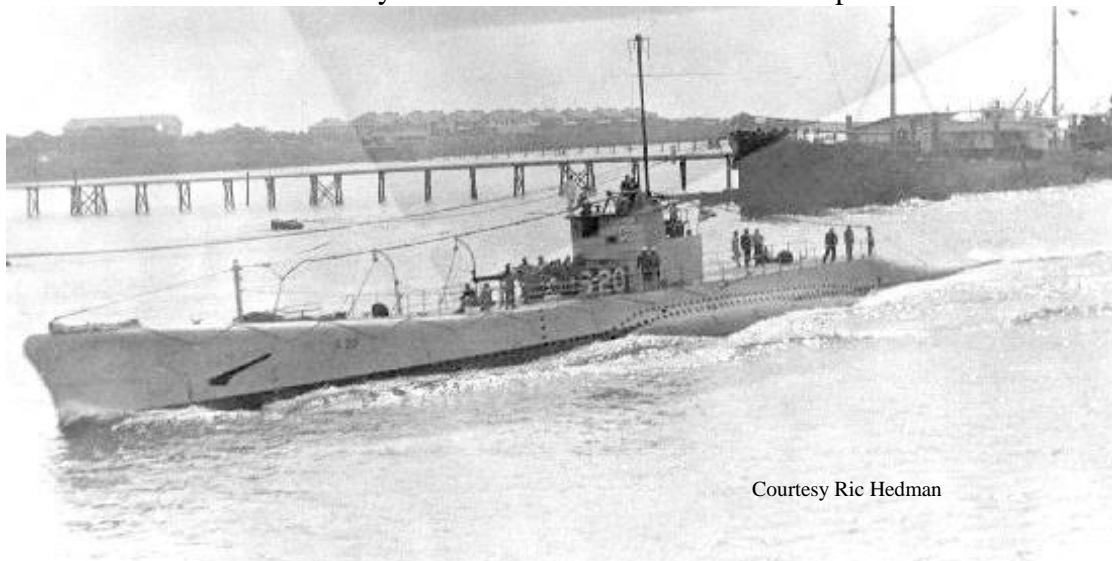
OTHER VARIATIONS

S-19 was a Fore River built member of the 20 series group. She apparently was a test ship for the later modification to the bow plane pivot housing. She alone among the 20 series boats had the rounded housing of the UIW built 30 series units.



S-19 photo from National Archives via Navsource

In late 1924, *S-20* became a test ship for modernization schemes then being proposed for the S-boats. Her bow was completely rebuilt for better sea keeping, the design serving as a test bed for the later *V-1* class fleet boats. She had external blister tanks installed on each side of the boat that held an additional 5889 gallons of fuel. The skeg was cut away (although to a lesser extent than the other boats) and an escape hatch installed in the motor room. She also had many other internal modifications and updates. These



Courtesy Ric Hedman

modifications were not successful enough to warrant follow-ons (they were also quite expensive) and she was the only boat to receive them. In 1931 she became an engineering test boat and had a variety of engine configurations installed during the rest of her career.

WARTIME UPGRADES

The lack of sufficient quantities of fleet boats at the start of the war led many of the S-boats to soldier on to the end of WWII. Most of the surviving S-boats received at least some modifications, i.e. radar, air conditioning, and gun platforms. Additionally, as war approached all the boats were repainted black. There was not a set pattern to these changes and some were unique to specific boats.



Naval Institute Press via Navsource

This 24 June 1943 photo of *S-28* shows her with a rebuilt aft superstructure. She also has had the aft extension of her conning tower fairwater removed, the access hatch moved down to deck level, and a raised gun platform built above this hatch. She has one of the early, enclosed Mk 5 pedestal mounts for a 20 mm AA gun on this platform. She is also sporting an SJ radar above and aft of the bridge. On her forward deck the ball shaped object is the high frequency JK sonar, sitting on top of the T shaped low frequency SC tube array. The JK is actually a flat panel. Original installations showed that water turbulence over the panel rendered it virtually useless above 5 knots. The solution was a hollow rubber ball to cover the array. This reduced flow noise so much that it effectively doubled the boat's maximum sonar speed.



This photo shows *S-38* with a completely new aft superstructure, installed during a 1943 overhaul. The messenger buoy had been deleted on fears that it would break loose during depth charge attacks, and the old superstructure was rickety enough it needed extensive repairs. At least 12 of the surviving EB design S-boats received modifications and modernizations similar to these.

S-42 through *47* were extensively rebuilt from the conning tower aft and thoroughly modernized. The forward end of the conning tower fairwater was rebuilt and a gun platform added there. SJ and SD radars, air conditioning, and a new JK/SC sonar combination was added. Except for *S-44* (lost in October 1943) they all had their 4"/50 caliber Mk 9 deck guns replaced with the smaller 3"/50 caliber Mk 21 gun. The more powerful weapons were needed on the fleet boats, the guns were simply swapped between boats. The photo below of *S-47* shows her with the later Mk 10 open pedestal mount for the 20 mm automatic cannon on the newly built fairwater gun deck. These modifications allowed the surviving S-boats to provide good service to the end of the war, although most had been pulled from front line patrol duties as quantities of the *Gato*, *Balao*, and *Tench* class boats became available.



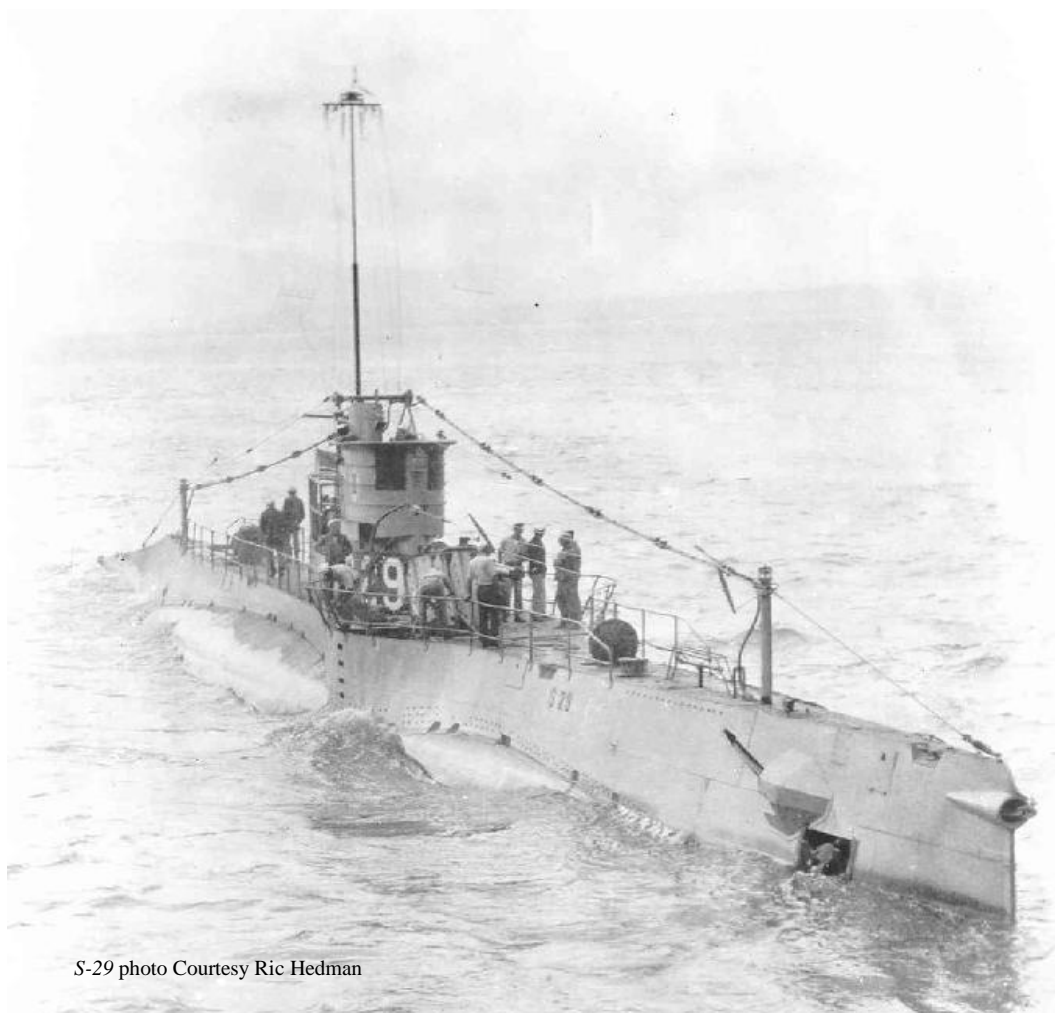
S-47 photo courtesy USNHC via Navsource

END OF THE LINE

Six EB design S-boats (*S-1*, *21*, *22*, *24*, *25*, and *29*) were leased to Great Britain under the Lend-Lease Act. They were recommissioned in the Royal Navy as the *P-551* through *556* and provided good service to the Brits. One boat, *P-551* (ex *S-25*) was eventually sold to Poland and renamed *Jastrzab*. She was mistakenly attacked and sunk by allied forces in 1942.

The Navy found little use for the ancient S-boats once the war ended. However several of them clung to life by their fingernails. The last two S-boats in active commission were the *S-42* and *S-43*, both of which were finally decommissioned on 07 December 1946. The *S-24*, having been sold to Great Britain as the *P-555*, was returned to U.S. ownership at the end of the war and the Navy retained possession of her hulk until 25 August 1947, when she was finally scuttled.

Final honors for the entire S-class of submarines goes to the USS *S-29* (SS-134). Loaned to Great Britain as the *P-556* in 1942, she was returned to U.S. control in 1946 and her name stricken from the Navy list. On 24 January 1947, her hulk was sold to ship breakers and while enroute to her date with the cutter's torch, she ran aground under tow off Portsmouth, UK. Freed after a bit, she finished her tow to the Pound salvage yard in Portsmouth, where she sat rusting away for the next 31 years. She finally succumbed in her valiant battle with the cutter's torch in 1978 when she was finally loaded up on a barge and shipped off to Spain for scrapping, 54 years after first being commissioned in the United States Navy.



S-29 photo Courtesy Ric Hedman

ACKNOWLEDGEMENTS

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