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## CHAPTER THREE: SHIP'S HISTORIES FOR THE SUNKEN VESSELS

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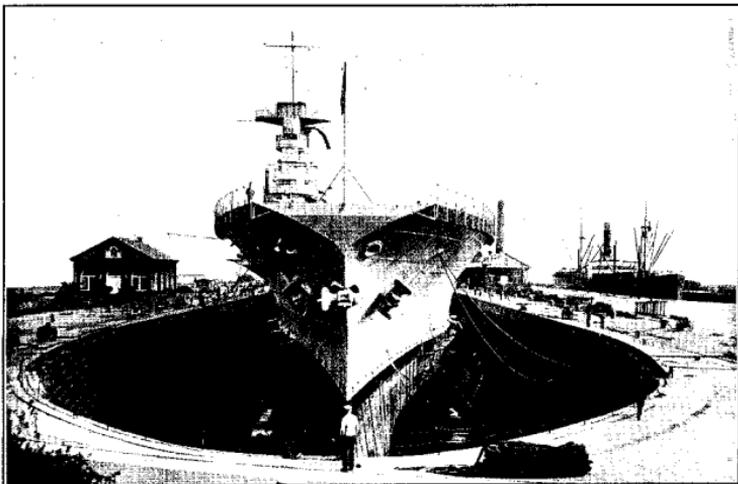
Twenty-one target vessels and small craft sank at Bikini as a result of Operation Crossroads. The characteristics, histories, and Crossroads role of each vessel sunk at Bikini, as well as *Prinz Eugen*, are discussed here.

### USS *SARATOGA* (CV-3)

#### Characteristics

USS *Saratoga* (CV-3) was a steel-hulled vessel with a waterline length of 830 feet. The cruiser hull of *Saratoga* was wedged to the

flight deck, which as built was 874 feet long (later extended to 888 feet) and overhung the hull forward and aft. "Above the water line the hull shape was determined by the requirements for as wide a flying deck as possible. This has given a very pronounced flare both forward and aft."<sup>11</sup> From keel to flight deck, the depth of the hull was 74-1/2 feet. The hangar deck below was built to accommodate 90 aircraft maximum; *Saratoga* usually carried 81 to 83 planes. *Saratoga*'s maximum beam was 105-1/2 feet, with a mean draft of 31 feet. *Saratoga* "officially" displaced 33,000 standard tons in compliance with the



*Saratoga* in drydock at Hunter's Point, San Francisco, 1928. (San Francisco Maritime National Historical Park)

Washington Naval Treaty. The vessel actually displaced (full combat load) 43,500 tons--later alluded to by "official" tonnage upgrades to 36,000, later increased to 40,000, tons. The ship's trial displacement was 38,957 tons.<sup>2</sup> *Saratoga's* characteristics as an aircraft carrier were influenced by the ship's original design as a cruiser. Partially completed as cruisers when the order was given to convert *Saratoga* and its sister *Lexington* to carriers, they could not be economically torn apart and rebuilt. "The principal dimensions of the hull, the primary features of protection against gunfire and underwater explosion, and the design of the propelling machinery were thus determined before the plans for conversion to airplane carriers was undertaken. This situation...forced the acceptance of elements which in a new design might have been changed. The development of the machinery and ammunition handling spaces was practically complete, and the airplane carrier development took place almost entirely above the protective deck."<sup>3</sup>

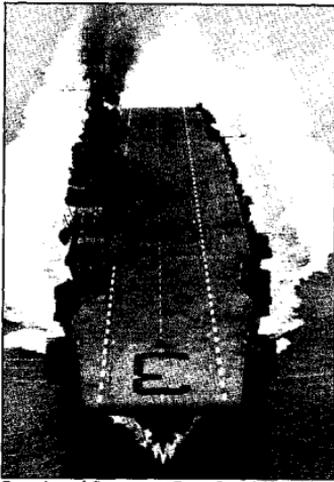
The hull was modified for the first time in 1942; a torpedo blister was added to the starboard side, increasing the beam to 108 feet and fixing a list caused by the heavy island, guns, and funnel on that side. *Saratoga's* four shafts were driven by a GE turbo-electric drive. Eight engines, two on each shaft, produced 180,000 shaft horsepower at 32.25 knots. *Saratoga* delivered 32.28 knots on its initial trials and 34.99 knots on its final trials. Steam was produced by 16 White-Foster oil-burning boilers. The uptakes were swept together into a single, flat-sided, 105-foot long, 80-foot tall (later cut down some 15 feet) funnel abaft the island. The flight deck, 47 feet above the waterline, was covered with wood planking, caulked and painted.<sup>4</sup>

*Saratoga's* main gun armament consisted of twin 8-inch/55 caliber guns in four gun houses, with an anti-aircraft array of twelve 5-inch/25 caliber guns and eight .50 caliber machine guns; the latter were later replaced with quad-mount 1.1-inch machine guns.<sup>5</sup> In January-April 1942, following the carrier's return to the Puget Sound Navy Yard after being torpedoed, *Saratoga* underwent its first major wartime refit. The 8-inch guns were replaced by twin

mounted 5-inch/38 caliber guns in four houses; single 5-inch guns of the same caliber were added to the sponsons, replacing the original 5-inch/25 caliber weapons. Thirty 20mm Oerlikon anti-aircraft guns were added, and four quad 40mm Bofors guns were installed.

Torpedoed in August 1942, *Saratoga* after repairs was again modified; the 1.1-inch guns were removed and replaced with 40mm Bofors, making nine such mounts, and twenty-two additional 20mm guns were installed, making 52 of these single-barrel weapons on board. In another refit in December 1943, *Saratoga* received 16 more Bofors mounts; two in new portside sponsons abeam the island, seven in the boat recesses to port, two in the boat recess to starboard, three outboard of the flight deck off the island, and two in the bow machine gun galleries.<sup>6</sup> Other modifications included reducing the island structure, cutting it down to an open bridge for air operations, with the original flag plot one deck below, followed by the pilothouse and navigating bridge, conning tower, and at flight deck level, the meteorological platform and air intelligence office. The original tripod foremast was replaced by a pole mast mounting SK radar. In the summer of 1944, *Saratoga* received an SM fighter-director set of radar on the forward end of the funnel, and a pair of H Mk II hydraulic catapults were installed forward on the flight deck (previously the ship had a single hydraulic catapult). Other modifications included the installation of a portside torpedo blister.<sup>7</sup>

*Saratoga* was heavily damaged off Iwo Jima by Japanese bomb hits on February 21, 1945, which holed the flight deck and the starboard hull near the bow, starting fires on the hangar deck. Repairs at Puget Sound hastily patched the hull and deck, removed the after elevator, fitted a new 44-foot square elevator forward, and filled the aft end of the hangar deck with two decks of berths. *Saratoga* was again modified for Operation Crossroads. Nearly two-thirds of the ship's armament was stripped, including two of the houses with the twin 5-inch guns. Other fixtures, including compasses and the ship's bell (now at the Washington Navy Yard), were taken off, and



Bow view of *Saratoga* at Puget Sound Navy Yard, Bremerton, Washington, September 1944. (U.S. Naval Institute)

aircraft, vehicles, and radar were mounted on the ship. Blast gauge towers and other instruments were mounted on *Saratoga*. Loaded with 700 gallons of fuel oil, 15 tons of diesel, and two-thirds of its ammunition, *Saratoga* was sent to the bottom in a near-combat-ready state.<sup>9</sup>

#### History

The aircraft carrier *Saratoga* was originally planned as (CC-3), the second cruiser of a six-vessel *Lexington* class authorized and appropriated for on August 29, 1916, as part of a three-year program of naval construction.<sup>9</sup> Laid down on September 25, 1920, at the Camden, New Jersey, yard of the New York Shipbuilding Company, *Saratoga* was completed as a result of a post-WWI naval arms race with Britain, Japan, France, and Italy in which construction efforts focused on capital ships—namely battleships and battle cruisers.

This arms race, as well as growing interest in naval aviation, conspired to redesign *Saratoga* before its launch. Despite Congressional insistence that all new ship construction focus on capital ships, the U.S. Navy received funds to convert the collier *Jupiter* (AC-3) into an aircraft carrier. Conversion of the hybrid ship at Norfolk Navy Yard took two years before USS *Langley* (CV-1) emerged as the U.S. Navy's first aircraft carrier on March 22, 1922. By that time, however, plans were already being considered for the conversion of the cruisers *Lexington* and *Saratoga* into fully functional fleet carriers.

The post-war naval arms race led to several conferences, conventions, and treaties. The Washington Naval Conference of 1921-1922 led to international agreement to limit the numbers, sizes, and armament of naval vessels. Under the treaty, many of the battleships and cruisers then under construction could either be scrapped or converted to aircraft carriers. Anticipating the order to scrap the six *Lexington* class cruisers, the Navy prepared plans to convert one of the cruisers into a carrier. When the conference agreed to scrapping the cruisers, the U.S. converted two ships, *Lexington* and *Saratoga*, into aircraft carriers. The incomplete hulls of the two cruisers were redesignated CV-2 and CV-3 on July 1, 1922, the day Congress approved their conversion. Japan followed suit, converting the battle cruiser *Akagi* and the battleship *Kaga* into fleet carriers.<sup>10</sup> At that time, work on *Saratoga* had progressed to the point where the cruiser hull had received its armored barbettes and decks were being laid. All of this work had to be torn out to reconstruct *Saratoga* as a carrier.

Under provision of the Washington Naval treaty, carrier conversions were limited to 33,000 tons maximum standard displacement, and no more than ten low-angle guns with a maximum caliber of eight inches. Both the United States and Japan interpreted a clause in the Treaty to permit adding 3,000 tons of anti-aircraft and torpedo defenses to capital ships, to apply to their carrier conversions. As a result, while listed "officially" at 33,000

tons, *Lexington* and *Saratoga* carried weight in excess of the treaty limit, even after sacrificing some of their cruiser armor. *Saratoga* was the first launched, sliding down the ways into the Delaware River on April 7, 1925. The first of the two *Lexington*-class carriers, *Saratoga*'s launch was the heaviest warship launch on record and in the top dozen heaviest launches for merchant and naval vessels up to that time.<sup>11</sup> The launching program noted that "the new *Saratoga*, aircraft carrier, when completed and commissioned...will be the largest and fastest craft of its kind in the world."<sup>12</sup> Fitting out *Saratoga* took two years; the carrier was commissioned on November 16, 1927, at the Philadelphia Navy Yard. Departing Philadelphia on a shakedown cruise on January 6, 1928, *Saratoga*'s first aircraft landed on board on January 11.<sup>13</sup>

The Navy considered *Saratoga* and *Lexington* as major successes. The most powerful carriers in the U.S. fleet, as well as their first fleet carriers, the two ships were, according to historian Norman Friedman,

as remarkable in their way as the first British Dreadnought battleship launched only 25 years before, outclassing every other carrier in existence. *Saratoga* and *Lexington* were faster than their Japanese rivals, they could operate more aircraft, and their design was so sound that they went to war...without major reconstruction since their completion.<sup>14</sup>

Just prior to its launching, *Saratoga* was hailed by the Philadelphia *Evening Star* because "there is no counterpart for this first American first-line carrier in any other navy..."<sup>15</sup> Naval officers appreciated the vessels. Capt. Marc Mitscher, naval aviation pioneer, captain of USS *Hornet* (CV-8), the carrier that launched Col. "Jimmy" Doolittle's strike at Japan, later commander of the fast carrier task force, and, incidentally, the first man to land a plane aboard *Saratoga*, testified in 1940 that

we have always felt, a good many of us, that the *Lexington* and *Saratoga* were the best ships we have ever built for all purpose ships, carrying the protection

and armor of a cruiser. We will have twelve carriers that need cruiser protection and that cannot be sent out on independent missions unless they have cruiser protection. I feel that we have two carriers, the *Lexington* and *Saratoga* that can be sent out on independent missions and if they lose their cruiser protection they can still protect themselves with their aircraft and armament. Therefore we feel we should look into that field for future carriers....<sup>16</sup>

However, the *Lexington*-class carriers had one major design flaw--the inclusion of their four twin 8-inch gun mounts, which could only be fired in starboard broadsides. The 8-inch guns, intended to battle a surface enemy, were also out of place on a carrier. This was corrected after the outbreak of war, when the 8-inch guns were replaced with 5-inch/38 caliber guns, "the correct weapon against the carrier's true foe: enemy carrier aircraft."<sup>17</sup> Despite Captain Mitscher's sentiments, "*Lexington* and *Saratoga* were never envisaged as prototypes for a heavyweight carrier fleet. They remained one-offs, a unique double product of the Washington Treaty..."<sup>18</sup>

*Saratoga*'s prewar career was spent engaged in fleet training exercises that defined a strong role for aircraft carriers in naval warfare. This included "attacks" on the Panama Canal and Pearl Harbor, usually operating in tandem with *Lexington*, then in later years with the carriers that followed these pioneers. Based out of San Pedro or San Diego, *Saratoga* operated in annual fleet "problem" exercises. According to the ship's official Navy history, "in the fleet problems, *Saratoga* continued to assist in the development of fast carrier tactics, and her importance was recognized by the fact that she was always a high priority target for the opposing forces."<sup>19</sup>

According to Friedman, "it was with *Lexington* and *Saratoga*--the matched giants, the biggest carriers in the world--that the U.S. Navy learned the rudiments of carrier task force operations between 1927 and 1941."<sup>20</sup> Fleet

Admiral W. F. "Bull" Halsey noted in his 1947 autobiography:

the *Sara* is a queen and that is why she will always have a secure place in my heart. First, I loved her as a home; I commanded her for two years and flew my rear admiral's flag on her for two more, which means that I lived on board her longer than I ever lived anywhere else. Second, I loved her as a ship; she helped me make my debut in the carrier Navy, and she initiated me into the marvels of fleet aviation.<sup>21</sup>

When the United States Pacific Fleet was attacked at Pearl Harbor on December 7, 1941, *Saratoga* was in California, entering San Diego harbor after an overhaul at the Puget Sound Navy Yard at Bremerton, Washington. Within 24 hours, the carrier was on its way into the

Pacific.<sup>22</sup> During WWII, *Saratoga* participated in several campaigns. *Saratoga* was involved in the aborted effort to relieve the beleaguered Marine garrison of Wake Island, and opened the American attack on Guadalcanal. *Saratoga* pounded Japanese bases in the Gilbert and Marshall Islands, providing support for the landings at Tarawa and flying combat air patrols over Eniwetok and Wotje. *Saratoga's* aircraft struck the heavily defended Japanese port of Rabaul and airfields at Buka, neutralizing effective Japanese counterstrikes at Bougainville in "perhaps her most brilliant strike of the war," according to the Navy.<sup>23</sup> Admiral Halsey, going aboard the carrier at Espiritu, Santo, praised *Saratoga*: "Your strike," he stated, "was another shot heard round the world...the *Saratoga*, when given the chance, can be deadly."<sup>24</sup> Operating with a British carrier and a French battleship, *Saratoga* struck Japanese-occupied Sumatra and Java, damaging

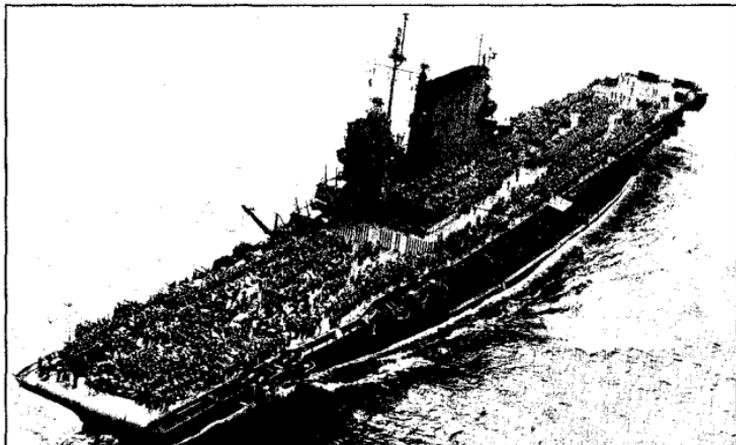


*Saratoga's* most trying hour, off Iwo Jima, February 21, 1945, as the flight deck forward burns after a kamikaze attack. (U.S. Naval Institute)

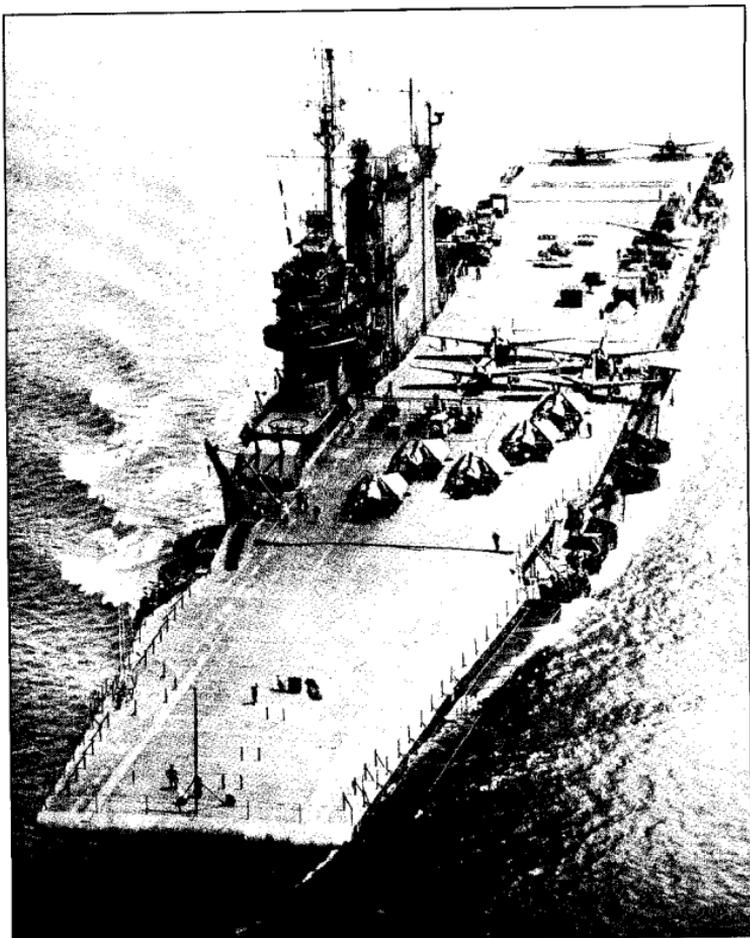
port and oil production facilities. In another important wartime assignment, the carrier spent several months training fliers to operate at night. *Saratoga* then participated in night strikes against the Japanese home islands as diversionary aids during the Iwo Jima operation, also flying patrols over Chichi Jima.<sup>25</sup> Considered a "lucky" vessel by its crew despite two torpedoings, *Saratoga* was hit hard off Iwo Jima when five kamikazes struck the ship on February 21, 1945, killing 123 men, wounding another 192, and tearing a huge hole in the ship's side. In June 1945, the Navy announced the damage to the by then repaired carrier:

Fires broke out and burning planes and fuel scattered over great areas of the ship. The forward part of the flight deck was battered beyond use. One enemy suicider penetrated the side of the ship into the hangar deck where he exploded to cause a great fire. The crane forward of the bridge, the catapults and many guns were battered by the crashing planes and exploding bombs.<sup>26</sup>

At the war's end *Saratoga* was steaming toward Japan to strike the home islands. Sent to the West Coast for decommissioning, *Saratoga* was instead ordered to "Magic Carpet" service in November 1945. *Saratoga* ferried naval veterans back to the United States as part of Operation "Magic Carpet." Within 28 hours "after her last plane was launched *Sara* was en route from Pearl Harbor to Alameda, California, with 3,800 grinning, happy, overseas warriors. Her hangar deck had been made into the world's largest dormitory with endless rows of 4-tiered bunks for passengers. Recreation facilities replaced planes on her flight deck."<sup>27</sup> By the end of "Magic Carpet," *Saratoga* had carried 29,204 veterans home, more than any other vessel. By the end of its career, *Saratoga* also held the record for the greatest number of aircraft landed on a carrier, with a lifetime total of 98,549 landings in 17 years.<sup>28</sup> On January 22, 1946, *Saratoga* was attached to Task Unit 1.2.2, the aircraft carrier unit of the target ship task group being assembled by Joint Task Force One for Operation Crossroads. Designated as a replacement for the carrier *Ranger* (CV-4) which had originally been designated as a



*Saratoga* arrives at San Francisco on a Magic Carpet voyage, 1945. (San Francisco Maritime National Historical Park)



*Saratoga sails for Bikini, modified for Operation Crossroads, May 1946. (San Francisco Maritime National Historical Park)*

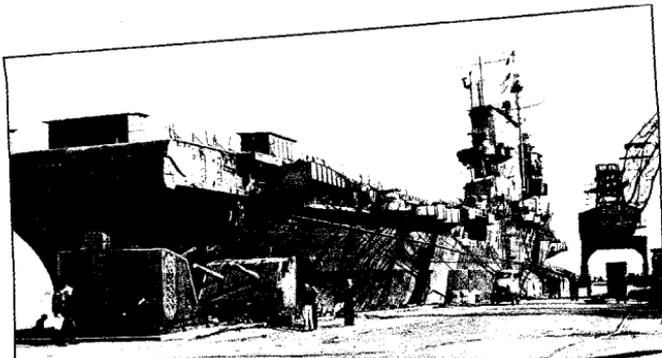


*Saratoga* sinks, bow in the air, at Bikini on July 25. (National Archives)

scores who wanted to save her--and perhaps she might have been saved, had there been a crew aboard. But she died a lonely death, with no man upon the decks once teeming with life, with pumps idle and boilers dead.... From three o'clock on she sank fast, her buoyancy gone, as the fleet kept the death watch for a "fighting lady." The...*Sara* settled--the air soughing from her compartments like the breath from exhausted lungs. At 3:45 p.m. the starboard after corner of her flight deck was awash; then the loud speakers blared: "The water is up to her island

now; the bow is high in the air." She died like a queen--proudly. The bow slowly reared high; the stern sank deep, and, as if striving for immortality, the *Sara* lifted her white numeral "3"...high into the sun before her bow slipped slowly under. Her last minutes were slow and tortured; she fought and would not sink, but slowly the "3" was engulfed by the reaching waters...the tip of her mast was the last bit of the *Sara* seen by man...<sup>34</sup>

The carrier was decommissioned on August 15, 1946, and stricken from the Navy Register.<sup>35</sup>



*Saratoga* being prepared for Operation Crossroads at Hunter's Point. Note the two 5-inch/38 caliber gun houses landed on the dock off the carrier's stern. (San Francisco Maritime National Historical Park)

target vessel, *Saratoga* was then prepared for the atomic bomb tests in early 1946 at Hunter's Point Naval Shipyard in San Francisco.<sup>29</sup> A January 25, 1946, news release showed the "gallant carrier" in dock as two 5-inch gun houses and the majority of the lighter anti-aircraft weapons were stripped from the ship. Sent to Pearl Harbor "after stripping" and reduction of personnel on April 30, 1946, *Saratoga* arrived there on May 7. From there, the carrier was ordered to proceed to Bikini Atoll, steaming from Pearl on May 23 in the company of the destroyer *Anderson* and arriving at Bikini on May 31.

*Saratoga* was selected as a test ship for Operation Crossroads because it, as a sole representative of a now obsolete class, had been replaced by the large number of wartime-built *Essex*-class carriers now available for future fleet use. Additionally, the carrier's compartmentation was "unusually complete" with more than 1,000 watertight compartments and its "underwater protection was very similar in arrangement to that of modern battleships and large carriers."<sup>30</sup> *Lexington* had not survived the war (it was sunk in May 1942 at the Battle of Coral Sea). *Saratoga* was moored 2,260 yards off the actual zero point for the Able test blast of July 1, 1946; intentionally located at some distance to save the carrier for the Baker

test. *Saratoga* was lightly damaged, with a fire on deck that was extinguished.<sup>31</sup> Initial array

plans for Baker placed *Saratoga* within a 300-yard radius of the detonation point. Because this position was deemed likely to sink the carrier so quickly that "no photographs could be made of the behavior of her flight deck under the severe hull pressure and wave action expected," *Saratoga* was changed to a 500-yard distant mooring, within the 500- to 700-yard "lethal radius" of the blast. Because of slack moorings and a wind change, the carrier drifted closer in, perhaps to within 300 yards of the bomb location before the detonation.<sup>32</sup> The ship was blown out to a position 800 yards distant before drifting back in and sinking 600 yards from the detonation point.<sup>33</sup>

*New York Times* correspondent Hanson W. Baldwin, watching nearby as *Saratoga* slowly sank nearly eight hours after the blast, penned an epitaph:

There were many who had served her in the observing fleet and they fought with her through the long hot hours as the sun mounted.... Outside the reef—a safe distance from the radioactive waters in the lagoon—the observing ships cruised, while the *Sara* slowly died. There were

## USS *ARKANSAS* (BB-33)

### Characteristics

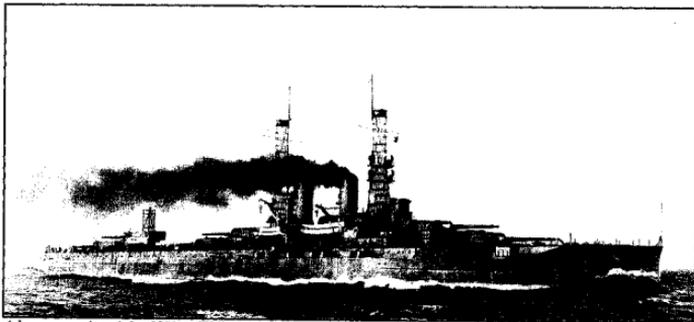
USS *Arkansas* (BB-33) was a riveted steel vessel 562 feet long overall, with a waterline length of 555-1/2 feet, a maximum beam of 106 feet, and a draft of 29 feet, 11-1/2 inches. *Arkansas* originally displaced 23,066 tons standard; the addition of deck armor and torpedo blisters between 1925-1927 increased the battleship to 26,100 tons standard displacement. The ship had 1,448 crew and was fitted as a flagship.<sup>36</sup>

*Arkansas* was heavily armored above the waterline; an 9-to-11-inch armor belt protected the ship amidships. The turrets were covered by 9 to 12 inches of armor plate. The hull was double-bottomed except in the machinery spaces, where three bottoms were fitted. The battleship received additional deck armor between 1925-1927; 3.5 inches of armor covered the top of the armor belt. This increased the displacement by 3,000 tons.

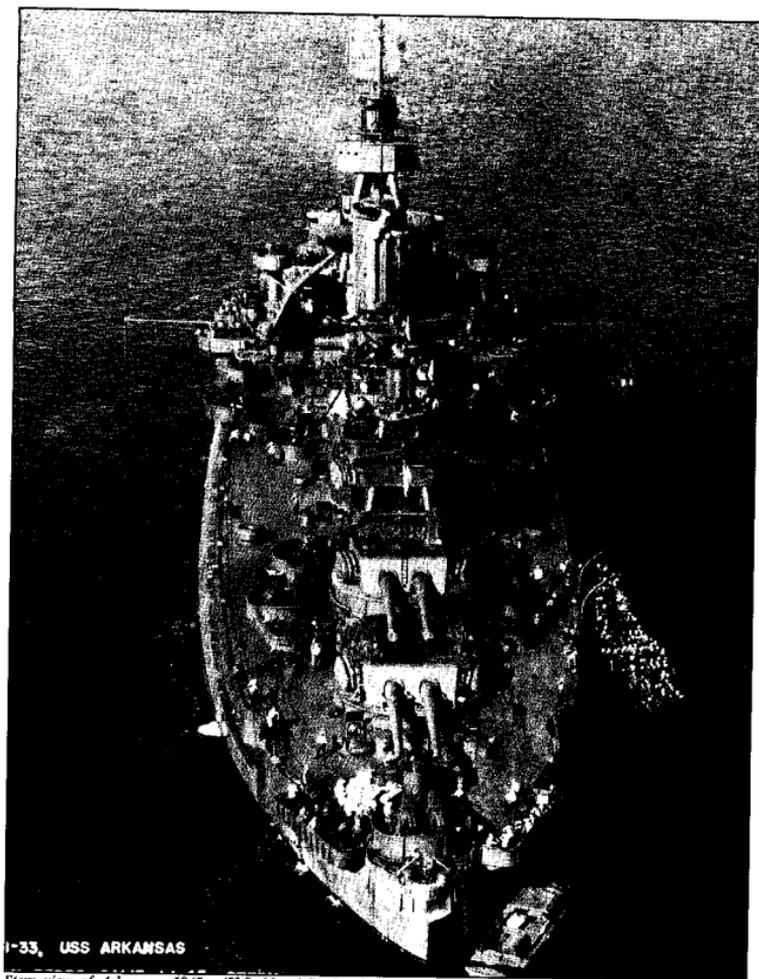
The main battery consisted of twelve 12-inch/50 caliber guns, twin mounted in six turrets--two forward, two amidships, and two aft. The secondary battery consisted of sixteen 5-inch/51 caliber guns in casemates.<sup>37</sup> Between 1925-1927 some of these latter positions, which were wet

in a seaway, were moved up to the main deck, and in 1942, ten of the 5-inch guns were removed, leaving three 5-inch guns in midships casemates (known aboard ship as the air castles) on each beam of the ship. *Arkansas* mounted two 21-inch torpedo tubes, which were later removed. The battleship's original anti-aircraft battery comprised eight 3-inch/50 caliber guns. In 1942 additional AA guns were added; as of 1945, *Arkansas* mounted nine quad 40mm Bofors guns and 28 single-mount 20mm Oerlikon guns. In its 1925-1927 refit, *Arkansas* also received an airplane catapult atop turret No. 3 and three spotter aircraft.<sup>38</sup>

*Arkansas*' four screws were driven by Parsons turbines and four White-Forster boilers which developed 28,000 shaft horsepower at 20.5 knots. The boilers vented into two stacks; between 1925-1927 when *Arkansas* was reboilered, a single stack replaced the original two. The coal-burning boilers installed in 1912 were replaced at that time with oil-burners; *Arkansas*' bunkers carried 5,425 tons of fuel oil. Other topside changes included replacing the cage mast with a low tripod between No. 4 and No. 5 turrets. In 1942, the ship was fitted with a tripod foremast aft of the bridge; the bridge itself was reconstructed at the same time. Fire control stations were located atop each mast in the enlarged tops.<sup>39</sup>



*Arkansas* on its trials, 1912. (Philadelphia Maritime Museum)



BB-33, USS ARKANSAS

*Stern view of Arkansas, 1945. (U.S. Naval Institute)*

### History

USS *Arkansas* (BB-33), second of two *Wyoming*-class battleships, was a near-sister of four *Florida*- and *Texas*-class battleships, which included the before-mentioned vessels as well as USS *Utah* and USS *New York*. *Arkansas* and its near-sisters represented the first "modern" class of U.S. battleships. The American "dreadnoughts" were designed to win sea battles through superior fire power and speed. *Arkansas* mounted six turrets with 12-inch guns, and was powered by newly developed steam turbines operating at then unheard-of speeds. *Arkansas* was built at the Camden, New Jersey, yard of the New York Shipbuilding Corporation. The battleship was laid down on January 25, 1910, just weeks after its near sister *Utah* was launched from the same yard. As *Utah* was fitted out, *Arkansas* rose on the ways. Launched into the Delaware River on January 14, 1911, the new battleship was fitted out in 20 months' time, and was commissioned as USS *Arkansas* at the Philadelphia Navy Yard on September 17, 1912.<sup>40</sup>

Prior to the First World War, *Arkansas* spent its career on the Atlantic coast and in the Caribbean, with one voyage to the Mediterranean. *Arkansas* carried President William H. Taft to Panama in December 1912 to inspect work on the Canal.<sup>41</sup> In 1914 *Arkansas* played an important role in the American landings at Veracruz, Mexico. In late April, *Arkansas* joined other ships in an attempt to contravene the landing of German arms to Mexican President Victoriano Huerta, who had succeeded the assassinated elected President Francisco I. Madero. U.S. President Woodrow Wilson, supporting Madero backers and anti-Huerta revolutionaries as part of his international campaign for human rights, and seeking to stabilize war-torn Mexico (by force of arms if necessary), sent in troops.<sup>42</sup> Marines and bluejackets landed from U.S. vessels off Veracruz, took the city, and prevented the landing of German weapons. After this maneuver, between 1914 and 1917 *Arkansas* trained along the Atlantic seaboard and in the Caribbean.

Following the United States entry into World War I in April 1917, *Arkansas* spent the first year patrolling the eastern seaboard before sailing to Europe in July 1918. Attached to the 6th Battle Squadron of the British Grand Fleet, *Arkansas*, along with near-sister *Texas* was present when the German High Seas Fleet surrendered at Scapa Flow on November 20, 1918. *Arkansas* served as one of the honor escorts for *George Washington* when that vessel carried President Wilson to France. Returning to the United States at the end of 1918, *Arkansas* resumed training and cruising; this time, however, the battleship operated in the Pacific. Between 1919 and 1938, *Arkansas* alternated in service between both coasts, spending several years in each ocean before being attached to Battleship Division 5 of the Atlantic Squadron in October 1938. *Arkansas* served on the Neutrality Patrol in the North Atlantic in 1941, prior to the U.S. entry in World War II. Following the Japanese attack on Pearl Harbor and Germany's declaration of



*Arkansas'* bow, showing two blast gauge towers and tanks placed on the battleship for the tests. (National Archives)

war against the United States, *Arkansas* served on convoy duty, escorting vessels to Ireland, Scotland, Iceland, and French Morocco. In June 1944, *Arkansas* participated in the invasion of Normandy, providing fire support on Omaha Beach. It also was used in the bombardment of Cherbourg, and later assisted in the invasion of Southern France in mid-August of the same year. Returning to the United States in September 1944, *Arkansas* was modernized at the Boston Navy Yard in Boston and sent into the Pacific.<sup>45</sup>

When *Arkansas* arrived in the Pacific in late 1944, it was the oldest and smallest of the then-existing American capital ships, as well as the last American battleship to mount 12-inch guns. Replaced as a first-line ship by the new battleship *North Carolina*, *Arkansas* nonetheless played a major role in the Pacific war. *Arkansas* provided pre-invasion bombardment at both Iwo Jima (February 1945) and Okinawa (March 1945) as well as ongoing fire support for both operations. The battleship fired 1,262 rounds of 12-inch ammunition at Iwo Jima and 2,564 rounds at Okinawa. Through the war *Arkansas'* 12-inch guns fired 5,255 rounds in all; the 5-inch guns of the secondary battery fired 5,123 rounds, and the ship's lighter antiaircraft battery fired 8,422 rounds, while the battleship steamed 134,141 miles. Returning to the United States in October 1945, *Arkansas* was readied for participation in Operation "Magic Carpet"; the veteran battleship then made three voyages transporting returning servicemen to Pearl Harbor. *Arkansas* was selected as a target vessel for Operation Crossroads and was prepared for the bomb tests at Terminal Island, California, before steaming from Pearl Harbor on May 8, 1946. *Arkansas* left Pearl on May 20 and arrived at Bikini on May 29, 1946.

*Arkansas* was moored off the port beam of USS *Nevada*, the target ship for the Able test on July 1, 1946. The battleship was "one of the three major combatant ships within one half mile of the zeropoint."<sup>44</sup> The ship was the site of the maximum measured radioactive contamination from the Able test; a pool of water on *Arkansas* was measured at eight roentgens per eight hours. *Arkansas* was

moored within 500 feet of the detonation point for the Baker Test of July 25, 1946; it was the closest of the target vessels with the exception of the vessel that suspended the bomb, LSM-60. The detonation is popularly believed to have lifted the battleship vertically out of the water within the blast column. Careful analysis of the sequence of movie photographs, however, shows what appears to be the battleship's foremast in the blast column, with the dark "hole" thought to be the up-ended battleship caused by the mass of the ship blocking the uplifted water column rising above it. *Arkansas* sank almost immediately; the Navy technical inspection report for *Arkansas* notes it disappeared within 19 seconds after the blast. According to *Bombs at Bikini*, "in sinking, she carried with her the dubious honor of being the first battleship to be sunk by an atomic bomb, and the first battleship to be sunk by a bomb that never touched her."<sup>49</sup>

## HIJMS NAGATO

### Characteristics

The Japanese battleship *Nagato* was a steel-hulled vessel 708 feet in length overall, with a 95-foot beam and a 30-foot draft. *Nagato* displaced 38,500 tons standard. The ship was armored with a 3.9-to-11.8-inch belt; the turrets were protected by 14-inch thick armor. *Nagato's* armament consisted of eight 16.1-inch/45 caliber guns, twenty 5.5-inch/50 caliber guns, four 3.1-inch antiaircraft guns, three machine guns, and eight 21-inch torpedo tubes, four above and four below the waterline. Between 1934-1936, *Nagato* was reconstructed: torpedo bulges were added and the superstructure was raised and modified. In June 1944, *Nagato* had sixty-eight 25mm Hotchkiss antiaircraft guns; by October of the same year, the number of antiaircraft guns had increased to include ninety-eight 20mm guns. At that time, *Nagato* retained eighteen 5.5-inch guns; *Nagato's* full load displacement at that time was 43,581 tons.<sup>48</sup>

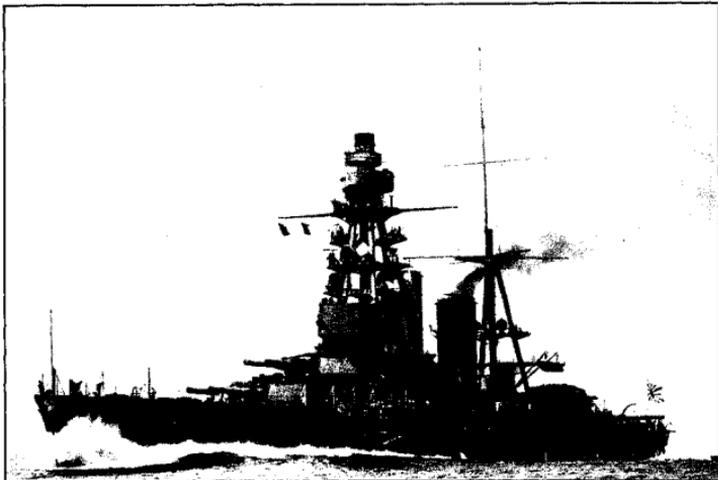
*Nagato's* four screws were driven by Gihon steam turbines that developed 80,000 shaft horsepower at 26.7 knots. By October 1944,

the rated speed of the vessel was 24.98 knots.<sup>47</sup> Steam was provided by 21 Kanpon boilers. The battleship was originally coal-fired; between 1934-1936 the ship's machinery was replaced with new oil-burning boilers. This led to the removal of *Nagato's* forward stack. During the reconstruction, in addition to new machinery and torpedo bulges, *Nagato* received a triple bottom, additional deck armor, and increased elevation for the 16-inch guns. *Nagato* carried three observation planes launched by catapult forward of the "C" turret. According to the U.S. Navy's confidential report on the Japanese Navy, ONI-221-J, issued in June 1945, "the most outstanding outboard feature of *Nagato* is the large heptapodal foremast with its numerous tops and bridges for fire and ship control purposes. The central vertical leg is thick enough to accommodate an electric lift running between the foretop and main deck."<sup>48</sup> *Nagato's* hull was reportedly divided into 560 separate watertight compartments; its rated complement was 1,333 men.<sup>49</sup>

#### History

The battleship *Nagato* was built by Kure Navy Yard for the Imperial Japanese Navy under provision of the 1916-1917 Programme of Naval Construction by that nation. Laid down in 1917, *Nagato* was launched on November 9, 1919. The first of two *Nagato*-class battleships (*Nagato* and *Mutsu*), *Nagato* was the first battleship in the world armed with 16-inch guns.<sup>50</sup> Completed on November 25, 1920, *Nagato* served in its most famous role as flagship for Adm. Isoroku Yamamoto, Commander in Chief for the Combined Fleet. *Nagato*, "its entire crew manning the sides," led the combined fleet in its last official public display on October 11, 1940, during an Imperial review off Yokohama in ceremonies celebrating the 2,600th anniversary of the accession of Jimmu, Japan's first emperor.<sup>51</sup>

*Nagato* was the scene of many meetings by Yamamoto and his staff as plans to attack the



*Nagato* underway in the 1920s. (U.S. Naval Institute)



View aft from the bow, showing *Nagato's* A and B turrets and distinctive superstructure, at Bikini, May 1946. (National Archives)

U.S. Pacific Fleet at Pearl Harbor were first broached, discussed, and refined. Final preparations for the war were made aboard *Nagato*, and Yamamoto stood aboard *Nagato* with the battleship's crew as the Pearl Harbor strike force vessels sortied. With them the Japanese aircraft carriers brought specially modified 16-inch shells from *Nagato* and its sister *Mutsu* that would be dropped on the American ships at Pearl Harbor as bombs. One of these shells would be credited with sinking the battleship *Arizona*. *Nagato* was the scene of nervous waiting by Yamamoto and his staff. They first heard of Japan's overwhelming success at Pearl Harbor when *Nagato's* radio operator received the famous "to, to, to" signal for a successful attack's commencement--crystal-clear reception from the skies over Oahu thousands of miles away.<sup>52</sup>

*Nagato* served as flagship for Yamamoto until replaced by the 63,700-ton super battleship *Yamato* in February 1942.<sup>53</sup> Yamamoto, when he shifted his flag to *Yamato*, released the older battleship for operational duty; thus, *Nagato* as part of the Japanese Main Force steamed with the striking force that attempted to take Midway and the Aleutians in late May 1942. *Nagato*, however, was not engaged in combat in the disastrous engagement off

Midway in June in which four carriers were sunk by American carrier aircraft.<sup>54</sup>

*Nagato* next sortied with the fleet in the Marianas in June 1944. This disastrous battle, Japan's last opportunity to win a decisive naval engagement, ended in defeat and the withdrawal of the fleet to Japanese home waters.<sup>55</sup> The fleet, with *Nagato*, again sailed in October 1944 to engage the American fleet at the Battle of Leyte Gulf. *Nagato*, in formation with the super battleships *Musashi* (sunk in this engagement) and *Yamato*, was hit by two torpedoes but survived, assisting *Yamato* off Samar. In retreat *Nagato* took a heavy pounding from carrier bombers; it was hit by four bombs and was damaged by nine near-misses.<sup>56</sup> Upon reaching Japan, *Nagato* was left at anchor at Yokosuka, awaiting repairs that never came. Thus, the crippled *Nagato*, tied up at Yokosuka, missed the last sortie of the Imperial Japanese Navy in April 1945. In that special *kikusui* (battle of certain death) *Yamato* was sunk, effectively destroying the Imperial Japanese Navy as a fighting force.<sup>57</sup>

*Nagato*, already badly damaged, was again mauled by aerial attack while at anchor at Yokosuka on July 18, 1945. The principal target of the attack, *Nagato* was moored close to shore next to antiaircraft batteries and camouflaged by the removal of its mainmast and stack. The battleship was pounded by aircraft from USS *Yorktown* (CV-10). *Nagato* was neutralized--the bridge wrecked, and the decks and superstructure holed and damaged.<sup>58</sup> Ending the war out of action in Tokyo Bay, *Nagato* was the only Japanese battleship to survive the war afloat. Following the Japanese surrender, Task Force Thirty-One (the Tokyo Bay occupation force) landed and occupied the Tokyo Bay area. Navy Underwater Demolition Team 18 was assigned to "capture" *Nagato* on August 30, 1945. This act, according to the U.S. Navy, "symbolized the unconditional and complete surrender of the Japanese Navy."<sup>59</sup> Unlike some other captured vessels, *Nagato* was not brought into the U.S. Navy as a special auxiliary, as was the case with the German battle cruiser *Prinz Eugen*. This may have been because *Nagato* was heavily damaged and was

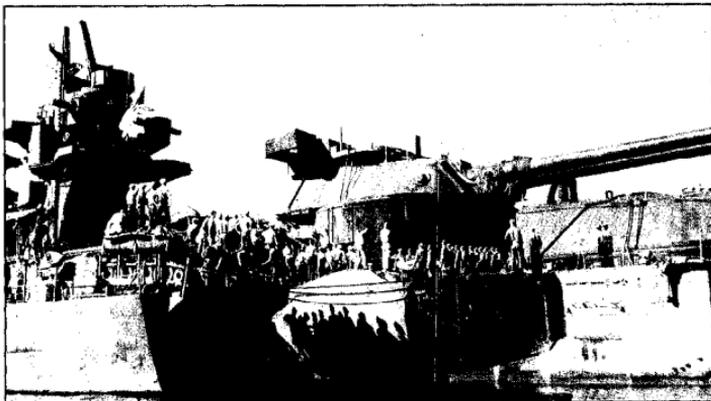
of no use to the United States as a capital ship. The vessel was also a symbolically laden ship, being the "flagship" of the *kido butai* or "strike force," as well as the genesis point of the plan for the attack on Pearl Harbor, which Americans perceived as a vicious sneak attack, and onetime quarters of Yamamoto, who, while a villain in the United States was still very much a hero to the Japanese. *Nagato*, not surprisingly, was selected as a target vessel for Operation Crossroads. In early 1946 the ship was prepared at the Yokosuka Naval Base and steamed under its own power close to Bikini Atoll in the company of the captured cruiser HJMS *Sakawa*.

*Nagato's* imminent arrival was noted in "Crossroads," the semi-official newsletter of the tests, on August 27, 1946:

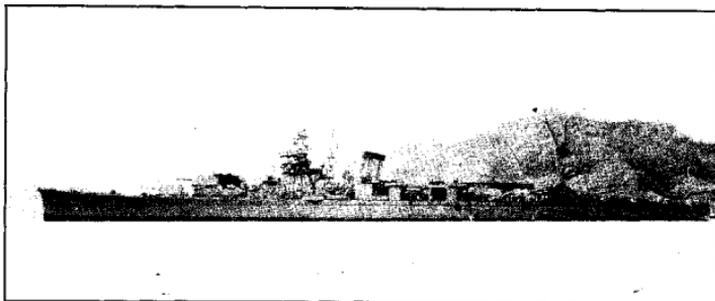
Once the lofty pride of the Japanese fleet, the battleship *Nagato* will strike an ironic contrast as she enters the atoll shortly. Flying the American ensign and manned by an American crew, she will be the first of the 'guinea' ships to take her position for what may well be her last mooring. Then, humbly, she will

await the fateful day when the blow, mightier than the greatest salvo ever produced by man, will descend.

After its arrival at the end of April, *Nagato*, "the one-time pride of the Japanese Navy," was eagerly explored by sightseeing sailors. According to the May 4 edition of "Crossroads," "this huge battleship appears to have already undergone the blast. Visitors will find that she is pretty-well shattered, her decks and bulkheads rusty, and her equipment highly picked over. An LST alongside supplies all her water and electricity." The vessel was prepared by a repair ship for the tests at Bikini, and then moored 400 yards to the starboard of *Nevada*, target ship for the Able test. When the bomb missed *Nevada*, *Nagato* was only moderately damaged by the Able blast; light plating on the superstructure was wrinkled and light non-watertight doors were blown off their hinges; paint was scorched. The report on the ship concluded that "the *Nagato* is structurally sound.... The poor condition of the ship and her equipment is due to lack of preventive maintenance and overhaul, and to the fact that her engineering plant sat idle for over a year."<sup>60</sup>



The "capture" of *Nagato* and the symbolic surrender of the Imperial Japanese Navy at Yokosuka, August 30, 1945. (U.S. Naval Institute)



*A captured Japanese photograph of Sakawa, circa 1945. (U.S. Naval Historical Center)*

The end came for *Nagato* when the Baker test bomb detonated nearby on July 25, 1946.<sup>61</sup> The passing of the battleship under these circumstances made a profound impression on the Japanese. Naval historian Masanori Ito wrote:

When World War II began, the Japanese Navy--the third most powerful in the world--included some of the mightiest ships in naval history and was a force worthy of the pride and trust of the Japanese people. Then, in less than four years, this great war machine fell from glory to oblivion. Of ten battleships riding in Hiroshima Bay in December 1941, nine were sunk. The lone survivor, *Nagato*, died at Bikini Island as a target in an atomic bomb test.<sup>62</sup>

## **HIJMS SAKAWA**

### Characteristics

*Sakawa* was a welded steel cruiser of the *Agano* class. Particulars of the ship are not fully documented since Japanese records were destroyed at the time of the surrender. The U.S. Navy's official report on the Japanese Navy, ONI-221-J, issued in June 1945, cites a length of 530 feet overall and a beam of 49.6 feet. The vessel's length is not cited in other

sources; its sister ship *Yahagi*, built at the same yard at roughly the same time, had a length of 531 feet between perpendiculars. *Sakawa* displaced 6,652 tons. The ship had a flush deck, "with marked sheer to the forecastle." The *Agano* class cruisers were also fitted with bulbous bows. The four shafts were driven by steam turbines; steam was provided by six Kampon boilers. *Agano* was rated at 10,000 shaft horsepower at 35 knots; *Sakawa* probably had the same rating. The vessels were reportedly armed with six 6-inch/50 caliber guns, paired in three turrets, two forward and one aft. *Sakawa* had an anti-aircraft battery of four 3.1-inch/65 caliber guns, and thirty-two 25mm/65 caliber Hotchkiss guns. *Sakawa* also mounted eight 24-inch torpedo tubes above water and carried 16 depth charges. Each *Agano* class cruiser also carried two floatplanes for observation, launched from a single catapult.<sup>63</sup>

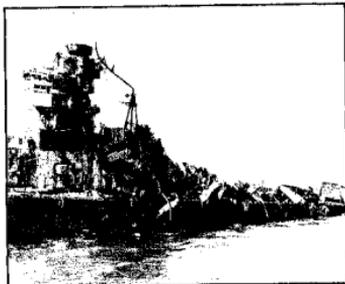
### History

The cruiser *Sakawa* was built at Sasebo Navy Yard for the Imperial Japanese Navy as part of that nation's 1939 Programme of Naval Construction. Fourth and last of the *Agano* class cruisers, *Sakawa* and its sisters were the first regular light cruisers to be added to the Imperial Japanese Navy in more than ten years.<sup>64</sup> Laid down in 1942, *Sakawa* was launched on April 9, 1944, and completed on

November 30 of the same year. *Sakawa* was the only vessel of its class to survive the war. Intended for use as flagships for destroyer flotillas, the *Aganos* were lost in combat. *Agano* was sunk by USS *Skate* off Truk on February 17, 1944; *Noshiro* was sunk by carrier aircraft from USS *Hornet* and *Wasp* on October 26, 1944; *Yahagi* was sunk while sortying with the battleship *Yamato* on April 7, 1945.<sup>65</sup> The undamaged *Sakawa* was at the Japanese naval base at Maizuru (on the coastline of the Sea of Japan) in August 1945.<sup>66</sup> After use as a reparations vessel, *Sakawa* was selected as a target ship for Operation Crossroads. *Sakawa* sailed to Bikini from Yokosuka in company with the battleship *Nagato*. Both vessels were readied for the tests at Bikini by a U.S. Navy repair ship. This work included removing the airplane catapults, torpedo tubes, 6-inch guns, and smaller gun mounts from the cruiser.<sup>67</sup>

*Sakawa* was moored off the port quarter of *Nevada*. The actual detonation of the Able bomb took place some 490 yards above and slightly to starboard of *Sakawa's* stern. Following the blast, observers noted that *Sakawa's* superstructure and hull had suffered major damage. The superstructure aft of the bridge was smashed down, as was the stack, which collapsed forward. The mainmast toppled forward and to port until it overhung the side by one-third of its length. Reports also noted that "the tops of the after mounts were crushed. The tops of the forward mounts were dished in a fore and aft V having a two-foot maximum depression."<sup>68</sup> The worse damage, however, was to the hull. "The stern was most badly damaged... Its deck plating was crushed inward and shell plating about the counter was twisted and torn open in several places. Shell plating on the starboard side...was badly wrinkled from approximately frame 145 aft."<sup>69</sup> Other damage included the dislodging of deck fittings, the smashing of the lifeboats, and a fire that broke out on the stern and raged for two hours.<sup>70</sup>

Immediately after the test *Sakawa's* stern sank two feet. Through the night the stern continued to settle as the cruiser listed to port. Some 24 hours after the test, the ship lay on its port beam, half submerged, with the stern



Mangled by the Able detonation, *Sakawa* sinks by the stern on July 1. (National Archives)

on the lagoon bottom. *Sakawa's* bow sank beneath the lagoon surface at 10:43 a.m. on July 2. According to the U.S. Navy, "flooding unquestionably started when the *Sakawa's* stern was ripped open to the sea by the blast... Poor watertight integrity...permitted progressive flooding. After 24.5 hours the main deck was awash. In the next hour rapid progressive flooding, probably due to poorly fitted and damaged hatches, vent trunks, and other fittings in the main deck, sent the *Sakawa* to the bottom."<sup>71</sup> At the time of sinking, the Navy tug *Achomawi* (ATT-148) had a line aboard *Sakawa* and was attempting to pull the ship from astern to shore; the cruiser was moved astern about 150 feet when it finally sank. The Navy was able to board and inspect the cruiser prior to sinking; "diving operations on this vessel were assigned low priority and eventually limited by a time factor to recovery of instruments. Hence no diver's report is available..."<sup>72</sup>

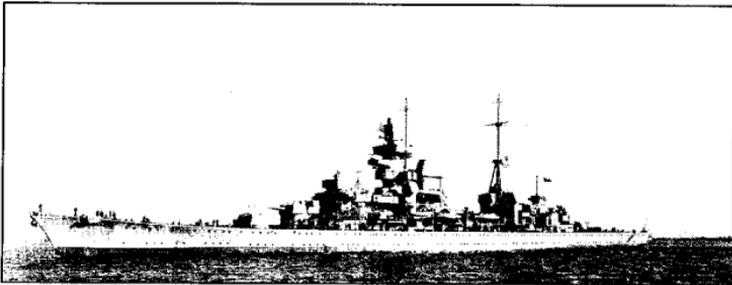
#### USS PRINZ EUGEN (IX-300)

##### Characteristics

*Prinz Eugen* was a welded-steel vessel incorporating substantial aluminum internal construction. It was 692 feet in length, with a 71.2-foot beam and a 24.8-foot draft, and displaced 19,553 tons standard. The vessel



*Prinz Eugen* at the Krupp Yard in Kiel, circa 1939-1940. (U.S. Naval Institute)



*Prinz Eugen* at Philadelphia, March 1946. (Floating Drydock)

carried a complement of 830 crew. The armament consisted of eight 8-inch/55 caliber guns in four turrets; twelve 4.1-inch antiaircraft guns; twelve 21-inch torpedo tubes in triple deck mounts; six 40mm Bofors AA guns; eight .30 caliber guns in four twin mounts; and twenty-eight 20mm flak guns mounted as two quads and ten twins. *Prinz Eugen* carried three AR-196 spotter aircraft in a hangar between the stack and mainmast. The planes were launched from a single catapult and recovered

by cranes on either side of the hangar. The ship was armored with 3.15-inch-thick vertical nickel steel side armor, with 2-inch armor on the bridge and 20mm of armor on the rangefinder positions. The turret barbettes were protected by 3.5-inch-thick steel armor; the turrets themselves were covered by two to six inches of armor. The vessel's three shafts were powered by geared steam turbines reportedly rated at 80,000 shaft horsepower at 32 knots. The three complete sets of main

turbines consisted of a high, intermediate, and low pressure turbine, with astern turbines installed in the casings of the main I.P. and L.P. turbines. The main reduction gears were single reduction. The engines were powered by high pressure, Lamont forced circulation watertube boilers. The ship's electrical power was provided by six turbo generators and four diesel emergency generators. According to wartime issues of *Jane's Fighting Ships*, "Internal arrangements of these ships [were] reported to be decidedly cramped and badly ventilated." *Prinz Eugen's* capacity was rated at 1,049 crew by *Jane's*. In many respects, *Prinz Eugen* resembled the battleship *Bismarck*, its "big brother" and running mate: according to German officers from both, even trained observers had difficulty telling the two ships apart at a distance when their relative size could not be assessed.<sup>73</sup>

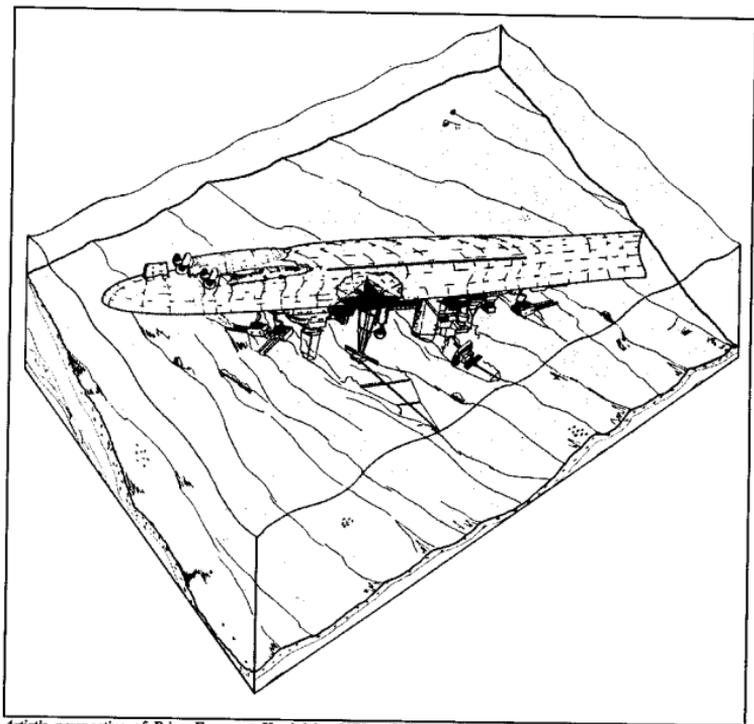
#### History

The heavy cruiser *Prinz Eugen* was built by Krupp at their Germania Werft shipyard in Kiel for the German Navy under the 1936 naval construction program. Laid down in 1936, *Prinz Eugen* was launched on August 20, 1938, in the presence of Adolf Hitler and Grossadmiral Erich Rader. The cruiser was christened by Madame Horthy, wife of the Hungarian dictator, Admiral Nicholas Horthy.<sup>74</sup> Second of four *Hipper* class heavy cruisers (*Admiral Hipper*, *Prinz Eugen*, *Seydlitz*, and *Lutzw*), *Eugen* was completed in 1940 and commissioned on August 1 of that year. Constructed principally for high seas commerce raiding, *Prinz Eugen* spent most of WWII blockaded in port. After shakedown exercises in the Baltic, the cruiser joined KMS *Bismarck* in Norway in May 1941. *Prinz Eugen* and the battleship made their famous breakout into the North Atlantic, where they engaged and sank the battle cruiser *Hood* on May 24; *Prinz Eugen's* shells were credited with setting the British ship afire before a hit from *Bismarck* detonated *Hood's* magazines. Prior to being met by a superior British task force that sank *Bismarck* after a running sea battle, *Prinz Eugen* escaped the battleship's fate by slipping away to the Azores.<sup>75</sup> Arriving at Brest, France, for sanctuary and an overhaul in June

1941, *Prinz Eugen* was harassed by British air raids. While blockaded at Brest, *Eugen* was damaged by aerial bombing; a hit on July 2, 1941, destroyed the main gunnery control room and damage control, and killed 52 men.<sup>76</sup>

In another famous breakout, *Prinz Eugen*, with the battleships *Scharnhorst* and *Gneisenau* raced up the English Channel between February 11 and 13, 1942, as allied aircraft, coastal gun batteries, and ships attempted to sink them. After its escape, *Prinz Eugen* operated in Norwegian waters. On February 23, 1942, however, the cruiser was torpedoed by the British submarine *Trident* in a Norwegian fjord and lost its counter. After another harrowing run to Germany under attack by British planes, the ship was repaired and returned to service as a training ship on the Baltic in the summer of 1942. In October 1943 the ship rejoined the fleet as flagship of the German Baltic forces. In this capacity, the cruiser provided fire support for German troops and panzers in Lithuania and Latvia in 1944; *Prinz Eugen* spent the last months of the war on the Baltic coast, supporting ground forces retreating from the Russian advance, firing more than 5,000 rounds. Surrendered at the end of the European war on May 7, 1945, at Copenhagen, *Prinz Eugen* was taken by the United States as a prize of war.<sup>77</sup> Designated IX-300 as a special auxiliary, *Prinz Eugen* was taken to the United States for tests and analysis in January 1946, arriving at Boston on the 24th of the month.<sup>78</sup>

Selected as a target vessel for Operation Crossroads, *Prinz Eugen* was readied at the Philadelphia Navy Yard in February-March 1946. This work involved removing two 8-inch gun barrels from turret "A" for additional evaluation. A fire control tower was also taken from the ship at this time. *Prinz Eugen* then proceeded to Bikini, arriving on June 11, 1946. There it was moored between two U.S. destroyers off the port quarter of USS *Arkansas*, 1,200 yards from the zero point. The vessel was not appreciably damaged in the Able test of July 1, 1946, nor in the Baker test three weeks later, when it was moored one mile off the detonation point, but was contaminated with radioactive fallout. The cruiser was towed to Kwajalein for



Artist's perspective of *Prinz Eugen* at Kwajalein, 1973. (U.S. Navy, Supervisor of Salvage)

decontamination along with several other vessels after the tests. The ship had a slight, but progressive leak, and on the morning of December 21, 1946, it was found listing and down by the stern. Boarding parties found the ship flooding rapidly from what was believed to be a failed sea valve. An attempt was made to beach the ship on Enebuju Island, but underpowered tugs and strong winds swung *Prinz Eugen* broadside to the beach, portside to shore, where the ship grounded offshore on a coral ledge at 5:00 p.m. During the night the

flooding continued, with the list gradually reaching 35 degrees to starboard. At 12:43 in the morning of December 22, 1946, *Prinz Eugen* capsized and sank.<sup>79</sup> Subsequent dives on the ship found that technically the cruiser could be raised, but radiation hazards prohibited this action being practical. In 1973, the Department of the Interior requested that the Navy relinquish title to *Prinz Eugen* to allow scrapping of the ship to commence. A Navy team dove and documented the wreck, and reported in June 1974 that beta and gamma

radiation could no longer be detected on *Eugen*, but that the vessel had suffered severe hull damage amidships, was partially imbedded in the lagoon bottom, and required removal of residual fuel oil and ordnance before salvage operations could commence.<sup>60</sup> As a consequence, no action to remove the ship was taken.

## USS *ANDERSON* (DD-411)

### Characteristics

The *Sims*-class destroyer *Anderson* was a welded steel vessel with an overall length of 348.3 feet, a waterline length of 341.4 feet, a 36.1-foot beam, a 19.8-foot depth, and a 17.4-foot draft. *Anderson* displaced 1,720 tons standard.<sup>61</sup> The *Sims*-class destroyers were supposed to have been 1,570 tons; lack of communication between the Navy's Bureau of Construction and Repair and the Bureau of Engineering led to the overweight problem of the *Sims* class. As a result of this and other problems, the two Bureaus were merged into a single organization, the Bureau of Ships, in 1940.<sup>62</sup> *Anderson's* twin screws were driven by Westinghouse steam turbines and three oil-fired Babcock and Wilcox boilers, rated at 50,000 shaft horsepower at 35 knots. The Navy experimented with streamlining these vessels in an effort to improve speed and fuel consumption; a rounded bridge structure on the *Sims* class produced less wind resistance and turbulence than previous classes. *Anderson's* main battery comprised five 5-inch/38 caliber guns in single mounts. The ship carried twelve triple-mounted 21-inch torpedo tubes on deck. In mid-1941, four .50 caliber machine guns for AA use were installed. *Anderson* also mounted two depth charge racks aft.<sup>63</sup>

USS *Anderson's* superstructure was badly damaged by the Able test burst; the stack toppled, and a fire started abaft the bridge. The fire subsided in a minute's time, then flared up as *Anderson* capsized to port. Once capsized, *Anderson* sank by the stern. Shortly after the Able event, Navy divers found the destroyer in 176 feet of water, lying on its port side, with the bow imbedded in the bottom and

the stern lying 15 feet off the bottom. The damage that sank the ship was presumed to be on the port side; the starboard hull was wrinkled and "several seams...were leaking oil and air."<sup>64</sup> The worst damage noted was topside; the mainmast was stripped of fittings and the yardarm was snapped in half. Radar antenna and the stack were missing. The deckhouses were crumpled, the No. 2 gun shield split open, bulwarks on several superstructure decks were torn away, the torpedo crane was bent at a 90-degree angle, and the starboard "Y" depth charge launchers were ripped off the deck.<sup>65</sup> The Navy determined that blast damage and a post-blast fire and explosion sank *Anderson*. This was the only occasion during the tests that shipboard munitions detonated.

### History

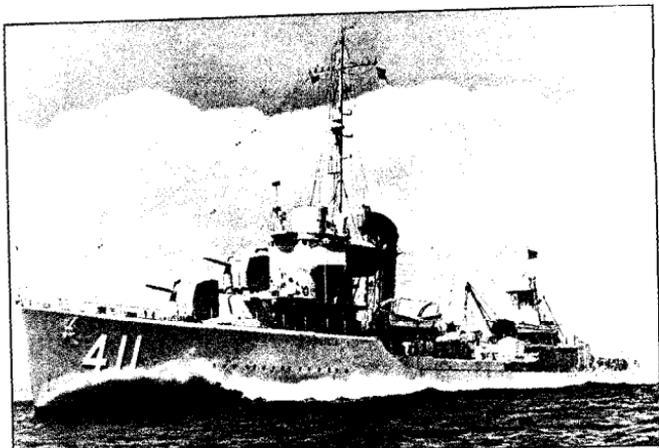
USS *Anderson* was the third of twelve *Sims*-class destroyers. The last of the American "single stackers," these vessels were the result of a 1935 request by the Chief of Naval Operations for a new design for destroyers. The U.S. Navy's General Board forwarded a proposal in May 1936 for a 1,570-ton ship with five 5-inch guns and twelve 21-inch torpedo tubes.<sup>66</sup> Twelve destroyers were built to the design, commencing with USS *Sims* (DD-409). Authorized in fiscal year 1937, the destroyers were built by different yards to a design by the noted New York firm of Gibbs and Cox. The *Sims* class had robust hulls and were heavily armed; more significantly, these destroyers were the first to carry the newly developed Mark 37 fire control system, which introduced for the first time in a destroyer a computer room below decks--an innovation that proved highly successful in combat in WWII and was fitted to all major U.S. combatant vessels by 1945.<sup>67</sup>

*Anderson* was laid down in late 1938 at the Kearny, New Jersey, yard of the Federal Shipbuilding and Drydock Corporation (a subsidiary of U.S. Steel). The destroyer was launched on February 4, 1939, and fitted out over the next few months.<sup>68</sup> *Anderson* was commissioned on May 19, 1939, and began a year-long program of tests and trials. Sent into the Pacific in 1940, *Anderson* spent a year as

flagship of Destroyer Division 3 until sent back to the Atlantic in June 1941. There, the destroyer joined the other *Sims* class vessels in Neutrality Patrol and convoy duties between Canada and Iceland. *Anderson* was part of the escort force for three convoys. Following the Japanese attack on the U.S. fleet at Pearl Harbor, *Anderson* returned to the Pacific in December 1941. The remainder of the ship's career was spent in the Pacific.<sup>49</sup>

*Anderson* served as part of the screening force for the Navy's carriers during the early, decisive battles in the Pacific. In May 1942, *Anderson* operated with Task Group 17 in the Coral Sea. This force moved against the Japanese, with *Anderson* screening the carrier *Lexington* (CV-2), sister of *Saratoga*. In the battle, the Japanese light carrier *Shoho* was sunk, along with *Lexington*, which succumbed to ruptured gasoline lines. Accumulating gasoline fumes ignited, setting off internal explosions that spread flames throughout the ship.

*Anderson* stood by to render assistance and rescued 377 men from the carrier, which was then sunk with a torpedo from the destroyer *Phelps* (DD-360). *Anderson* was recalled to Pearl Harbor, arriving on May 23, 1942, where it sortied with Task Force 17 for the Battle of Midway. TF 17 was grouped around the carrier *Yorktown* (CV-5), which had been damaged during and quickly repaired after the Battle of the Coral Sea. At Midway, *Yorktown* was the only American carrier located by the Japanese, who struck Task Force 17, bombing *Yorktown*. A second wave of planes again attacked as *Yorktown's* crew got the fires under control; *Anderson* shot down one torpedo plane, but others got through and *Yorktown* was again hit, this time by two torpedoes. The destroyer managed to destroy four planes in the two attacks. *Anderson* moved in to pick up survivors as *Yorktown* was abandoned; 204 men were taken off by the destroyer. Damage control crews on *Yorktown* managed once again to keep the carrier afloat; however, a Japanese

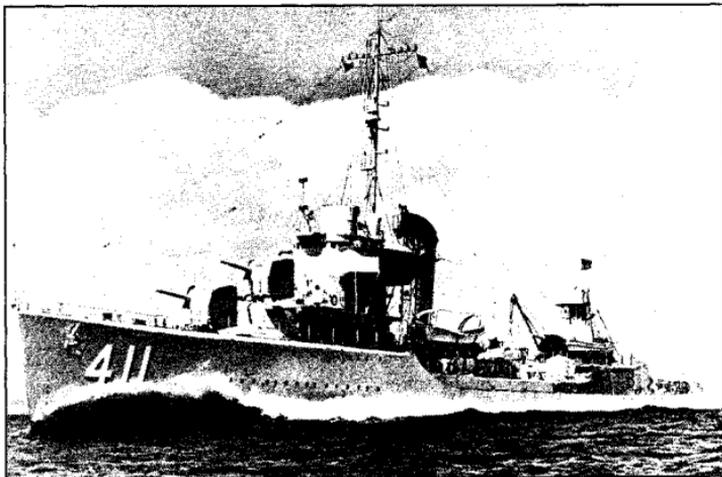


*Anderson*, shown in a popular view that epitomized the prewar destroyer force. (U.S. Naval Historical Center)

flagship of Destroyer Division 3 until sent back to the Atlantic in June 1941. There, the destroyer joined the other *Sims* class vessels in Neutrality Patrol and convoy duties between Canada and Iceland. *Anderson* was part of the escort force for three convoys. Following the Japanese attack on the U.S. fleet at Pearl Harbor, *Anderson* returned to the Pacific in December 1941. The remainder of the ship's career was spent in the Pacific.<sup>99</sup>

*Anderson* served as part of the screening force for the Navy's carriers during the early, decisive battles in the Pacific. In May 1942, *Anderson* operated with Task Group 17 in the Coral Sea. This force moved against the Japanese, with *Anderson* screening the carrier *Lexington* (CV-2), sister of *Saratoga*. In the battle, the Japanese light carrier *Shoho* was sunk, along with *Lexington*, which succumbed to ruptured gasoline lines. Accumulating gasoline fumes ignited, setting off internal explosions that spread flames throughout the ship.

*Anderson* stood by to render assistance and rescued 377 men from the carrier, which was then sunk with a torpedo from the destroyer *Phelps* (DD-360). *Anderson* was recalled to Pearl Harbor, arriving on May 23, 1942, where it sortied with Task Force 17 for the Battle of Midway. TF 17 was grouped around the carrier *Yorktown* (CV-5), which had been damaged during and quickly repaired after the Battle of the Coral Sea. At Midway, *Yorktown* was the only American carrier located by the Japanese, who struck Task Force 17, bombing *Yorktown*. A second wave of planes again attacked as *Yorktown's* crew got the fires under control; *Anderson* shot down one torpedo plane, but others got through and *Yorktown* was again hit, this time by two torpedoes. The destroyer managed to destroy four planes in the two attacks. *Anderson* moved in to pick up survivors as *Yorktown* was abandoned; 204 men were taken off by the destroyer. Damage control crews on *Yorktown* managed once again to keep the carrier afloat; however, a Japanese



*Anderson*, shown in a popular view that epitomized the prewar destroyer force. (U.S. Naval Historical Center)

submarine launched two torpedoes that sank the carrier and the destroyer *Hammann* (DD-412), a sister ship of *Anderson*, which was alongside.<sup>90</sup>

Always in the front lines, *Anderson* screened USS *Wasp* (CV-7), which was sunk by torpedo attack on September 15, 1942. The destroyer next screened USS *Hornet* (CV-8) at the Battles of the Eastern Solomons and Santa Cruz; in the latter battle (October 25-26, 1942) *Hornet* was lost. In both cases *Anderson* again moved towards the stricken carriers and rescued men; in all, the destroyer saved more than 1,000 crew members from the four carriers. The destroyer was shifted from screening duty to invasion support in November 1942; *Anderson* screened transports carrying reinforcements to Guadalcanal and shelled Japanese troops on the island. It then went on escort duty and anti-submarine patrols in the New Hebrides. In July-September 1943 *Anderson* served in the Aleutians, participating in the bombardment of the Japanese garrison on occupied Kiska. The destroyer then screened transports and provided fire support for troops invading Tarawa. *Anderson* then steamed to the Marshalls for the invasion of those heavily defended islands. The destroyer bombarded *Wotje* and screened vessels shelling *Kwajalein*. *Anderson* was hit by an enemy 155mm shell off *Wotje*, which killed the captain and five other officers and wounded 18 men. While transferring the wounded off ship, *Anderson* struck an uncharted pinnacle that badly damaged the destroyer, which was then towed to Pearl Harbor for repairs.<sup>91</sup>

After repairs, *Anderson* was deployed to assist the *Sansapor*, *Morotai*, and *Leyte* operations; at *Leyte* on November 1, 1944, the ship was again badly damaged when a kamikaze struck the deck, killing 18 and wounding 21 members of the crew. *Anderson* steamed to San Francisco for repairs at Hunter's Point. After these repairs and an overhaul, *Anderson* joined the 9th Fleet operating off the *Kuriles* on anti-submarine patrols and shore bombardment. *Anderson* ended the war by participating in the occupation of northern Honshu after the Japanese surrender.<sup>92</sup> The ship was ordered to the Atlantic for decommissioning. *Anderson* arrived at San Diego on November 8, en route to Philadelphia. On November 14, 1945,

however, *Anderson* was ordered retained in the Pacific "in an inactive status in view of experimental tests." Selected as a target vessel for Operation Crossroads *Anderson* was "stripped in preparation for use as a target..." at Pearl Harbor between January and May 1946.<sup>93</sup>

Arriving at Bikini on May 30, 1946, in the company of the carrier *Saratoga*, *Anderson* was moored close to the actual zero point for the Able test on July 1, 1946. Following the burst, *Anderson* suffered two explosions within nine seconds' time. The ship capsized, while burning, onto its port side, and sank within seven minutes.<sup>94</sup> Ironically, the destroyer that had stood by and rendered assistance when *Lexington* went down, sank at Bikini with *Saratoga*, sister of the lost carrier.

Of 12 *Sims*-class destroyers, none survived past 1948; five were lost during the war, *Anderson* was sunk at Bikini in 1946, three were broken up in 1947, and three were sunk as targets in 1948.<sup>95</sup> *Anderson* was stricken from the Navy register on September 25, 1946. The ship's bell and nameplate were presented to the city of Anderson, South Carolina, by Congressional request. These had apparently been removed at Bikini and given to an Anderson, South Carolina, press representative on board USS *Appalachian*.<sup>96</sup>

## USS LAMSON (DD-367)

### Characteristics

USS *Lamson* was a welded steel destroyer of the *Mahan* class. *Lamson* was 341.3 feet long overall, with a waterline length of 334 feet, a 34.8-foot beam, a 9.9-foot draft, and a 1,726-ton displacement.<sup>97</sup> *Lamson's* twin screws were driven by General Electric geared turbines, which were powered by four Babcock and Wilcox, oil-burning, Express boilers. The ship's plant was rated at 46,000 shaft horsepower at 37 knots. Armament consisted of a main battery of five 5-inch/38 caliber guns and three quad 21-inch torpedo tubes mounted on deck. *Lamson* additionally carried four .50 caliber machine guns, two depth charge tracks, and "K"-type depth charge projectors.<sup>98</sup>

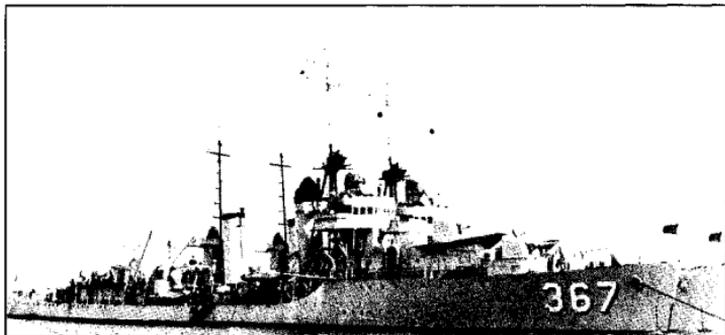
Loaded with 50 percent of its fuel and ammunition, *Lamson* was badly damaged by the Able test burst, which tore off the light topside superstructure, stacks, and mainmast, and badly smashed the bridge. The vessel capsized to starboard and sank (after floating bottom up) sometime between 2:00 p.m. and 5:00 p.m., five to eight hours after the blast. Divers found the ship resting on its starboard side; "the stern was lying in a hole which makes it appear that the ship went down stern first, pivoted around and ended up heading southwest on the bottom."<sup>99</sup> Navy reports made just after Able indicate that "the portion of the stern aft of frame 178 has twisted counterclockwise until the sheer strakes are separated about three feet. This rotation appears to pivot about the centerline of the deck."<sup>100</sup> A "large dent" was noted in the bottom shell plating extending from the port propeller guard to the centerline, with an 18-inch-deep "wrinkle" in the main deck plating at the stern, with another wrinkle "of varying depth and width in the port side shell plating. It is 2.5 feet deep and 18 inches wide at frame 170 and tapers to nothing at frame 130. The sheer strake appears crushed between frame 70 and 80."<sup>101</sup> The starboard side was not examined because the destroyer was lying on it.

Damage topside included the missing stacks and mainmast, "badly damaged" light superstructure,

and the foremast, which was bent aft at a 90-degree angle. "At frame 70 a Z door and frame are blown out. The port side of the deckhouse aft of mount 2 is opened up top and bottom for a short distance fore and aft."<sup>102</sup> The guns remained in their mounts, "at maximum elevation," and the quad 21-inch torpedo tubes "are apparently intact. Only one torpedo is in the tubes and it is broken and hanging there." The depth charge racks "are twisted and torn almost beyond recognition," with "a large number of depth charges around the bottom aft. The special weapon NORD 5130 was not in its chocks on the stern and could not be located."<sup>103</sup>

### History

Prior to World War II the United States focused considerable attention on destroyer design and construction; in 1922 it possessed the largest destroyer fleet in the world.<sup>104</sup> The basic pattern for prewar destroyers was set with the *Farragut* class destroyers of 1934; they were followed by larger "leader" destroyers of the *Porter* class of 1935-1936. The next class, and the first to introduce "extreme steam conditions" was the *Mahan* class. The *Mahan* destroyers "incorporated prototypes of a new generation of destroyer machinery, which combined increases in pressure and steam temperature with a new type of lightweight, fast-running turbine."<sup>105</sup>



*Lamson* off Yorktown, Virginia, in April 1939. (The Mariners Museum, Ted Stone Collection)

Thus was introduced a class "whose long endurance was so important for Pacific warfare."<sup>108</sup> The *Mahan* class was also important in that additional above-the-waterline 21-inch torpedo tubes were added and gun crew shelters were built for the superimposed weapons fore and aft for the first time.<sup>107</sup> The *Mahan* destroyers were the first destroyers fitted with emergency diesel generators. Eighteen of these destroyers were built between 1935 and 1936, among them, *Lamson*.

*Lamson* was laid down on March 20, 1934, at the Bath Iron Works Corporation, Bath, Maine. The ship was launched on June 17, 1936, and was commissioned on October 21, 1936, at the Boston Navy Yard. After a shakedown cruise to South America, the destroyer proceeded through the Panama Canal on July 1 for the Pacific. For the entire month of July, *Lamson* searched the Marshall and Gilbert Islands for missing aviatrix Amelia Earhart. Returning to the United States, *Lamson* was based at San Diego for the next four years except for a one-month deployment on the East Coast in 1938. Ordered to Pearl Harbor in October 1941, *Lamson* was deployed with other vessels in an unsuccessful search for the Japanese Task Force on December 7-8, 1941. The destroyer was then detached and sent to Johnston Island to rescue civilians from the advancing Japanese. With refugees aboard, *Lamson* arrived at Pearl Harbor on January 3, 1942.<sup>109</sup>

In February 1942, *Lamson* was sent south to join the ANZAC squadron in Fiji. This six-vessel squadron (USS *Chicago*, USS *Perkins*, HMAS *Australia*, HMZNS *Achilles*, HMZNS *Leander*, and *Lamson*), was formed to keep South Pacific supply lines open. The destroyer was sent back to Pearl Harbor on June 1 to serve in the reserve line for the Battle of Midway. Detached from this unit on June 13, *Lamson* was sent to Mare Island Navy Yard for an overhaul before being deployed again to the South Pacific. On October 22, 1942, *Lamson* and sister ship *Mahan* raided Japanese picket boats between the Gilbert and Ellice Islands; together they sank a 7,000-ton armed auxiliary. After a month-long duty patrolling Guadalcanal, *Lamson* joined Task Force 67 and fought in the Battle of Tassafaranga and then patrolled the Solomon Islands as part of an

antisubmarine warfare screen until April 1943.<sup>100</sup>

Returning to Pearl Harbor on May 6, 1943, *Lamson* was soon dispatched to Australia. The destroyer participated in the bombardment of New Britain and was one of four destroyers that penetrated Japanese lines some 160 miles to bombard the main Japanese naval base at Madang in New Guinea on November 29, 1943. As part of the U.S. Fifth Fleet, *Lamson* served off New Guinea and in the Marshall Islands through much of 1944. On October 20, 1944, *Lamson* was ordered to join the Seventh Fleet and proceeded to the Philippines. In December 1944, *Lamson* was deployed off Leyte as fighter director ship for small convoys going through the Surigao Straits to reinforce troops ashore. Attacked by kamikazes, these convoys were badly mauled. On December 6, 1944, *Lamson's* sister ship *Mahan* was sunk at 11:00 a.m.; at 3:00 p.m., the convoy was again attacked. A kamikaze came in low from astern and hit *Lamson's* after stack with its right wing before cartwheeling into the superstructure:

The flame of the explosion reached to the top of the mast and flashed from stem to stern. 21 enlisted men and 4 officers were either killed instantly or died of wounds received, 1 man was missing and 54 men wounded. The superstructure from the forecandle deck up and both stacks were completely destroyed. The forward fireroom was flooded. A tug...attempted to put out the fires but it appeared hopeless, all remaining men aboard the *Lamson* were put aboard the tug. Just as the USS *Flusser*, which was standing by, prepared to sink the *Lamson* with torpedoes, the tug reported making headway against the fires and the ship was saved.<sup>110</sup>

Towed to safety, the destroyer received rudimentary repairs and proceeded under its own power to Pearl Harbor and then to Bremerton for repairs. *Lamson* made the trip with its torpedo tubes loaded "with enough torpedoes to sink a battleship" but jammed by the kamikaze attack.<sup>111</sup>

After arriving at Bremerton on January 16, 1945, 90 percent of the ship's superstructure



*Marine Corps artist Grant Powers depicts the destruction of Lamson during Able. (Naval Historical Center)*



*The stern of the sunken Lamson after Able. (U.S. Naval Institute)*

was removed and a new deckhouse was installed; "electrical repairs on the *Lamson* required four times more work than usually is required for a complete electrical overhaul.... Bomb fragmentation had pierced cables in remote places. More than 200 major circuits had to be installed and 25 percent of the total battle damage repair fell to the electrical shop."<sup>112</sup> The destroyer steamed from Bremerton on April 15 for San Diego, and then quickly proceeded back to the Pacific. Stationed off Iwo Jima, *Lamson* spent the remainder of the war rescuing downed aviators who ditched while returning from striking the Japanese home islands. At the war's end, the destroyer was sent to Sasebo as part of the occupation force, departing for Pearl Harbor on October 29, and arriving there on November 9, 1945. *Lamson* was ordered retained in inactive status on November 15 "in view of experimental tests" and was sent to San Diego on November 29.<sup>113</sup> At year's end, the destroyer returned to Pearl Harbor, where it was prepared for Operation Crossroads.

*Lamson* steamed from Pearl on May 21, 1946, for Bikini. The destroyer sailed with Submarine Division 111, made up of *Skipjack*, *Tuna*, *Skate*, and *Searaven*, also bound for Crossroads. On the afternoon of Thursday, May 30, 1946, *Lamson* arrived at Bikini and was anchored at "Berth 142" in 21 fathoms of water. According to the ship's log for June 30, 1946, the main engines were secured on 12 hours notice, the gyro was secured, and boiler No. 4 alone was lit for auxiliary purposes. That morning the crew was mustered, evacuated to USS *Henrico* (APA-45), and the last inspection of the ship was made. In the afternoon the fires were allowed to die under the No. 4 boiler, the engineering plant was secured, and condition "affirm" was set: "ship is secured throughout" before the last of the crew departed. The log reported on Monday, July 1, "Anchored as before. 0902 Bomb for Test 'ABLE' was detonated. 0930 *Lamson* was reported as capsized, with her keel in the air, as a result of the atom bomb detonation. In the early afternoon the *Lamson* rolled onto her port side and sank stern first in 21 fathoms of water."<sup>114</sup>

*Lamson* was anchored approximately 700 yards abeam and slightly aft of the actual zero point for the Able bomb's detonation. Photos taken

12 seconds after the burst show the destroyer upright, but with heavy superstructure damage; a second photograph, taken nearly six minutes after the burst, shows the same. At 9:40 a.m. a reconnaissance plane, PBM Charlie, noted the destroyer was on its beam ends, "on her starboard side with her bridge structure underwater, and the port side of her bottom above the surface. A large oil slick...trailing to leeward."<sup>115</sup> *Lamson* remained afloat at least until 2:00 p.m., when PBM Charlie departed the lagoon; at 5:00 p.m., USS *Reclaimer* (ARS-42) made a quick tour of the lagoon and found "no trace of the *Lamson*."<sup>116</sup> *Lamson* was decommissioned on July 29 and stricken from the Navy Register on August 15, 1946.

## USS APOGON (SS-308)

### Characteristics

USS *Apogon* was a welded, riveted, and high-tensile *Balao*-class steel submarine--311.8 feet long overall, with a 27.3-foot extreme beam, a height of 47.2 feet, and a 15.3-foot draft at surface trim. *Apogon* displaced 1,525 tons standard surfaced and 2,424 tons submerged.<sup>117</sup> The boat's two shafts were driven by twin Elliot electric motors, each rated at 2,740 shaft horsepower for a total of 5,480 SHP. While surfaced, electricity was provided by four Fairbanks-Morse diesel engines, each rated at 5,400 brake horsepower. While submerged, *Apogon*'s motors were powered by 252 Exide battery cells. *Apogon* was capable of 20.25 knots surfaced and 8.75 knots submerged.<sup>118</sup> The boat's primary armament consisted of ten 21-inch torpedo tubes--six located forward and four aft. *Apogon* carried 24 Mark torpedoes. The boat also mounted a single 5-inch/25 caliber gun on deck; lighter AA guns were also fitted.

### History

The United States Navy built hundreds of "fleet boat" submarines during the Second World War. One hundred thirty-two of the *Balao* class, the most common U.S. submarine of the war, were constructed at shipyards throughout the country. As part of this effort, beginning in 1940, an order was placed for 73 *Gato*-class vessels, "in response to the realization that the

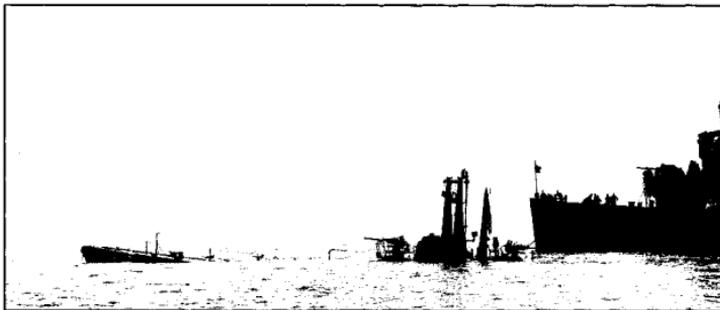
U.S. would probably become involved in the current war.<sup>119</sup> Longer, tougher, and with more endurance, the *Gatos* were supplemented after Pearl Harbor by an order for 132 near-identical *Balao*-class submarines. The *Balaos* were slightly reconfigured for prefabrication and were built with a higher tensile steel that extended their diving depth 100 feet beyond the *Gato* boats' 300-foot operating limit.

Of these submarines, all 73 *Gato* and 101 of the *Balao* boats saw combat, all of it in the Pacific.<sup>120</sup> These boats waged a terrible war of attrition against Japan's navy and merchant marine, particularly the latter. U.S. submarines sank most of Japan's merchant fleet, crippling the industrial capabilities of the empire and forcing the abandonment of far-flung outposts.

USS *Abadejo* (SS-308) was laid down at the Portsmouth Navy Yard in 1942. Renamed *Apogon* on September 24 of the same year, the submarine was launched March 10, 1943. After fitting out, *Apogon* was commissioned on July 16, 1943, and proceeded to the Pacific.<sup>121</sup> The boat made eight war patrols, sinking three Japanese vessels totalling 7,575 tons. *Apogon*'s first patrol was out of Pearl Harbor on November 3, 1943. In later patrols, the submarine sortied from Majuro and Midway. *Apogon* was one of ten submarines deployed for Operation Galvanic in November 1943. In this coordinated action, a carrier task force,

amphibious landing force, and the submarines worked together to invade Tarawa and the Gilbert Islands and prevent a Japanese counterstrike. *Apogon* and two additional submarines were stationed at the entrance to Truk, the Japanese naval stronghold, in order to attack Japanese ships attempting a sortie to the Gilberts. One of the boats, USS *Corvina* (SS-226), was lost in the operation, but *Apogon* escaped without harm.<sup>122</sup> Not long after this, the sub scored its first kill on December 4, 1943, when *Daido Maru*, a former gunboat of 889 tons, was sunk north of the Marshalls.<sup>123</sup> In February 1944, U.S. carrier aircraft pounded the Japanese fleet anchored in Truk Lagoon as part of Operation Hailstone. Following this highly successful action, a second strike at Saipan was orchestrated with a pack of four submarines, including *Apogon*, surrounding the area. The raid was a success, and submarines sank six ships escaping from Saipan. In June 1944, *Apogon* sailed with three other boats, *Guardfish* (SS-217), *Piranha* (SS-389), and *Thresher* (SS-200) in a wolf-pack known as the "Mickey Fins." Working off Formosa, the wolf-pack sank 41,000 tons of Japanese shipping, but *Apogon* did not get a kill.<sup>124</sup> The boat's next sinking was on September 27, 1944, when the 1,999-ton freighter *Hachirogata Maru* was torpedoced.<sup>125</sup>

*Apogon* played an important role in coordinating attack information with the other boats as had been done when the sub was a



*Apogon* surfaces after a test submergence at Bikini, 1946. (U.S. Naval Institute)

member of the "Mickey Finns."<sup>128</sup> *Apogon's* last kill came in June 1945 as the submarines blockaded Japanese ports and commenced finishing off the rapidly diminishing merchant marine of the nearly defeated nation. North of the Kuriles, *Apogon* ambushed the 2,614-ton transport *Hakuai Maru* on June 18, sending it to the bottom.<sup>127</sup> *Apogon* returned from its last patrol on September 2, 1945.

Consigned to the Operation Crossroads tests, *Apogon* arrived at San Diego on September 11, 1945. There the boat was readied for the tests. One of eight submarines selected for Crossroads, *Apogon* was modified to submerge and surface without a crew on board. According to *Bombs at Bikini*, "never before had there been occasion to submerge a submarine without crew aboard. The method used was to fill part of the ballast tanks with water, then suspend heavy weights from the bow and stern by cables of carefully chosen length. These weights overcame the submarine's residual buoyancy and drew her down to the desired depth. She could be surfaced again by pumping air back into her ballast tanks."<sup>128</sup>

Lightly damaged during Able, *Apogon* sank during Baker. Shortly after sinking, Navy divers located the submarine in 180 feet of water, entered the boat, and began salvage operations, which included blowing air into the flooded hull. The salvage efforts were abandoned, however, before the boat was brought to the surface. *Apogon* was decommissioned and stricken from the Navy Register on February 25, 1947.<sup>129</sup>

## USS PILOTFISH (SS-386)

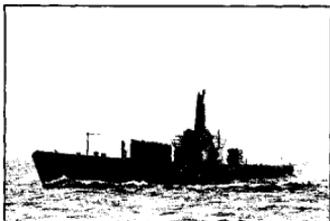
### Characteristics

USS *Pilotfish* was a welded and riveted, high-tensile-steel submersible *Balao*-class boat. *Pilotfish* was 311.8 feet long overall, with a 27.3-foot extreme beam, a height of 47.2 feet, and a 15.3-foot draft at surface trim. *Pilotfish* displaced 1,525 tons standard when surfaced and 2,424 tons when submerged.<sup>130</sup> The boat's two shafts were driven by twin GE electric motors, each rated at 2,740 shaft horsepower,

for a total of 5,480 SHP. While submerged, *Pilotfish's* motors were powered by 252 Exide battery cells. *Pilotfish* was capable of 20.25 knots surfaced and 8.75 knots submerged.<sup>131</sup> The boat's primary armament consisted of ten 21-inch torpedo tubes; six tubes were located forward and four tubes aft. *Pilotfish* carried 24 Mark 14 torpedoes. As built, the boat carried a 5-inch/25 caliber gun on the deck aft of the sail and a single 40mm Bofors antiaircraft gun forward of the sail. When sunk at Operation Crossroads, *Pilotfish* had been modified to a late-war configuration; the 5-inch gun had been removed, and twin 20mm Oerlikon AA guns had been mounted aft of the periscope shears on the sail.

### History

USS *Pilotfish* (SS-386) was laid down at the Portsmouth Navy Yard, New Hampshire, on March 15, 1943. The submarine was launched August 30, 1943. After fitting out, *Pilotfish* was commissioned December 16, 1943, and proceeded to the Pacific after training on March 29, 1944, arriving at Pearl Harbor on April 26.<sup>130</sup> At this time submarines were deployed in wolf-packs, and on its first patrol, *Pilotfish* was sent out with the pack known as "Blair's Blasters," which included *Pintado* and *Shark* under tactical command of Capt. L. N. Blair of *Pintado*.<sup>133</sup> The boat made five war patrols, beginning the first, to the Marianas, in May 1944. (By this time, the Pacific war had turned against Japan. Submarines played an important role by sinking merchant ships seeking to supply, reinforce, or withdraw troops cut off in the Marianas.) Subsequent patrols took *Pilotfish* to the Bonin Islands, the East China Sea, Marcus Island, and off the southeast coast of Japan. The submarine was not able to make a successful attack except on the third patrol, when the submarine hit and badly damaged a Japanese cargo ship off the Bonins.<sup>134</sup> In 1945 *Pilotfish* served as the command vessel for a coordinated-attack group sent to the east China Sea. This group was credited as being strategically essential to the success of the Iwo Jima assault.<sup>135</sup> In its last war patrol, *Pilotfish* served on lifeguard picket duty off the Japanese home islands, armed with AA guns and standing by to rescue downed airmen returning from the bombing of Japan.<sup>136</sup>



*Pilotfish* enters San Francisco Bay in November 1945. (U.S. Naval Institute)

After provisioning at Guam, *Pilotfish* departed for its sixth war patrol on August 9, 1945. Taking up position off Japan, the submarine was ordered to cease hostile action on August 15 when the Japanese surrendered. After cruising off Kii Suido on life guard duty and neutrality patrol, *Pilotfish* was ordered to stand in to Tokyo Bay as part of the fleet making the formal occupation of Japan. With 11 other submarines, *Pilotfish* was present, moored alongside the submarine tender *Proteus* (AS-19), during the formal surrender ceremonies on September 2, 1945.<sup>157</sup> Departing Japan on September 3, *Pilotfish* arrived at Pearl Harbor on the 12th. From there the sub was sent to San Francisco for lay-up after 18 months' duty in the Pacific, with 313 days and 75,075 miles of war patrols.<sup>158</sup> After arrival in the United States, the submarine was assigned to Operation Crossroads. *Pilotfish* was one of eight submarines originally slated for scrapping or reserve fleet lay-up, that were instead modified for use in the atomic bomb tests. Lightly scorched while moored on the surface for Able, *Pilotfish* was submerged for Baker. Closest of the submarines to the zero point, *Pilotfish* was sunk by the Baker blast.

According to some accounts, *Pilotfish*, although decommissioned August 29, 1946, little more than a month after sinking, was in fact raised, towed away, and "resunk" on October 16, 1948, as a target off Eniwetok.<sup>159</sup> This report is in error; Navy records indicate the ship was "expended" at Bikini on July 25, 1946, decommissioned on August 29, 1946, and stricken from the Navy list on February 28,

1947.<sup>140</sup> *Pilotfish* lies on the bottom of the lagoon at its mooring for the Baker test.

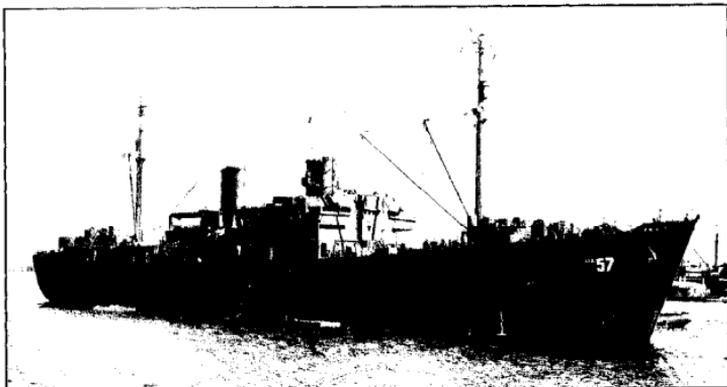
## USS GILLIAM (APA-57)

### Characteristics

USS *Gilliam* was a welded steel vessel 426 feet long overall, with a waterline length of 400 feet, an extreme beam of 58 feet, a maximum depth of hold of 37 feet, and a 15.6-foot draft. *Gilliam* displaced 6,800 tons standard. The twin screws were driven by Westinghouse Steam Turbines that developed 6,000 shaft horsepower at 18 knots. Steam was provided by two oil-burning Babcock and Wilcox boilers. The vessel was armed with a single 5-inch/38 caliber gun, four twin-mounted 40mm Bofors anti-aircraft guns, and ten single 20mm Oerlikon guns. *Gilliam* carried thirteen LCVPs (Landing Craft Vehicles, Personnel), one LCPL (Landing Craft Personnel, Large), and 1,032 tons of cargo or 849 troops.<sup>141</sup> The superstructure was located in the center of the ship; two masts, one forward and one aft, were fitted with booms and steam winches that handled cargo and the ship's landing craft.

### History

USS *Gilliam*, a type S4-SE2-BU1 transport, was built under a U.S. Maritime Commission contract in 1944 by the Consolidated Steel Corporation of Wilmington, California.<sup>142</sup> Launched on March 28, 1944, *Gilliam* was the first of 32 *Gilliam*-class attack transports, specially designed vessels that served as amphibious ships. "Unlike conventional freighters and transports, attack transports were designed to unload their cargoes over the side into landing craft which they carried; in a sense their beaching craft were their main batteries."<sup>143</sup> *Gilliam* was acquired by the U.S. Navy on July 31, 1944, and commissioned the next day as APA-57. *Gilliam* departed San Francisco Bay on October 16, 1944, with 750 Army troops bound for New Guinea. *Gilliam* ferried troops to the Philippines in support of the reconquest of those islands and served as a receiving ship for crews and injured personnel of damaged or lost warships during the Battle of Leyte Gulf. *Gilliam* also participated in the assault on Okinawa. At the war's end the



*Gilliam* in 1946. The transport was identical to the 31 other ships of the *Gilliam* class, including *Carlisle* (U.S. Naval Institute)

transport carried occupation troops to Sasebo, Japan, and ferried returning troops home as part of Operation "Magic Carpet."<sup>144</sup>

*Gilliam* was selected as a target vessel for Operation Crossroads. Arriving at Pearl Harbor on February 16, 1946, the ship was readied for the tests.<sup>145</sup> *Gilliam* was moored ast of *Nevada*, the projected target for the Able test detonation. The bomb instead detonated off *Nevada* and close to *Gilliam*, "the only ship located within 1,000 feet of the projected zeropoint."<sup>146</sup> The vessel sank in less than two minutes.

#### **USS CARLISLE (APA-69)**

##### Characteristics

USS *Carlisle* was a welded steel vessel 426 feet long overall, with a waterline length of 400 feet, an extreme beam of 58 feet, a maximum depth of hold of 37 feet, and a 15.6-foot draft. *Carlisle* displaced 6,800 tons standard. The twin screws were driven by two Westinghouse steam turbines that developed 6,000 shaft horsepower at 18 knots. Steam was provided by two oil-burning Babcock and Wilcox boilers.

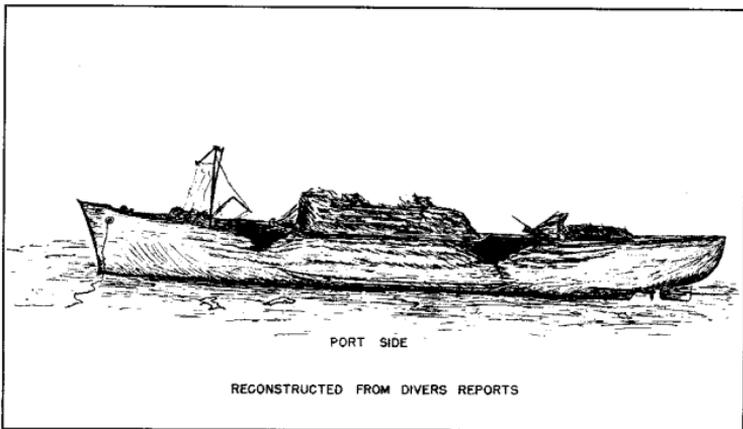
The vessel was armed with a single 5-inch/38 caliber gun, four twin-mounted 40mm Bofors anti-aircraft guns, and ten single 20mm Oerlikon guns. *Carlisle* carried thirteen LCVs, one LCPL, and 1,032 tons of cargo or 849 troops.<sup>147</sup> The ship's superstructure was located amidships; two masts, fore and aft, were fitted with booms and steam winches to handle landing craft and cargo.

##### History

USS *Carlisle*, a type S4-SE2-BU1 transport, was built under a U.S. Maritime Commission contract by the Consolidated Steel Corporation of Wilmington, California.<sup>148</sup> *Carlisle* was one of 32 *Gilliam* class attack transports.<sup>149</sup> The keel was laid on May 12, 1944; *Carlisle* was launched little more than two months later on July 30. Named for Carlisle County, Kentucky, the vessel was completed and acquired by the U.S. Navy on November 28, 1944.<sup>150</sup> It was commissioned the next day at Terminal Island, Los Angeles. After provisioning, outfitting, and some alterations at San Pedro, the ship underwent a shakedown cruise in December 1944. First sent to San Diego for amphibious landing training, the transport was finally ordered to Pearl Harbor on January 23, 1945,



Grant Powers' depiction of Able's detonation over Gilliam and Carlisle. (U.S. Naval Historical Center)



Artist's 1946 drawing of the sunken Carlisle. (National Archives)

arriving there on January 31. The ship's main propulsion motor had shorted and burned while underway to Pearl Harbor; after landing the troops and cargo aboard, *Carlisle* was sent to San Francisco for repairs. Returning to San Diego in March 1945, *Carlisle* loaded personnel and cargo and again sailed for Pearl Harbor on March 17, 1945, arriving on March 26. *Carlisle* was used for crew training in the Hawaiian Islands before the vessel returned to the West Coast in June 1945. After a trip to Seattle and San Francisco, the ship returned to Pearl, where it was sent to Eniwetok, Ulithi, and Samar, arriving at the latter port on August 11, 1945.<sup>161</sup>

At the war's end the ship was detailed to "Magic Carpet" service, carrying troops from the Philippines, Pearl Harbor, and Japan to Seattle and San Francisco. In this capacity, *Carlisle* had loaded 44 officers and 92 enlisted men at Tokyo, and on January 26, 1946, sailed for Seattle. Four days later, while at sea, the ship was ordered to Pearl Harbor for assignment to Joint Task Force One for Operation Crossroads. Arriving at Pearl on February 4, the ship was "stripped" during that month before sailing to Bikini Atoll as one of eighteen attack transports slated for the tests.<sup>162</sup> Moored close to *Gilliam*, *Carlisle* was sunk by the Able test burst on July 1, 1946. USS *Carlisle* was stricken from the Navy Register on August 15, 1946.

#### ARDC-13

##### Characteristics

The floating drydock ARDC-13 (Auxiliary Repair Drydock, Concrete) was built of steel-reinforced concrete with a lift capacity of 2,800 tons. The dock's overall length was 389 feet, with an 84-foot width, and a height of 40 feet. The dock floated with a 9-foot, 6-inch draft. The dock was built of three sections; (1) the 5-3/4-inch to 6-inch thick slabs that formed the hull, which consisted of the side, bottom, and dock floor; (2) the 5-1/2-inch-thick port; and (3) the starboard wing walls, each containing a 5-inch-thick intermediate and 6-1/2-inch-thick top deck. The vessel was further reinforced by concrete transverse frames every six feet. The hull was divided into eight

watertight compartments, four on each side, in addition to fore and after peak tanks.<sup>163</sup> The ARDC was capable of drydocking submarines, destroyers, and LSTs. Two Christmas trees were mounted on the wing walls for Crossroads.

##### History

ARDC-13 was rushed to completion in March 1946 to serve as a target vessel for Operation Crossroads. No armament was fitted, and the main discharge pumps and cranes were never installed. Only one anchor windlass was fitted. The vessel was only 60 percent complete when towed to Bikini. "Otherwise, the dock was essentially complete insofar as required to perform its function as a target ship."<sup>164</sup> ARDC-13 was moored off *Saratoga* for the Able test blast. The pressure wave from the blast came from approximately 12 degrees forward of the port beam; this cracked the port wingwall, carried away the control house, spalled concrete and strained the hull "sufficiently to open hairline cracks, for the most part, throughout the length of the dock. A few of the cracks are well defined."<sup>165</sup> Beached on Enyu where temporary repairs were effected, ARDC-13 was removed in the array for Baker. Refloated and moored in the target array for Baker, ARDC-13 was damaged by the detonation, but remained afloat. It was not inspected until eight days after Baker. At that time, "slow leakage was observed through cracks in the underwater body which had resulted from Test A. The rate of flooding was calculated to be approximately 30 percent of that which was observed before temporary repairs.... Two days later the dock capsized as a result of progressive flooding of the port side compartments."<sup>166</sup> After capsizing, ARDC-13 remained afloat, with its starboard side up, until sunk by demolition charges on August 6, 1946.

#### YO-160

##### Characteristics

YO-160 (Yard Oiler) was a steel-reinforced concrete barge, 375-feet long overall, with a 56-foot beam and a 28.6-foot draft. The barge displaced 6,422 tons, and was registered at 5,426 tons gross and 5,295 tons net. The

barge's capacity was 62,900 cubic barrels of fuel oil.<sup>157</sup>

### History

YO-160 was ordered by the Maritime Commission from the Concrete Ship Constructors of National City, California. The hull was converted to naval use almost immediately as construction proceeded in May 1943. The completed barge was acquired by the 11th Naval District, which purchased it from the Maritime Commission on August 31, 1943, at a cost of \$2,900,000.<sup>158</sup> The barge was towed to Pearl Harbor by the fleet tug *Tawasa* (ATF-92), arriving on November 5, 1943. There YO-160 was assigned to the advanced bases in the Pacific, arriving at Funafuti in the Ellice Islands in December 1943.<sup>159</sup> Presumably the barge spent its entire wartime career there before being ordered to Bikini Atoll to participate in Operation Crossroads in March 1946.

Heavily damaged during Able, YO-160 was sunk by the Baker test blast; Navy reports credit the descending water column as the probable cause. Photographs of the blast taken from Enyu show the barge's bow lifted some 36 feet by the blast wave.<sup>160</sup> Subsequent photographs show the water column covering the vessel. When the air cleared, YO-160 was no longer afloat. No dives were made. The vessel was stricken from the Navy Register on August 15, 1946.<sup>161</sup>

### **LCT-414, 812, 1114, 1175, 1187, and 1237**

#### Characteristics

The LCT (Landing Craft, Tank) was a welded steel "light but extremely rugged vessel designed for direct 'on-the-beach' loading and unloading.... Equipped with a bow ramp...the bottom is especially designed for 'beaching'....docking facilities are not required."<sup>162</sup> These standardized craft were 117.5 feet long overall, with a beam of 32 feet, and a light draft of 1.5 feet forward. The loaded draft was 3.75 feet forward. LCTs displaced 134 tons light and 286 tons loaded and could carry 150 tons of cargo; this could be four medium or three heavy tanks. The LCT came in several models: the target LCTs

were Mark 5 and Mark 6 versions. The latter was an improved design that permitted stern loading and had increased living accommodations. One purpose of the Mark 6 modification was to serve as links in floating causeways between LSTs (Landing Ships, Tank) and the shore. They had a detachable stern plate, "with a lip beneath it for the LST ramp to engage;...the superstructure was split in half to permit vehicles to run the entire length of the craft."<sup>163</sup> LCTs were propelled by three screws, each driven by a single 225 HP Gray Marine diesel engine that developed a maximum speed of 9 knots. The fuel capacity was 11.12 tons in addition to 140 gallons of lube oil.<sup>164</sup> These craft were usually armed with two single 20mm anti-aircraft guns. According to a wartime manual, the LCT was often seen "transported on LSTs or in sections on APAs and AKAs. They are the largest of the U.S. open-deck, bow-ramp types."<sup>165</sup>

### History

The LCT was the largest of all U.S. shipborne amphibious warfare craft and the smallest U.S. landing craft to receive numbers in their own right.<sup>166</sup> LCTs were the result of a November 1941 British request for a U.S. version of a tank lighter for a projected European invasion. The first LCT was completed on June 29, 1942; the last wartime-built LCT was finished on December 22, 1944. In all, five hundred LCTs, Mark 5 models were built, along with 965 Mark 6 LCTs.<sup>167</sup>

LCT-1114 was a late-model Mark 6 unit. The vessel was one of ten LCTs requisitioned for Operation Crossroads and placed in the target array. LCT-1114 capsized as a result of the Baker test detonation and the resulting wave of water. After the blast, it was observed floating bottom up, bow ramp secured, with the "stern awash and the bow four feet out of the water" next to ARDC-13.<sup>168</sup> LCT-1114 remained afloat for four days, gradually drifting in a westerly direction "until it was finally sunk off Amen Island with a demolition charge to prevent it from becoming a menace to navigation."<sup>169</sup>

Similarly, the other LCTs were sunk in the days after the Baker test as hazards to navigation. A total of 18 vessels were beached off Bikini Island during the Baker test; among them were

six LCTs: the Mark 5 LCT-412, and five Mark 6 LCTs--Nos. 812, 1175, 1187, and 1237, which were beached between the high and low tide mark on the lagoon side of the island. LCT-1187 and LCT-1237 "suffered major flooding as a result of apparent bottom damage due to pounding against coral ledges and working in the surf."<sup>170</sup> They were also displaced by wave action. LCT-812 suffered major damage, with its bow ramp torn free and missing after the test; both it and LCT-412 became waterborne "as a direct result of the waves which immediately followed the test..."<sup>171</sup>

Post-Baker inspection of LCT-1187 found that

the tanks from about midships aft were completely flooded. The manhole cover plate to the void below the forward starboard wing tank deckhouse was not secured in place. This void was flooded. The galley was flooded to a depth of two feet from water coming in over the stern.... This craft was slightly above radiological tolerance when boarded on 1 August 1946.<sup>172</sup>

After the Baker detonation, LCT-1237 was displaced about 20 feet along the beach and swung around parallel to the water's edge.

This craft was leaking badly before the test and by Baker day the engine room were completely flooded. The tanks just forward of the crew's quarters was completely flooded. The tanks just aft of the forward stowage compartments contained about one foot of water. The after end of the galley contained 1-1/2 feet of water. The sounding hole covers were missing from the flooded tanks. Indications are that much of the tank flooding was due to waves washing over the vehicle deck, but leaky propeller shaft glands probably caused flooding of the engine space.<sup>173</sup>

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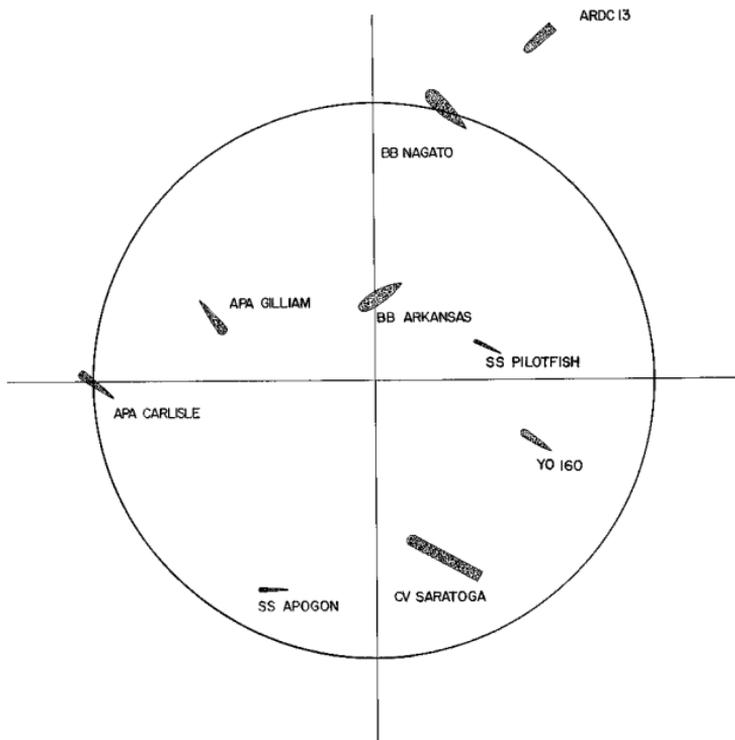
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- 143 Chesnau, *Conway's All the World's Fighting Ships*, p. 160.

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- 151 *Ibid.*
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- 153 Director of Ship Material, Joint Task Force One, "Bureau of Ships Group, Technical Inspection Report, USS ARDC-13, Test Able, Operation Crossroads," p. 13, National Archives Record Group 374.
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*Actual positions of the sunken ships at Bikini, as plotted by the U.S. Navy, 1989. (Redrawn by Robbyn Jackson, HABS/HAER)*