

= Japanese battleship Musashi =

Musashi (??) was the second ship of the Yamato class of Imperial Japanese Navy World War II battleships .

She and her sister ship , Yamato , were the heaviest battleships ever constructed , displacing 72 @, @ 800 tonnes at full load and armed with nine 46 cm (18 @. @ 1 inch) 45 Caliber Type 94 main guns , which were the largest guns ever mounted on a warship . Neither ship survived the war .

Named after Japan 's ancient Musashi Province , the Musashi was commissioned in mid @-@ 1942 , modified to serve as the flagship of the Combined Fleet , and spent the rest of the year working up . The ship was transferred to Truk in early 1943 and sortied several times that year with the fleet in unsuccessful searches for American forces . She was used to transfer forces and equipment between Japan and various occupied islands several times in 1944 . Torpedoed in early 1944 by an American submarine , Musashi was forced to return to Japan for repairs , where the navy greatly augmented her anti @-@ aircraft armament . She was present during the Battle of the Philippine Sea in June , but did not come in contact with American surface forces . Musashi was sunk by an estimated 19 torpedo and 17 bomb hits from American carrier @-@ based aircraft on 24 October 1944 during the Battle of Leyte Gulf . Over half of her crew was rescued .

Her wreck was located in March 2015 by Microsoft co @-@ founder Paul Allen and his team of researchers .

= = Design and description = =

During the 1930s the Japanese government adopted an ultranationalist militancy with a view to greatly expanding the Japanese Empire . Japan withdrew from the League of Nations in 1934 , renouncing its treaty obligations . After withdrawing from the Washington Naval Treaty , which limited the size and power of capital ships , the Imperial Japanese Navy began their design of the new Yamato class of heavy battleships . Their planners recognized Japan would be unable to compete with the output of U.S. naval shipyards should war break out , so the 70 @, @ 000 ton vessels of the Yamato class were designed to be capable of engaging multiple enemy battleships at the same time .

Musashi had a length of 244 metres (800 ft 6 in) between perpendiculars and 263 metres (862 ft 10 in) overall . She had a beam of 36 @. @ 9 metres (121 ft 1 in) and a draft of 10 @. @ 86 metres (35 @. @ 6 ft) at deep load. she displaced 64 @, @ 000 long tons (65 @, @ 000 t) at standard load and 71 @, @ 659 long tons (72 @, @ 809 t) at deep load . Her crew consisted of 2 @, @ 500 officers and enlisted men in 1942 , and about 2 @, @ 800 in 1944 .

The battleship had four sets of Kampon geared steam turbines , each of which drove one propeller shaft . The turbines were designed to produce a total of 150 @, @ 000 shaft horsepower (110 @, @ 000 kW) , using steam provided by 12 Kampon water @-@ tube boilers , to give her a maximum speed of 27 knots (50 km / h ; 31 mph) . She had a stowage capacity of 6 @, @ 300 long tons (6 @, @ 400 t) of fuel oil , giving a range of 7 @, @ 200 nautical miles (13 @, @ 300 km ; 8 @, @ 300 mi) at a speed of 16 knots (30 km / h ; 18 mph) .

= = = Armament = = =

Musashi 's main battery consisted of nine 45 @-@ calibre 46 cm (18 @. @ 1 in) Type 94 guns mounted in three triple gun turrets , numbered from front to rear , each with an elevation range of ? 5 to + 45 degrees . They fired a 1 @, @ 460 @-@ kilogram (3 @, @ 220 lb) armour @-@ piercing (AP) shell to a range of 42 @, @ 000 metres (46 @, @ 000 yd) . These were the largest @-@ calibre guns ever fitted to a ship . The guns had a rate of fire of 1 @. @ 5 to 2 rounds per minute .

The ship 's secondary battery consisted of twelve 60 @-@ calibre 15 @. @ 5 cm (6 @. @ 1 in) 3rd Year Type guns mounted in four triple turrets , one each fore and aft of the superstructure and one on each side amidships . These had become available once the Mogami @-@ class cruisers were rearmed with 20 @. @ 3 @-@ centimetre (8 @. @ 0 in) guns . With a 55 @. @ 87 @-@ kilogram (

123 @. @ 2 lb) AP shell , the guns had a maximum range of 27 @, @ 400 metres (30 @, @ 000 yd) at an elevation of 45 degrees . Their rate of fire was five rounds per minute . Heavy anti @-@ aircraft defence was provided by a dozen 40 @-@ calibre 127 @-@ millimetre Type 89 dual @-@ purpose guns in six twin turrets , three on each side of the superstructure . When firing at surface targets , the guns had a range of 14 @, @ 700 metres (16 @, @ 100 yd) ; they had a maximum ceiling of 9 @, @ 440 metres (30 @, @ 970 ft) at their maximum elevation of 90 degrees . Their maximum rate of fire was 14 rounds a minute ; their sustained rate of fire was around eight rounds per minute .

Musashi also carried thirty @-@ six 25 mm Type 96 light anti @-@ aircraft (AA) guns in triple @-@ gun mounts , all mounted on the superstructure . These 25 @-@ millimetre (0 @. @ 98 in) guns had an effective range of 1 @, @ 500 ? 3 @, @ 000 metres (1 @, @ 600 ? 3 @, @ 300 yd) , and an effective ceiling of 5 @, @ 500 metres (18 @, @ 000 ft) at an elevation of + 85 degrees . The maximum effective rate of fire was only between 110 and 120 rounds per minute because of the frequent need to change the fifteen @-@ round magazines . This was the standard Japanese light AA gun during World War II ; it suffered from severe design shortcomings that rendered it a largely ineffective weapon . According to historian Mark Stille , the twin and triple mounts " lacked sufficient speed in train or elevation ; the gun sights were unable to handle fast targets ; the gun exhibited excessive vibration ; the magazine was too small , and ... the gun produced excessive muzzle blast " . The ship was also provided with two twin mounts for the licence @-@ built 13 @. @ 2 mm Type 93 anti @-@ aircraft machine guns , one on each side of the bridge . The maximum range of these guns was 6 @, @ 500 metres (7 @, @ 100 yd) , but the effective range against aircraft was only 1 @, @ 000 metres (1 @, @ 100 yd) . The cyclic rate was adjustable between 425 and 475 rounds per minute ; the need to change 30 @-@ round magazines reduced the effective rate to 250 rounds per minute .

While the ship was under repair in April 1944 , the two 15 @. @ 5 centimetre wing turrets were removed and replaced with three triple 25 @-@ millimetre (0 @. @ 98 in) gun mounts each . Twenty @-@ one triple 25 mm mounts and 25 single mounts were added , for a total light AA armament of one hundred and thirty 25 mm guns .

== = Armour == =

The ship 's waterline armour belt was 410 millimetres (16 @. @ 1 in) thick and angled outwards 20 degrees at the top . Below it was a strake of armour that ranged in thickness from 270 to 200 millimetres (10 @. @ 6 to 7 @. @ 9 in) over the magazines and machinery spaces respectively ; it tapered to a thickness of 75 millimetres (3 @. @ 0 in) at its bottom edge . The deck armour ranged in thickness from 230 to 200 millimetres (9 @. @ 1 to 7 @. @ 9 in) . The turrets were protected with an armour 650 millimetres (25 @. @ 6 in) thick on the face , 250 millimetres (9 @. @ 8 in) on the sides , and 270 millimetres on the roof . The barbettes of the turrets were protected by armour 560 to 280 millimetres (22 @. @ 0 to 11 @. @ 0 in) thick , and the turrets of the 155 mm guns were protected by 50 @-@ millimetre (2 @. @ 0 in) armour plates . The sides of the conning tower were 500 millimetres (19 @. @ 7 in) thick and it had a 200 @-@ millimetre thick roof . Underneath the magazines were 50 @-@ to @-@ 80 @-@ millimetre (2 @. @ 0 to 3 @. @ 1 in) armour plates to protect the ship from mine damage . Musashi contained 1147 watertight compartments (1065 underneath the armour deck , 82 above) to preserve buoyancy in the event of battle damage .

== = Aircraft == =

Musashi was fitted with two catapults on her quarterdeck and could stow up to seven floatplanes in her below @-@ decks hangar . The ship operated Mitsubishi F1M biplanes and Aichi E13A1 monoplanes and used a 6 @-@ tonne (5 @. @ 9 @-@ long @-@ ton) , stern @-@ mounted crane for recovery .

== = Fire control and sensors == =

The ship was equipped with four 15 @-@ metre (49 ft 3 in) rangefinders , one atop her forward superstructure and one each in her main gun turrets , and another 10 @-@ metre (32 ft 10 in) unit atop her rear superstructure . Each 15 @-@ 5 @-@ centimetre (6 @-@ 1 in) gun turret was equipped with an 8 @-@ metre (26 ft 3 in) rangefinder . Low @-@ angle fire was controlled by two Type 98 fire @-@ control directors mounted above the rangefinders on the superstructure . Type 94 high @-@ angle directors controlled the 12 @-@ 7 mm AA guns , with Type 95 short @-@ range directors for the 25 mm AA guns .

Musashi was built with a Type 0 hydrophone system in her bow . It was only usable while stationary or at low speed . In September 1942 a Type 21 air @-@ search radar was installed on the roof of the 15 @-@ metre rangefinder at the top of the forward superstructure . Two Type 22 surface @-@ search radars were installed on the forward superstructure in July 1943 . During repairs in April 1944 , the Type 21 radar was replaced by a more modern version and a Type 13 early warning radar was fitted .

= = Construction = =

To cope with Musashi 's great size and weight , the construction slipway was reinforced , nearby workshops were expanded , and two floating cranes were built . The ship 's keel was laid down on 29 March 1938 at Mitsubishi 's Nagasaki shipyard , and was designated " Battleship No. 2 " . Throughout construction , a large curtain made of hemp rope weighing 408 t (450 short tons) prevented outsiders from viewing construction .

Launching the Musashi presented its own problems . The ship 's 4 @-@ metre (13 ft 1 in) thick launch platform , made of nine 44 cm (17 in) Douglas fir planks bolted together , took two years to assemble (from keel @-@ laying in March 1938) because of the difficulty in drilling perfectly straight bolt holes through four metres of fresh timber . The problem of slowing and stopping the massive hull once inside the narrow Nagasaki Harbour was addressed by attaching 570 tonnes (560 long tons) of heavy chains divided evenly between the two sides of the hull to create dragging resistance in the water . The launch , like the ship itself , had to be concealed from prying eyes ; the most important means of accomplishing this was a citywide air @-@ raid drill staged on the launch day to keep everyone inside their homes . Musashi was successfully launched on 1 November 1940 , coming to a stop only 1 metre (3 @-@ 3 ft) in excess of the hull 's calculated 220 metres (720 ft) travel distance across the harbour . The entry of such a large mass into the water caused a 120 cm (3 ft 11 in) tsunami , which propagated throughout the harbour and up the local rivers , flooding homes and capsizing small fishing boats . Musashi was fitted out at nearby Sasebo , with Captain Kaoru Arima assigned as her commanding officer .

Towards the end of fitting out , the ship 's flagship facilities , including those on the bridge and in the admiral 's cabins , were modified to satisfy Combined Fleet 's desire to have the ship equipped as the primary flagship of the commander @-@ in @-@ chief , as her sister Yamato was too far along for such changes . These alterations , along with improvements in the secondary battery armour , pushed back completion and pre @-@ handover testing of Musashi by two months , to August 1942 .

= = Service = =

Musashi was commissioned at Nagasaki on 5 August 1942 , and assigned to the 1st Battleship Division together with Yamato , Nagato , and Mutsu . Beginning five days later , the ship conducted machinery and aircraft @-@ handling trials near Hashirajima . Her secondary armament of twelve 127 mm guns , 12 triple 25 mm gun mounts , and four 13 @-@ 2 mm (0 @-@ 52 in) anti @-@ aircraft machine guns was fitted from 3 ? 28 September 1942 at Kure , as well as a Type 21 radar . The ship was working up for the rest of the year . Captain Arima was promoted to rear admiral on 1 November .

Musashi was assigned to the Combined Fleet , commanded by Admiral Isoroku Yamamoto , on 15

January 1943 and sailed for Truk three days later , arriving on 22 January . On 11 February , she replaced her sister ship Yamato as the fleet 's flagship . On 3 April , Yamamoto left Musashi and flew to Rabaul , New Britain to personally direct " Operation I @-@ Go " , a Japanese aerial offensive in the Solomon Islands . His orders were intercepted and deciphered by Magic , and American Lockheed P @-@ 38 Lightning fighters shot down his aircraft and killed him in Operation Vengeance while he was en route from New Britain to Ballale , Bougainville . On 23 April , his cremated remains were flown back to Truk and placed in his cabin on board Musashi .

On 17 May , in response to American attacks on Attu Island , Musashi ? together with the carrier Hiy? , two heavy cruisers , and nine destroyers ? sortied to the northern Pacific . When no contact was made with American forces , the ships sailed to Kure on 23 May , where Yamamoto 's ashes were taken from the vessel in preparation for a formal state funeral . Immediately afterwards , Musashi 's task force was significantly reinforced to counterattack American naval forces off Attu , but the island was captured before the force could intervene . On 9 June Arima was relieved by captain Keiz? Komura . On 24 June , while being overhauled at Yokosuka Naval Arsenal , Musashi was visited by Emperor Hirohito and high @-@ ranking naval officers . From 1 to 8 July , the ship was fitted with a pair of Type 22 radars at Kure . She sailed for Truk on 30 July and arrived there six days later , where she resumed her position as fleet flagship for Admiral Mineichi Koga .

In mid @-@ October , in response to suspicions of planned American raids on Wake Island , Musashi led a large fleet ? three carriers , six battleships , and 11 cruisers ? to intercept American forces , but failed to make contact and returned to Truk on 26 October . She spent the remainder of 1943 in Truk Lagoon . Captain Komura was promoted to rear admiral on 1 November and transferred to the 3rd Fleet on 7 December as Chief of Staff , Captain Bunji Asakura assuming command of Musashi .

The ship remained in Truk Lagoon until 10 February 1944 , when she returned to Yokosuka . On 24 February , Musashi sailed for Palau , carrying one Imperial Japanese Army battalion and another of Special Naval Landing Forces and their equipment . After losing most of her deck cargo during a typhoon , she arrived at Palau on 29 February and remained there for the next month . On 29 March , Musashi departed Palau under cover of darkness to avoid an expected air raid , and encountered the submarine USS Tunny , which fired six torpedoes at the battleship ; five of them missed , but the sixth blew a hole 5 @. @ 8 metres (19 ft) in diameter near the bow , flooding her with 3000 tonnes of water . The torpedo hit killed seven crewmen and wounded another eleven . After temporary repairs , Musashi sailed for Japan later that night and arrived at Kure Naval Arsenal on 3 April . From 10 to 22 April , she was repaired and her anti @-@ aircraft armament was substantially increased . When she undocked on 22 April , the ship 's secondary battery comprised six 15 @. @ 5 cm guns , twenty @-@ four 12 @. @ 7 cm guns , one hundred and thirty 25 mm guns , and four 13 @. @ 2 mm machine guns . She also received new radars (which were still primitive compared to American equipment) , and depth @-@ charge rails were installed on her fantail .

In May 1944 , captain Asakura was promoted to rear admiral and Musashi departed Kure for Okinawa on 10 May , then for Tawitawi on 12 May . She was assigned to the 1st Mobile Fleet , under the command of Vice Admiral Jisabur? Ozawa , with her sister . On 10 June , the battleships departed Tawitawi for Batjan under the command of Vice Admiral Matome Ugaki , in preparation for Operation Kon , a planned counterattack against the American invasion of Biak . Two days later , when word reached Ugaki of American attacks on Saipan , his force was diverted to the Mariana Islands . After they rendezvoused with Ozawa 's main force on 16 June , the battleships were assigned to Vice Admiral Takeo Kurita 's 2nd Fleet . During the Battle of the Philippine Sea , Musashi was not attacked . Following Japan 's disastrous defeat in the battle (also known as the " Great Marianas Turkey Shoot ") , the Second Fleet returned to Japan . On 8 July , Musashi and her sister embarked 3 @, @ 522 men and equipment of the Army 's 106th Infantry Regiment of the 49th Infantry Division and sailed for Lingga Island , where they arrived on 17 July .

= = = Battle of Leyte Gulf = = =

Captain Toshihira Inoguchi relieved Asakura in command of Musashi on 12 August and was

promoted to rear admiral on 15 October . Three days later , she sailed for Brunei Bay , Borneo , to join the main Japanese fleet in preparation for " Operation Sho @-@ 1 " , the counterattack planned against the American landings at Leyte . The Japanese plan called for Ozawa 's carrier forces to lure the American carrier fleets north of Leyte so that Kurita 's 1st Diversion Force (also known as the Central Force) could enter Leyte Gulf and destroy American forces landing on the island . Musashi , together with the rest of Kurita 's force , departed Brunei for the Philippines on 22 October .

The following day , the submarine USS Dace torpedoed and sank the heavy cruiser Maya near Palawan . The destroyer Akishimo rescued 769 survivors and transferred them to Musashi later in the day . On 24 October , while transiting the Sibuyan Sea , Kurita 's ships were spotted by a reconnaissance aircraft from the fleet carrier USS Intrepid . Just over two hours later , the battleship was attacked by eight Curtiss SB2C Helldiver dive bombers from Intrepid at 10 : 27 . One 500 @-@ pound (230 kg) bomb struck the roof of Turret No. 1 , failing to penetrate . Two minutes later , Musashi was struck starboard amidships by a torpedo from a Grumman TBF Avenger , also from Intrepid . The ship took on 3 @,@ 000 long tons (3 @,@ 000 t) of water and a 5 @.@ 5 degree list to starboard that was later reduced to 1 degree by counterflooding compartments on the opposite side . During this attack two Avengers were shot down .

An hour and a half later , another eight Helldivers from Intrepid attacked Musashi again . One bomb hit the upper deck and failed to detonate ; another hit the port side of the deck and penetrated two decks before exploding above one of the engine rooms . Fragments broke a steam pipe in the engine room and forced its abandonment as well as that of the adjacent boiler room . Power was lost to the port inboard propeller shaft and the ship 's speed dropped to 22 knots (41 km / h ; 25 mph) . Anti @-@ aircraft fire shot down two Helldivers during this attack . Three minutes later , nine Avengers attacked from both sides of the ship , scoring three torpedo hits on the port side . One hit abreast Turret No. 1 , the second flooded a hydraulic machinery room forcing the main turrets to switch over to auxiliary hydraulic pumps , and the third flooded another engine room . More counterflooding reduced the list to one degree to port , but the degree of flooding reduced the ship 's forward freeboard by 6 feet (1 @.@ 8 m) . During this attack , Musashi fired sanshikidan anti @-@ aircraft shells from her main armament ; one shell detonated in the middle gun of Turret No. 1 , possibly because of a bomb fragment in the barrel , and wrecked the turret 's elevating machinery .

At 13 : 31 , the ship was attacked by 29 aircraft from the fleet carriers Essex and Lexington . Two Grumman F6F Hellcat fighters strafed the ship 's deck and Helldivers scored four more bomb hits near her forward turrets . Musashi was hit by four more torpedoes , three of which were forward of Turret No. 1 , causing extensive flooding . The ship was now listing one degree to starboard , and had taken on so much water that her bow was now down 13 feet (4 @.@ 0 m) and her speed had been reduced to 20 knots (37 km / h ; 23 mph) . Two hours later nine Helldivers from Enterprise attacked with 1 @,@ 000 @-@ pound (450 kg) armour @-@ piercing bombs , scoring four hits . The ship was hit by three more torpedoes , opening up her starboard bow and reducing her speed to 13 knots (24 km / h ; 15 mph) . At 15 : 25 , Musashi was attacked by 37 aircraft from Intrepid , the fleet carrier Franklin and the light carrier Cabot . The ship was hit by 13 bombs and 11 more torpedoes during this attack for the loss of three Avengers and three Helldivers . Her speed was reduced to 6 knots (11 km / h ; 6 @.@ 9 mph) , her main steering engine was temporarily knocked out and her rudder was briefly jammed 15 degrees to port . Counterflooding reduced her list to six degrees to port from its previous maximum of ten degrees . Musashi had been struck by a total of 19 torpedoes and 17 bombs .

Kurita left Musashi to fend for herself at 15 : 30 , and encountered her again at 16 : 21 after reversing course . The ship was headed north , with a list of 10 degrees to port , down 26 feet (7 @.@ 9 m) at the bow with her forecastle awash . He detailed a heavy cruiser and two destroyers to escort her while frantic efforts were made to correct her list , including flooding another engine room and some boiler rooms . Her engines stopped before she could be beached . At 19 : 15 her list reached 12 degrees and her crew was ordered to prepare to abandon ship , which they did fifteen minutes later when the list reached 30 degrees . Musashi capsized at 19 : 36 and sank in 4 @,@ 430 feet (1 @,@ 350 m) at 13 ° 07 ' N 122 ° 32 ' E. Inoguchi chose to go down with his ship ; 1

376 of her 2 399 man crew were rescued . About half of her survivors were evacuated to Japan , and the rest took part in the defence of the Philippines . The destroyer Shimakaze rescued 635 of Maya 's survivors from Musashi .

= = Discovery = =

In March 2015 , the American philanthropist and Microsoft co founder , Paul Allen , and his team of researchers located the wreck of Musashi in the Sibuyan Sea using a remotely operated underwater vehicle deployed from the yacht Octopus . The ship lies at a depth of around 1 000 metres (3 300 ft) . The wreck was revealed to be in several pieces with most of the hull amidships appearing to have been blown apart after leaving the surface . The bow section from the number one barrette forward is upright on the sea floor while the stern is upside down . The forward superstructure and funnel is detached from the rest of the ship and lies on its port side .