= South Carolina @-@ class battleship =

The South Carolina @-@ class battleships , also known as the Michigan @-@ class , were built during the first decade of the twentieth century for the United States Navy . Named South Carolina and Michigan , they were the first American dreadnoughts ? powerful warships whose capabilities far outstripped those of the world 's older battleships .

In the opening years of the twentieth century , the prevailing theory of naval combat was that battles would continue to be fought at relatively close range using many small , fast @-@ firing guns . As such , each of the ships in the United States ' previous battleship class (the Connecticut class) had many medium @-@ sized weapons alongside four large guns . This paradigm , however , was soon to be subverted , as American naval theorists proposed that a ship mounting a homogeneous battery of large guns would be more effective in battle .

As their ideas began to enjoy wider acceptance , the US Congress authorized the country 's Navy to construct two small 16 @,@ 000 long tons (16 @,@ 257 t) battleships . This displacement was roughly the same size as the Connecticut class and at least 2 @,@ 000 long tons (2 @,@ 032 t) smaller than the foreign standard . A solution was found in an ambitious design drawn up by Rear Admiral Washington L. Capps , the chief of the navy 's Bureau of Construction and Repair , which featured heavy armament and relatively thick armor , both favored by naval theorists . However , in balancing the congressionally mandated limits to displacement and the inherent design trade @-@ offs between armament , armor , and propulsion , the South Carolina class ' speed was severely limited ? an ultimately fatal disadvantage that severely limited their utility in a conflict .

With their superfiring main armament , press accounts billed South Carolina and Michigan , alongside the British HMS Dreadnought , as heralding a new epoch in warship design . Both , however , were soon surpassed by ever @-@ larger and stronger super @-@ dreadnoughts . The class ' low top speed of about 18 @.@ 5 kn (21 mph ; 34 km / h) , as compared to the 21 kn (24 mph ; 39 km / h) standard of later American battleships , relegated them to serving with older , obsolete battleships during the First World War . Thereafter , both South Carolinas were scrapped with the signing of the Washington Naval Treaty .

= = Background = =

In 1901 , the US Navy 's battleship designs reflected the prevailing theory of naval combat ? that battles would initially be fought at some distance , but the ships would then approach to close range for the final blows , when shorter @-@ range , faster @-@ firing guns would prove most useful . The premier battleship class then under construction carried four large 12 @-@ inch (305 mm) , eight 8 @-@ inch (203 mm) , and twelve 7 @-@ inch (178 mm) guns , a striking power slightly heavier than typical foreign battleships of the time .

The Naval Institute 's Proceedings magazine devoted space in two of its 1902 issues to possible improvements in battleship design . The first article was authored by Lieutenant Matt H. Signor , who argued for a ship with 13 @-@ inch (330 mm) and 10 @-@ inch (254 mm) / 40 caliber guns in four triple turrets . The secondary battery would be composed of 5 @-@ inch (127 mm) / 60 guns . This paper provoked enough thought that Proceedings published comments on the story from Captain William M. Folger , Professor P.R. Alger and naval constructor David W. Taylor ? an up @-@ and @-@ coming officer and future head of the Bureau of Construction and Repair (C & R) . These comments expressed doubt that the proposed vessel could be modified into a feasible design , but they praised his thoughts as a step in the right direction . Alger believed that Signor was on the right track in suggesting larger armament , though he thought that triple turrets would be unworkable and eight 12 @-@ inch guns in four twin turrets would be a much more realistic arrangement . Naval historian Norman Friedman believes that this was one of the " earliest serious proposals for a homogeneous big @-@ gun battery . "

The suggestion leading directly to the South Carolina class came from Homer Poundstone , a Lieutenant Commander in the Navy , who became the principal proponent of an American all @-@ big @-@ gun design . In a December 1902 paper written for President Theodore Roosevelt , he

argued for greatly increasing the size of current battleships , although he also supported retaining mixed main batteries . However , by the March and June 1903 editions of Proceedings , Poundstone began advocating for an all @-@ big @-@ gun arrangement , featuring twelve 11 @-@ inch (279 mm) guns mounted on a 19 @,@ 330 long tons (19 @,@ 640 t) ship . In October of the same year , the Italian naval architect Vittorio Cuniberti presented a similar idea in an article for Jane 's Fighting Ships entitled " An Ideal Battleship for the British Navy " . He argued in favor of a ship with twelve 12 @-@ inch guns on a slightly larger displacement than the battleships in service at the time , 17 @,@ 000 long tons (17 @,@ 273 t) . He believed that the higher weight would allow 12 inches of armor and machinery capable of propelling the ship at 24 kn (44 km / h ; 28 mph) . Poundstone used what he believed to be the great popularity for this idea among Europeans to justify the all @-@ big @-@ gun design .

In 1903 , Poundstone 's designs began receiving attention from American naval authorities . After being refined by Washington Irving Chambers , Poundstone 's work was brought to the Naval War College , where it was tested in war games during the 1903 Newport Conference . The results indicated that a theoretical battleship that dispensed with the intermediate 8- and 7 @-@ inch armament and was armed with only twelve 11- or 12 @-@ inch guns , all able to fire on a single broadside , was worth three of the battleships then in service . According to the men who conducted the tests , the main reasoning for the finding was that the measure of effective gun ranges was directly related to the maximum length of an enemy 's torpedo range . At this time , the latter was roughly 3 @,@ 000 yd (2 @,@ 743 m) ; at that distance , the 7- and 8 @-@ inch guns common to American intermediate batteries would not be able to penetrate the armor of enemy battleships . Worse still , it was certain that ? as the United States was developing a 4 @,@ 000 yd (3 @,@ 658 m) torpedo ? gun range would have to rise in the near future , making the intermediate guns even less useful . However , a homogeneous main battery of 11- or 12 @-@ inch guns would be able to penetrate the armor and have sufficient explosive power to disable an enemy capital ship , and adding as many 3 @-@ inch (76 mm) guns as possible would provide a strong defense against torpedo @-@ carrying but unarmored destroyers .

= = Design = =

Faced with this evidence , the General Board sent a formal request in October 1903 to C & R , asking it to draw up plans for a battleship including these characteristics . No progress had been made by 26 January 1904 , when the General Board asked C & R for a design including four 12 @-@ inch guns , eight 10 @-@ inch or larger guns , and no intermediate armament beyond 3 @-@ inch anti @-@ destroyer guns . The move to only 10 @-@ inch weaponry was the result of doubt among naval authorities that heavier guns could physically be mounted on a ship 's broadside . No action was taken on this request until September , when C & R began planning a ship with four 12 @-@ inch guns in dual turrets along with eight dual 10 @-@ inch or four single 12 @-@ inch guns .

Meanwhile , the Naval War College played three battleship designs against each other at its 1904 Newport Conference : the ships that were built following the 1903 conference ; the new C & R design from September ; and the latest battleships under construction , the Connecticut class . The 7- and 8 @-@ inch guns , and even the 10 @-@ inch guns , were demonstrated again to be unsatisfactory ; even when hitting a battleship at the ideal angle of 90 ° to its belt , they failed to pierce beyond 12 inches of Krupp armor ? not enough to counter enemy capital ships . Speed calculations were also performed which demonstrated that even a 3 kn (6 km / h ; 3 mph) advantage over an enemy fleet would be inconsequential in the final outcome of almost all naval battles because the slower ships could stay within range by turning on a tighter radius .

Within the naval bureaus , however , there was still much resistance . In mid @-@ to @-@ late 1904 , Poundstone continued to lobby the General Board while C & R protested that the final determinant in a naval battle would be the light guns ? and in any case such a large uniform battery was not feasible . Poundstone replied with a design of his own creation , which he called USS Possible and fit twelve 11 @-@ inch guns on a ship that displaced 19 @,@ 330 long tons . With support from Lieutenant Commander William Sims , who was able to cite the increasingly accurate

long @-@ gunnery of the Navy , and interest shown in the project by President Roosevelt , the bureaucratic stalling ended .

On 3 March 1905 , Congress passed a bill that authorized the Navy to construct two new battleships to be named after the states of South Carolina and Michigan . The maximum tonnage limit was set at 16000 long tons , the same weight as the mixed @-@ battery Connecticut class of two years prior , in an attempt to stem the rising displacement ? and accompanying costs ? of the Navy 's new capital ships . The provision was met with a mixed reception from naval designers . Some , including retired Admiral of the Navy George Dewey , thought the limit should have been set at the minimum standard of foreign battleships , or around 18 @,@ 000 long tons (18 @,@ 289 t) . Others believed adding a significant amount of speed or firepower ? something one would expect with an increase in tonnage ? would require much more than 18 @,@ 000 tons , and argued that the increase in size would buy nothing more than an increased target profile .

The Constructor of the Navy , Rear Admiral Washington L. Capps , devised an ambitious design that packed powerful armament and thick armor onto the small hull . He believed that future naval battles would involve fleets rather than single @-@ ship actions , and so while the wing turrets so common in European designs were useful in the latter role for putting a maximum amount of firepower in any given direction , they were less so when operating as part of a line of battle . From this , Capps theorized that the principal concern of battleships was how much shell weight they could fire per broadside . The arrangement of superfiring turrets placed on the centerline would allow the hull to be as short as possible while still having the most powerful broadside possible . A ship with its main battery placed along the center of the ship can focus the same amount of fire to port or starboard during a broadside . This is juxtaposed against wing turrets , which had significant shortcomings : their location on the left or right of a ship 's superstructure led to smaller possible broadsides , and the extreme weight placed on the sides of the ships led to torsional stress and rolling inertia .

As the additional main battery turrets with their associated magazines used a great amount of space within each already @-@ limited ship , Capps was forced to economize in other ways to stay within the tonnage limit . Machinery had to be built smaller than normal to fit in the space between the fore and aft magazines , both of which were larger than usual . Boiler rooms were moved inboard to make room for torpedo protection . The biggest drawback was in propulsion : there was no room for engines that could provide the same amount of power as on previous battleships . Capps suggested cutting down the number of boilers by one @-@ third to make room ; it may have been at this point that he considered turbine propulsion , for which he would have needed extra room . All the Bureau of Engineering could offer in response was more compact boiler rooms by eliminating centerline bulkheads .

The designers were running into the problem that Friedman calls the " squeeze " : the essential elements of a battleship (armament , propulsion machinery , and armor) typically added up to about sixty percent of their design displacement ; favoring one of these factors , the " three primary military qualities " , would mean accepting compromises in one or both of the others .

In the end , the choice of armament and armor meant that the South Carolinas top speed was lower than HMS Dreadnought , the namesake British ship built shortly before the South Carolinas , and all future US battleships .

= = Specifications = =

At a design displacement of 16 @,@ 000 long tons , the South Carolina class dreadnoughts were the same size as their Connecticut @-@ class pre @-@ dreadnought predecessors . In service , they could actually be lighter : Louisiana had a standard displacement of 15 @,@ 272 long tons (15 @,@ 517 t) , while Michigan was only 14 @,@ 891 long tons (15 @,@ 130 t) by the same measurement . The ship 's hull size was also comparable to the Connecticuts , with a length of 452 ft 9 in (138 m) overall , 450 ft (137 m) between perpendiculars , and the same at the waterline . The class ' beam was 80 ft 2 @.@ 5 in (24 m) , draft was 24 ft 6 in (7 m) , and metacentric height was 6 @.@ 9 ft (2 m) normally , coming in slightly lower at 6 @.@ 3 ft (2 m) when at full load .

They were designed to carry about 869 men .

The South Carolinas had a propulsion system consisting of two vertical triple @-@ expansion steam engines driving two 3 @-@ bladed screws . These were in turn powered by twelve coal @-@ fired superheating Babcock & Wilcox water @-@ tube boilers located in three watertight compartments . Together , they weighed 1 @,@ 555 long tons (1 @,@ 580 t) , which was just over the specified contract limit . Traditional triple @-@ expansion engines were installed rather than the steam turbines used in the British Dreadnought . The actual coal capacity of the ships was 2 @,@ 374 long tons (2 @,@ 412 t) at full load , slightly more than the designed maximum of 2 @,@ 200 long tons (2 @,@ 235 t) , allowing for an endurance of 6 @,@ 950 nmi (12 @,@ 871 km ; 7 @,@ 998 mi) at 10 kn (19 km / h ; 12 mph) . While both ships surpassed 20 kn (37 km / h ; 23 mph) in idealized trial conditions , the navy expected that the normal top speed would be around 18 @.@ 5 kn (34 km / h ; 21 mph) .

The class ' main battery consisted of eight 12 @-@ inch (305 mm) / 45 caliber Mark 5 guns in four turrets , one pair fore and one aft , with 100 rounds for each gun . The guns were placed in an innovative superfiring arrangement , where one turret was mounted slightly behind and above the other . The anti @-@ torpedo @-@ boat secondary armament of twenty @-@ two 3 @-@ inch (76 mm) guns was mounted in casemates , and the two 21 @-@ inch (533 mm) torpedo tubes were placed beneath the waterline , one on each side of the ship .

Armor on the South Carolina class was described by naval author Siegfried Breyer as " remarkably progressive " , despite deficiencies in horizontal and underwater protection . The belt was thicker over the magazines , 12 to 10 inches (305 to 254 mm) , than over the propulsion , 11 to 9 inches (279 to 229 mm) , and in front of the forward magazines , 10 to 8 inches (254 to 203 mm) . The casemates were also protected with 10 to 8 inches of armor , while the deck armor varied from 2 @.@ 5 to 1 inch (64 to 25 mm) . The turrets and conning tower had the heaviest armor , with 12 ? 8 ? 2 @.@ 5 inches (face / side / roof ; 305 ? 203 ? 63 @.@ 5 mm) and 12 to 2 inches (305 to 51 mm) , respectively . The barbettes were protected with 10 to 8 inches of armor . The total weight of the armor amounted to 31 @.@ 4 % of the design displacement , slightly more than the next three battleship classes .

= = Ships = =

= = Construction and trials = =

The contracts for the class were awarded on 20 and 21 July , respectively . Without armor or armament , South Carolina would cost $ 3 @,@ 540 @,@ 000 , while Michigan would come in at $ 3 @,@ 585 @,@ 000 . With armor and armament , the ships cost about $ 7 @,@ 000 @,@ 000 each .

Michigan 's keel was laid down on 17 December 1906 , one day before South Carolina 's . After the initial construction periods , the ships were launched on 26 May and 11 July 1908 (respectively) . Michigan was slightly more than half complete when launched , and the ship was christened by Carol Newberry , the daughter of Assistant Secretary of the Navy Truman Handy Newberry . The warship was billed as epoch @-@ making , and the spectacle drew many prominent individuals , including the governor and lieutenant @-@ governor of Michigan , the governor of New Jersey , the mayor of Detroit , and the secretary of the Interior Department , along with many naval admirals and constructors . Like its sister ship , South Carolina was just over halfway completed when it was launched . The accompanying ceremony took place just after noon and was attended by many notable residents of the state of South Carolina , including Governor Martin Frederick Ansel . His daughter Frederica christened the ship .

After their fitting @-@ out stage , the two ships were put through sea trials to ensure they met their contracted specifications . The first attempt at putting Michigan through a trial was conducted at the navy 's traditional testing grounds off Rockland , Maine beginning on 9 June 1909 . Although the ship completed its standardization run , other tests were disrupted when it ran aground on a sand

bar . Although Michigan was pulled off without incident , the navy soon discovered that both propellers required repair , delaying the completion of the trials until 20 ? 24 June . The battleship was commissioned several months later on 4 January 1910 ? making the United States the third country to have a dreadnought in commission , behind the United Kingdom and Germany , but just ahead of Brazil 's Minas Geraes class ? and its shakedown cruise lasted until 7 June .

South Carolina 's trials were conducted off the Delaware Capes beginning on 24 August 1909 , and its standardization runs were slightly faster than Michigan 's . After final modifications at William Cramp , South Carolina was commissioned on 1 March 1910 and departed for a shakedown cruise six days later .

= = Service history = =

After being commissioned , both ships were assigned to the US Atlantic Fleet . The two operated up and down the American east coast from July until November . On 2 November , as part of the Second Battleship Division , the ships left the Boston Navy Yard for a training voyage to Europe , where they visited the Isle of Portland in the United Kingdom and Cherbourg in France . In January 1911 , they returned to the US naval base in Guantanamo Bay , Cuba before continuing to another base in Norfolk . After further maneuvers , the two ships split up ; Michigan remained on the east coast , while South Carolina embarked on another trip to Europe . The ship visited Copenhagen (Denmark) , Stockholm (Sweden) , Kronstadt (Russia) , and Kiel (Germany) ? the last during Kieler Woche , a large sailing event ? before returning in July 1911 .

South Carolina next took part in the 1911 naval review in New York , before several months of traveling to ports on the east coast and welcoming a visiting German naval squadron including the battlecruiser SMS Moltke and two light cruisers . After a three @-@ month overhaul in Norfolk , South Carolina joined Michigan on a cruise to Pensacola , New Orleans , Galveston , and Veracruz in Mexico , as part of the Special Service Squadron . South Carolina later visited Colon , Panama in January 1913 . Both ships continued their previous service of visiting east coast ports before unrest in Mexico and the Caribbean caused the American government to order them away . South Carolina landed marines on Haiti on 28 January to protect the American delegation there . They returned to the ship when Oreste Zamor took power , but continued disorder later led the United States to occupy Haiti . South Carolina then joined Michigan at Vera Cruz while the United States occupied that city .

At the beginning of the First World War , both of the South Carolina @-@ class battleships were grouped with two older pre @-@ dreadnoughts (Vermont and Connecticut due to their top speeds , which were lower than all subsequent US battleships . South Carolina was refitted in Philadelphia between 14 October and 20 February 1915 , and both ships were kept on neutrality patrols on the American side of the Atlantic , even after the US entered the war on 6 April 1917 . In January 1918 , Michigan was training with the main fleet when it traveled through a strong storm . The high winds and waves caused its forward cage mast to collapse , killing six and injuring thirteen .

On 6 September 1918 , South Carolina escorted a fast convoy partway across the Atlantic , becoming one of the first American battleships (alongside New Hampshire and Kansas) to do so . When returning to the United States , South Carolina lost its starboard propeller . When continuing with the port propeller , a valve in its engine malfunctioned ; continuing with an auxiliary valve caused a large amount of vibration , so the ship was stopped just hours later for temporary repairs on the main valve before continuing to the Philadelphia Naval Yard for repairs . Michigan had the same problem when escorting a convoy in the next month ; the ship lost its port propeller on 8 October , but managed to return home on 11 October without further incident . After the war 's end on 11 November 1918 , both South Carolina @-@ class battleships were used to repatriate American soldiers that had been fighting in the war .

In the years after the war , the two battleships were used for training cruises . The terms of the 1922 Washington Naval Treaty , which limited naval construction to avert a vastly expensive naval arms race , also called for disposing of dozens of older battleships in the signatories ' navies . South Carolina was decommissioned on 15 December 1921 , shortly before the end of the conference ,

and its sister followed on 11 February 1922 , days after the treaty was signed . Both were stricken from the navy listing on 10 November 1923 and scrapped during 1924 in the Philadelphia Naval Yard .

= = Images = =

= = Endnotes = =