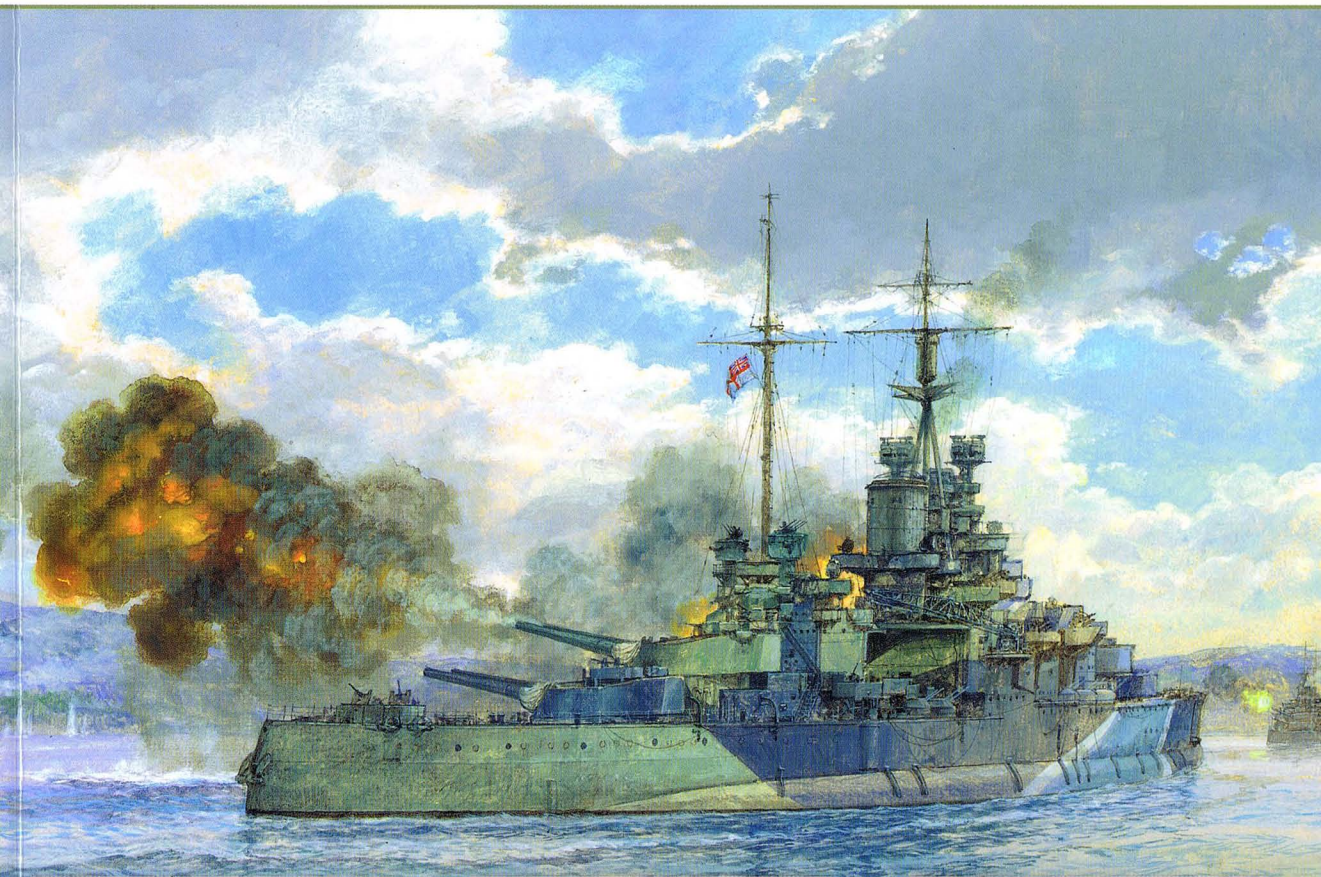
BRITISH BATTLESHIPS 1939–45 (1)

Queen Elizabeth and *Royal Sovereign* Classes



ANGUS KONSTAM ILLUSTRATED BY TONY BRYAN & PAUL WRIGHT

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ANGUS KONSTAM hails from the Orkney Islands, and is the author of over 50 books, 30 of which are published by Osprey. This acclaimed and widely published author has written several books on piracy, including *The History of Pirates* and *Blackbeard: America's Most Notorious Pirate*. A former naval officer and museum professional, he worked as the Curator of Weapons at the Tower of London and as the Chief Curator of the Mel Fisher Maritime Museum in Key West, Florida. He now works as a full-time author and historian, and lives in Edinburgh, Scotland.

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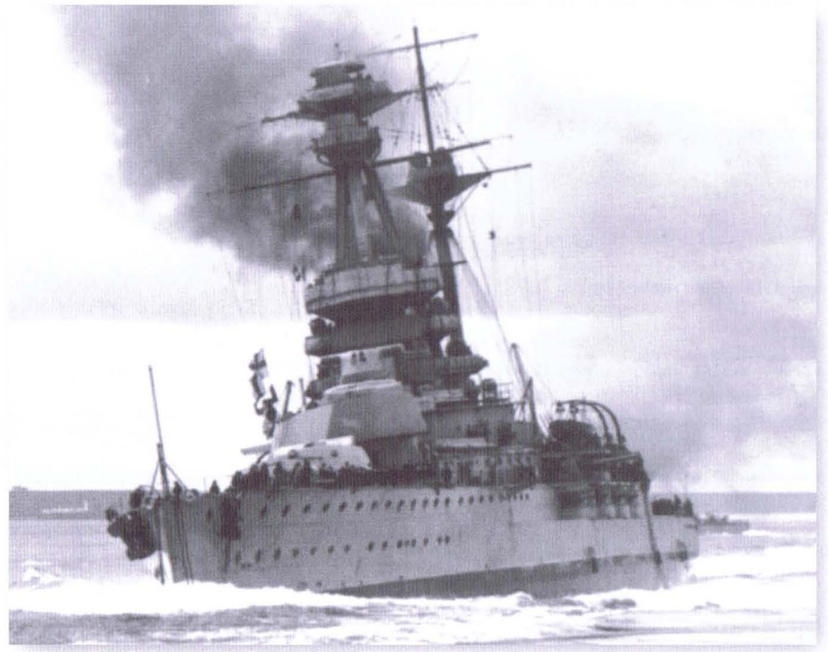

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BRITISH BATTLESHIPS (1)

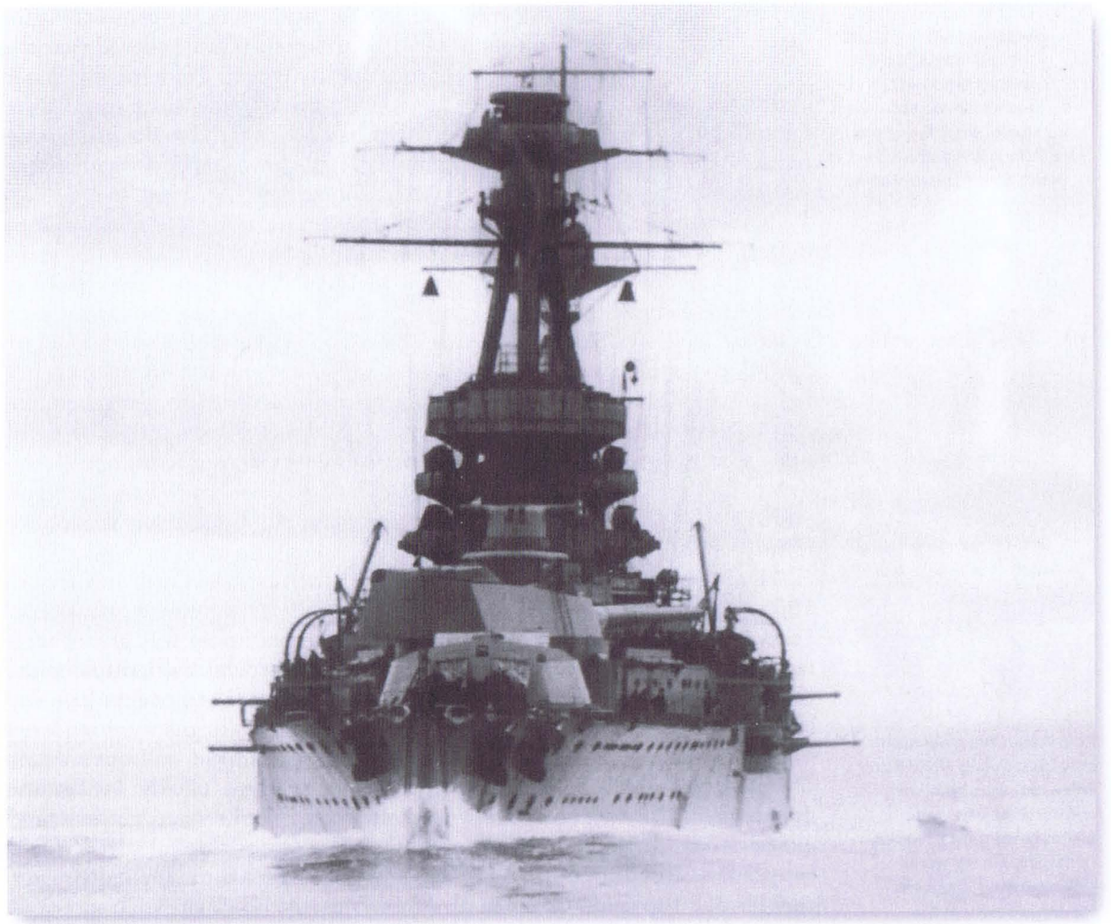
QUEEN ELIZABETH AND *ROYAL SOVEREIGN* CLASSES

INTRODUCTION

In September 1939, when the United Kingdom found itself at war with Germany, the Royal Navy might still have been the most powerful naval force on the planet, but it only consisted of a dozen battleships and three battlecruisers. Of these battleships, ten had seen service in World War I, and no less than six had been present at the Battle of Jutland, fought 23 years earlier in May 1916. These venerable battleships had been modernized and improved during the inter-war years, but they were still old – much older and less technologically advanced than the latest battleships and battlecruisers in the German or Italian fleets. However, with the onset of hostilities the Royal Navy had no choice. Until more modern battleships could be built, these grand old vessels would have to play their part, and play it well.

The reason these aged battleships could still hold their own against more modern opponents was largely a matter of armament. Unlike the other 'dreadnoughts' of World War I, they carried 15in guns, which meant that when they first entered service they were probably the most powerful warships afloat. During the inter-war years, the 'fast battleships' of the *Queen Elizabeth* class had their gunnery fire control systems improved, and during the following world war these battleships benefited from the introduction of radar. Consequently, they were still able to engage enemy battleships that might have been more modern, but had a less powerful armament. The battleships of the *Royal Sovereign* class were not so thoroughly modernized between the wars, hence they were considered less effective in a naval engagement, and so for the most part they were forced to play a supporting role in the conflict.

Of these ten World War I veterans, most managed to fire their guns in anger, and one or two even participated in full-blown naval engagements. Two more of the ships had their careers cut short when they fell prey to the torpedoes of German U-boats. Furthermore, most of the surviving ships were damaged at some point through enemy action, either by bombs, mines or torpedoes. In virtually every case, however, these old warhorses returned to the fray, and continued to serve until their enemies had been vanquished. This book tells the story of these prestigious vessels – the mainstay of the Royal Navy during the dark years between 1939 and 1945.



HMS *Royal Oak* under way, during a gunnery exercise shortly before the outbreak of the war. In this view her secondary armament is clearly visible along either beam. Above them her 4in guns are also visible, trained to fire to the port or starboard beam.

DESIGN AND CONSTRUCTION

The Notion of the 'Fast Battleship'

To understand the design of most of Britain's battleship fleet in 1939, you need to rewind the clock more than three decades. The story really began in 1904, when Sir John 'Jackie' Fisher (1841–1920) became the First Sea Lord. He held the post until 1911, retiring on his 70th birthday. He was recalled to service following the outbreak of war, but resigned just seven months later after clashes with Winston Churchill (1874–1965), then First Lord of the Admiralty. Fisher was an advocate of the big gun – arming battleships with the largest and most effective ordnance available, and augmenting this firepower by accurate fire control. In other words, he saw naval gunnery as a balance between range, accuracy, shell size and rate of fire, and believed it was his mission to improve all these elements. He was also a supporter of other technical innovations, including the steam turbine, the use of fuel oil rather than coal, and the use of both submarines and torpedoes, both of which were viewed with distaste by many of his contemporaries.

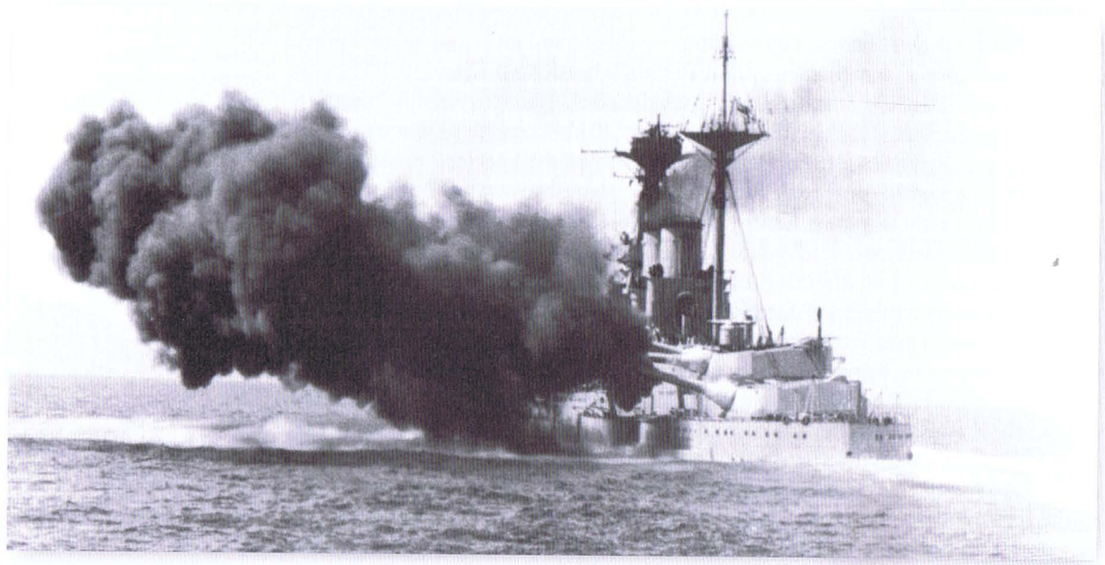
Fisher was fortunate enough to enjoy the support of a man who shared his enthusiasm for innovation and technological progress. Sir Philip Watts (1846–1926) succeeded Sir William White as Director of Naval Construction

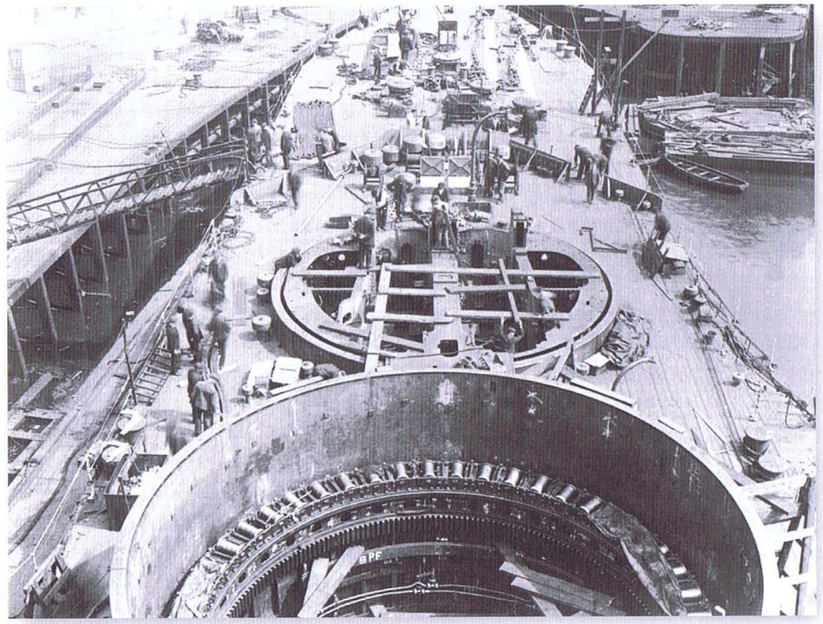
in 1902, and while his first years were spent completing the projects begun by his predecessor, he soon found an ally in Fisher. Watts believed that the future of warship design lay in battleships that were dramatically faster and better armed than current designs, but until 1904 his suggestions were rejected by a conservative Admiralty that had no desire to make its existing battle fleet redundant. He found an ally in Fisher, however, and together they embarked on a project that would revolutionize naval warfare.

Both men envisioned a new kind of battleship, carrying multiple turrets of big guns, with armour that was proof against the shells of other capital ships and turbine-powered engines that allowed her to overtake her rivals. The men were helped by developments overseas – both the American and Japanese navies were planning to commission new battleships with eight or more heavy guns apiece. This idea of a uniform main armament formed a key part of Watts' design, and it was clear that unless action was taken, the Royal Navy might well lose its numerical and technological edge over all other maritime powers. Reluctantly, the Admiralty agreed to commission a new battleship, designed along the radical lines proposed by Watts. The result was HMS *Dreadnought* – a warship so revolutionary that her very name gave rise to a type of warship, the dreadnought.

HMS *Dreadnought* was laid down in Portsmouth Dockyard in October 1905, and was completed in a record-breaking 14 months, a whole two years before her foreign rivals. This 18,000-ton battleship was armed with ten 12in guns, mounted in five twin turrets. As typical battleships of the period only carried four guns, this gave her a firepower greater than any two existing battleships combined. In fact, the earlier designs were rendered obsolete virtually overnight, and were soon given the collective name of 'pre-dreadnoughts'. The future of naval warfare clearly lay in the dreadnought. She was powered by a combination of boilers and turbines, and although coal-fired, these represented a significant technological advance over her predecessors. The powerplant also made Watts' new battleship much faster, capable of a top speed of 21 knots – more than 3 knots faster than previous battleships. *Dreadnought* was quite simply the fastest battleship in the world.

HMS *Valiant*, firing her main armament during World War I. When they were built, she and her sister ships were probably the most powerful capital ships in the world, with a degree of firepower and fire control that the Germans were unable to match.





The construction of HMS *Barham* in the John Brown Shipyard, Clydeside, in 1915. The barbettes have been fitted to her forward turrets, and in the foreground the traversing mechanism is being installed into 'B' turret.

Ironically, Britain had the most to lose from this upset of the naval balance, as she had by far the largest battlefleet. What followed was a naval arms race, as Britain and her maritime rivals began building dreadnoughts in a bid to preserve or alter the naval *status quo*. Watts was ordered to design new dreadnoughts, initiating a naval construction Programme that may have played a part in the outbreak of World War I, but which was also a strategic necessity for Britain if the country was to retain its global naval supremacy. The first of these new dreadnoughts were the three vessels of the *Bellerophon* class (*Bellerophon*, *Superb* and *Temeraire*), which were commissioned in late 1906 and entered service in early 1909. They were essentially the same as the *Dreadnought*, augmented by a secondary armament of 4in guns to ward off enemy destroyers. Then came the *St Vincent* class (*Collingwood*, *St Vincent* and *Vanguard*), whose design was similar, but with a slightly improved 12in gun. All three of these dreadnoughts entered service in 1909–10.

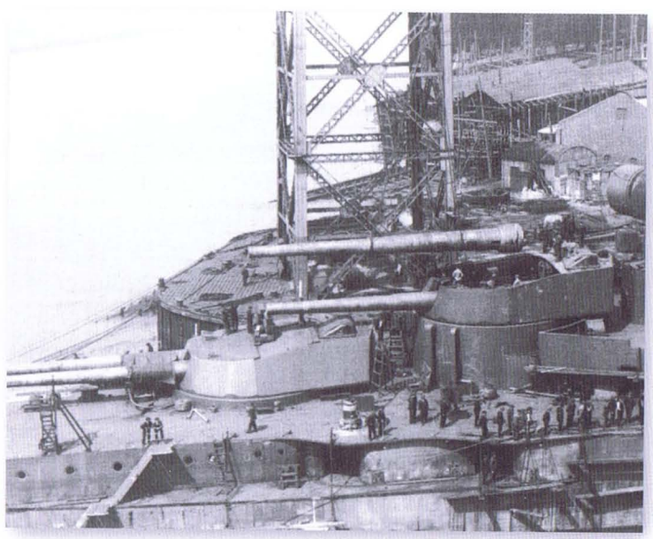
A criticism of the original *Dreadnought* design was that not all of her gun turrets could fire as part of a single broadside, as one turret would always be blocked by the ship's superstructure. Watts' solution was to create gaps in the superstructure, allowing all ten guns to fire at the same target. This innovation was introduced in the *Neptune*, and her near-sisters *Colossus* and *Hercules*, which were laid down in 1909 and completed in 1911. The *Colossus* class were the first vessels of the 1909 Programme, which saw the commissioning of four other dreadnoughts and two battlecruisers (*Lion* and *Princess Royal*). Technically, the remaining four battleships weren't dreadnoughts at all, but 'super-dreadnoughts', so named because they carried a more powerful armament of 13.5in guns. The *Orion* class (*Conqueror*, *Monarch*, *Orion* and *Thunderer*) were designed to allow all ten guns to fire in a single broadside, this time by placing one of the side turrets behind the forward turret, and placing the second amidships, where it had a relatively clear field of fire to each beam.

These first super-dreadnoughts were ordered in late 1909, and completed in 1912. They were now approaching the silhouette that would later be associated with battleships – four turrets, two forward and two aft. The midships turret provided added firepower, but caused significant problems for Watts and his team of designers, as the associated magazines were in the middle of the space usually allocated to the propulsion system. Next came the *King George V* class (*King George V*, *Ajax*, *Audacious* and *Centurion*), which was virtually identical to the previous class of super-dreadnoughts, apart from the placing of the foremast in front of the funnels, rather than between them. They also boasted a heavier secondary armament, which reflected the growing realization that torpedo-boat destroyers posed a significant threat to battleships, which lacked adequate means to defend themselves against fast, small enemy warships. The last of these super-dreadnoughts were the four battleships of the *Iron Duke* class (*Iron Duke*, *Marlborough*, *Benbow* and the *Emperor of India*), which were better-armoured versions of their predecessors. The other important modification was the introduction of a more potent secondary battery of 6in guns, housed in casemates built into the sides of the hull.

The *Iron Duke* class were all laid down in early 1912, by which time Fisher had retired as First Sea Lord, and Winston Churchill had become the civilian First Lord of the Admiralty. Although Watts retired in 1912, he had already designed the next generation of British battleships – a class of ships that would be viewed as the ultimate expression of the British dreadnought. They also formed the fighting core of the Royal Navy's battlefleet in World War II.

The 1912 Programme called for the building of three more super-dreadnoughts and another battlecruiser. Watts had originally intended that these should be slightly improved versions of the *Iron Duke* class, but two events forced him to rethink his plans. First, the Japanese and the Americans were both known to be building battleships designed to carry 14in guns, which would give them a firepower advantage over the British. While neither of these maritime powers was considered to be a potential adversary, the Admiralty still wanted to maintain a technological lead over all other navies – friendly or not. More alarming were the intelligence reports from Germany that reported that the Germans were planning to increase the calibre of their battleship armament from 12in to 14in guns. Consequently, the Admiralty ordered Watts to redesign these new battleships to carry heavier calibre guns.

The fitting of a 15in gun barrel to 'X' turret of HMS *Barham*, during her fitting out in 1913. Each of these monster barrels weighed over 83 tons, and required an extensive system of hydraulics to elevate them once they were fully operational.



While the British 13.5in gun had proved to be a highly effective weapon, Watts really needed something bigger. He therefore approached the Elswick Ordnance Company, who assured him they could produce a 15in gun in time to be mounted on any new battleships during their fitting out. Churchill was a staunch advocate of increasing the calibre of these new battleship guns,

and so Watts set about designing a new class of battleship, built around a type of gun that didn't even exist. The Director of Naval Construction also seized this opportunity to introduce other innovative ideas. First was the switch from coal-fired engines to ones powered by fuel oil. This new powerplant would make a dramatic difference to the vessels, giving them the power to outpace all other battleships. In effect, it made them the equivalent of battlecruisers, only with the defensive armour to hold their own against the guns of the enemy battlefleet. As a result they were quickly dubbed 'fast battleships'.

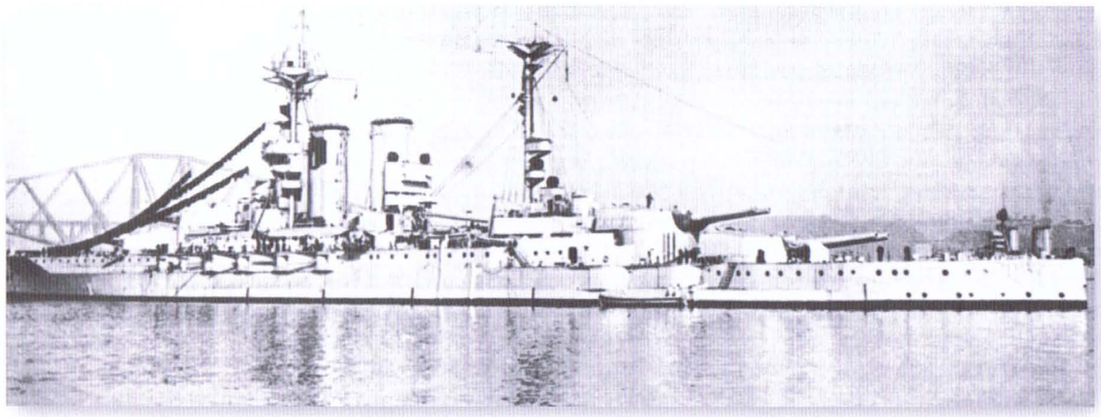
The new combination of speed and firepower led to a rethinking of current tactical doctrine. It was now expected that these fast battleships would be able to use their speed to manoeuvre themselves into a battle-winning position, 'crossing the T' of the enemy battle line, where all the British guns could bear on the head of the enemy line, while only the lead ship in the enemy column could fire back. In practice, this tactic was similar to the old Napoleonic notion of line versus column – a means of making the most of firepower and manoeuvre to defeat the enemy. The speed advantage also meant that the fast battleships could support the battlecruisers, and pin down the enemy long enough for the rest of the British battlefleet to join the fight. Better still, the 15in guns of the fast battleships meant that they had a superior level of firepower over their opponents, whoever they might be. All things considered, this new breed of warship would be the most powerful, speedy and versatile capital ships in the British Grand Fleet.

The *Queen Elizabeth* Class

Sir Philip Watts' original design for his fast battleships called for a five-turret super-dreadnought, similar to the *Iron Duke* class, only larger, to accommodate the extra weight of ordnance. During the unseasonably bad summer of 1912 Watts drafted three different plans – RIII, RIV and RIII*, the last of which was chosen by the Admiralty during late August. Plan RIII* was for a battleship with four rather than five turrets. Watts had discovered that even if he reduced the planned armament by one twin turret, these new battleships would still fire a heavier weight of broadside: 15,000lb per salvo compared with the 14,000lb roadside of the *Iron Duke* class. By avoiding the need for a fifth turret amidships, the design of the ship became a lot easier, allowing Watts to use the space to extend the engine room. This layout meant the new ship could carry more boilers, which in turn meant more propulsive power.

The *Queen Elizabeth* Class

Ship	Builder	Laid Down	Launched	Commissioned	Fate
Queen Elizabeth	Portsmouth Dockyard	21 October 1912	16 October 1913	January 1915	Broken up 1948
Warspite	Devonport Dockyard	31 October 1912	26 November 1913	March 1915	Broken up 1947
Valiant	Fairfield Shipyard, Clydebank	31 January 1913	4 November 1914	February 1916	Broken up 1948
Barham	John Brown Shipyard, Clydebank	24 February 1913	31 October 1914	October 1915	Sunk by U-boat 25 November 1941
Malaya	Armstrong Shipyard, Tyneside	20 October 1913	18 March 1915	February 1916	Broken up 1948
Agincourt	Portsmouth Dockyard	–	–	–	Cancelled August 1914



This photograph, dating from 1918, is one of the earliest of HMS *Warspite*, captured as she lay at anchor in the Firth of Forth, with the Forth Rail Bridge in the background. The front stays of her foremast are covered by hammocks, drying in the open air.

The RIII* design was for a 27,500-ton battleship that was 23ft longer than the *Iron Duke*, but with a similar beam. The beam was fixed by the width of Britain's dry docks, and while in theory this would have made these ships less stable than their predecessors, this was compensated for by their increased draught. Watts was later criticized for trying to do too much in a battleship of this size; the battleships were overweight and had a deeper draught than was considered advisable, which in turn reduced their speed. A greater displacement would have meant a shallower draught, and consequently would have made better use of the ship's engines. Still, Watts was working within tight constraints of time, budget and technology, and his ships were after all being designed around a gun that hadn't even been built when construction began.

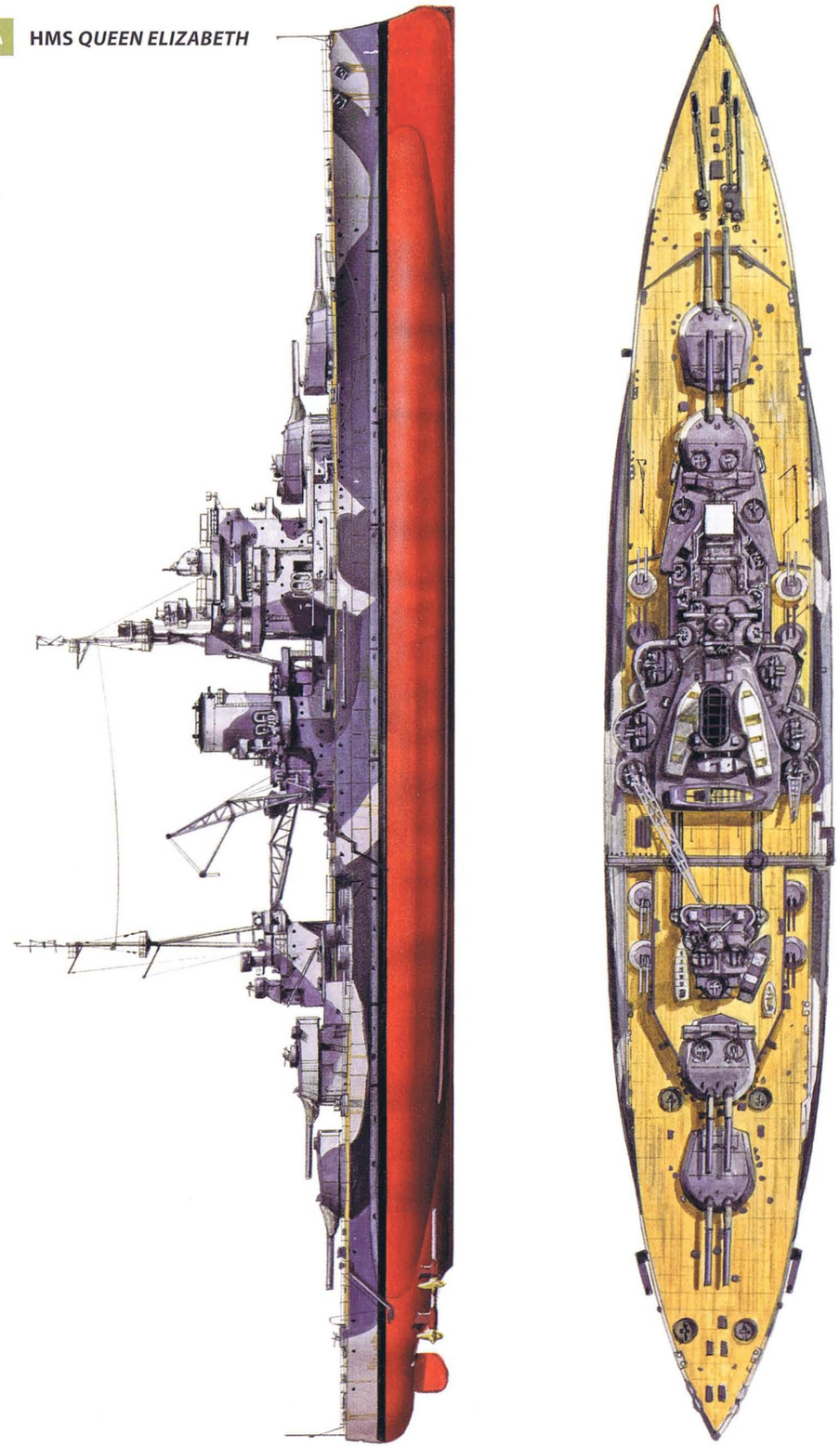
Watts also realized that the speed he wanted his fast battleships to achieve would be unattainable if he relied on coal-fired engines. The Admiralty was reluctant to switch to a fuel that wasn't produced within Britain, but Watts and Churchill managed to persuade the rest of the Admiralty that the switch to fuel oil was a necessity. Consequently, while the British government bought shares in the Middle Eastern oil industry, Watts designed his ships so that they could take advantage of the greater thermal efficiency of oil. As a result, these battleships were roughly 3 knots faster than their predecessors of the *Iron Duke* class, although this small increase required the inclusion of six more boilers, and the production of almost twice as much steam horsepower.

A

HMS *QUEEN ELIZABETH* (1923, 1935, 1940)

When they first entered service, the *Queen Elizabeth* Class super-dreadnoughts were classed as 'fast battleships' – the most versatile and modern capital ships in the Grand Fleet. Unlike their predecessors they carried 15in guns, which meant that they retained their usefulness during the inter-war years. During the mid 1920s, all five battleships of the class were extensively modernized. In the process their funnels were trunked together, and their anti-torpedo protection was improved.

HMS *Queen Elizabeth* then underwent a second major refit between 1937 and 1940, which involved an extensive re-configuration of her bridge, funnel, engines, secondary armament and armour. By the time she rejoined the Mediterranean Fleet in May 1941, she was practically a new warship. However, in December 1941 she was badly damaged by underwater charges laid during a daring raid by Italian midget submarines. The battleship flooded and settled on the harbour bottom, but she was raised, pumped out, and sent to Norfolk, Virginia to be repaired. She was effectively out of the fight for 18 months. After she returned to service in the summer of 1943, she was sent to the Far East, where she operated with the Eastern Fleet. This illustration shows the battleship as she looked after her last major refit.

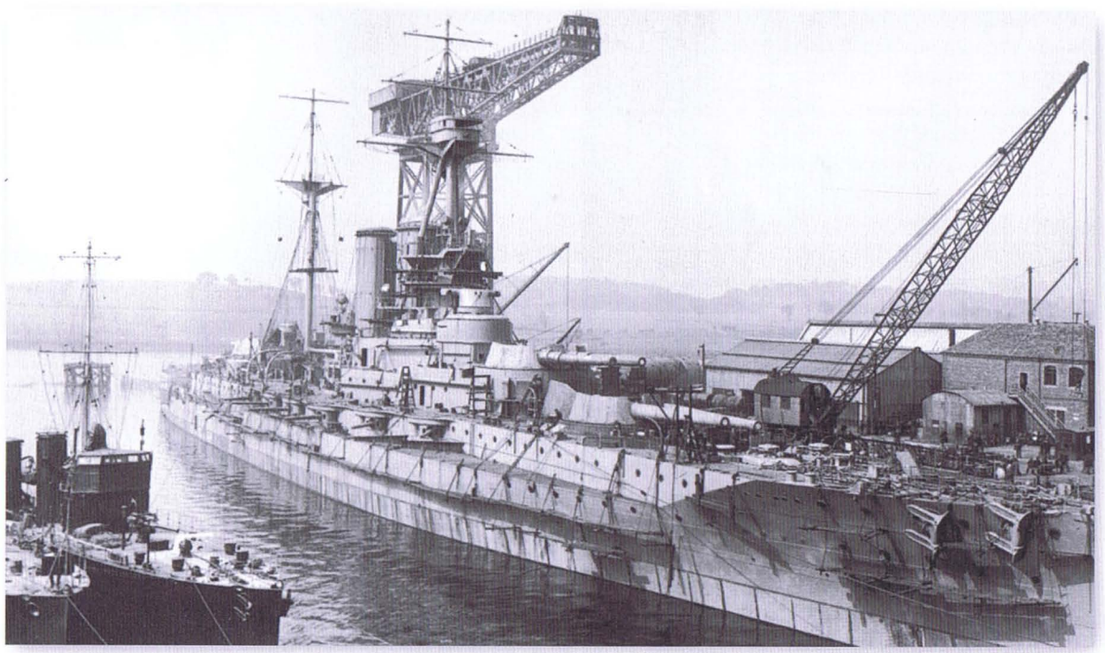


The protective scheme was virtually a repeat of that used for the Iron Duke class, only with a maximum belt thickness of 13in rather than 12in. This waterline armoured belt tapered off to just 8in towards the bow and stern (compared to 4in on the *Iron Duke*), and was augmented by lighter armour above it, protecting the casemate batteries. Armoured bulkheads protected against internal explosions, while the deck was plated with 1in of armour, increasing to 3in over the engine rooms, magazines and steering gear. Finally, the turrets themselves were well protected by thick armoured barbettes – the steel cylinders in which the turret mechanism sat – and the turret faces were also heavily armoured. An armoured conning tower protected the captain, the gunnery direction teams and other key personnel when these ships steamed into action. Almost a third of the displacement of these ships was taken up by their armour, making them – at least in theory – proof against almost all known warships.

In the *Iron Duke* class, Watts had increased the size of secondary armament from 4in to 6in guns. He repeated this in the *Queen Elizabeth* class, arming his vessels with 16 6in quick-firing guns, mounted in a series of casemates on either side of the hull. These secondary guns were never very successful, representing an armoured weak spot that caused problems for *Warspite* at the Battle of Jutland in 1916. They were also difficult to use in even moderate seas, and consequently the secondary armament was first reduced, then removed altogether during the service life of these ships.

The 1912 Programme called for the building of three battleships and a battlecruiser. The Admiralty felt that fast battleships were more useful than battlecruisers, so the funds were duly allocated to a fourth battleship of the class. This rather neatly meant the creation of a four-ship 'division', the standard tactical unit of the day. The first two ships of the class (*Queen Elizabeth* and *Warspite*) were laid down in the royal dockyards of Portsmouth and Devonport in late October 1912, and were followed a few months later by the two other ships of the class – *Barham* being built in the John Brown Shipyard in Glasgow's Clydebank, while *Valiant* was laid down in the nearby Fairfield Shipyard. Work began on these two later ships in early 1913.

HMS *Barham*, nearing completion in the John Brown Shipyard on Clydeside, July 1915. Particularly noticeable is the lack of any anti-torpedo bulge, a distinctive feature of the Queen Elizabeth class battleships from the mid 1920s on.



That year a fifth ship was ordered, her construction costs being a present to the British government by the Federated States of Malaya. Appropriately enough, she was named *Malaya*, and was laid down in the Armstrong Shipyard in Elswick, in Newcastle's Tyneside, during October 1913. By that time the *Queen Elizabeth* and *Warspite* had already been launched, and were being fitted out. A sixth ship was also planned as part of the 1913 Programme – the *Agincourt* – to be built in Portsmouth dockyard after the completion of the *Queen Elizabeth*. However, this project was cancelled shortly after the outbreak of World War I. When war finally came in August 1914, none of these battleships was ready for service, although *Queen Elizabeth* and *Warspite* were commissioned early the following year. *Barham* and *Valiant* had still to be launched, while *Malaya* was only half-built. Still, all five battleships would be serving with the Grand Fleet by the time it sailed out of Scapa Flow to do battle with the German High Seas Fleet in May 1916. That great fleet engagement would be the first baptism of fire for these powerful new warships.

The real benefit of these fast battleships came later. During the inter-war years they remained potent weapons of war, and as earlier and less well-armed dreadnoughts and super-dreadnoughts were scrapped, they increasingly became the core of the battlefleet. In 1919, the editor of *Jane's Fighting Ships* described them as 'the finest Capital Ships yet turned out'. A series of refits and overhauls meant that they retained this potency until 1939 and beyond. Improvements to their main armament and its fire control meant that these warships kept their edge in firepower, while their relatively high speed meant that unlike the battleships of the *Royal Sovereign* class, they were able to keep up with more modern vessels. In fact, after decades of modernizations and refits, the *Queen Elizabeth* class battleships of 1939 were largely unrecognizable from the fast battleships that had steamed into action against the German High Seas fleet at Jutland almost quarter of a century before.

Queen Elizabeth Class (as built)

Displacement: 27,500 tons (standard)

Dimensions: Length: 645ft 9in overall; Beam: 90ft 6in; Draft: 28ft 9in

Propulsion: Four Parsons turbines (Brown & Curtis turbines in *Barham* and *Valiant*), 24 Babcock & Wilson boilers (Yarrow boilers in *Barham* and *Valiant*), producing 56,000 steam horsepower

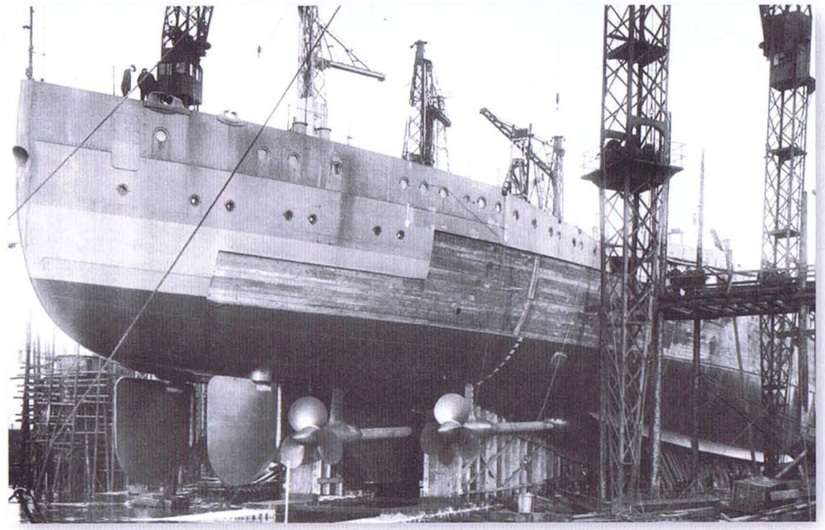
Maximum speed: 23 knots

Fuel oil capacity: 3,400 tons

Armament: 8 x 15in Mark I BL guns, in four twin turrets; 12 x 6in guns in single casemate mounts (14 guns on *Queen Elizabeth*); 2 x 6in guns on single deck mounts; 2 x 3in anti-aircraft guns in single mounts; 4 x 3-pdr saluting guns in single mounts; 4 x 21in submerged torpedo tubes

Armour: Belt: 6–13in; Bulkheads: 4–6in; Barbettes: 4–10in; Turrets: 13in (on front face); Conning tower: 11in; Decks: 1–3in

Complement: 951 officers and men



HMS *Barham*, photographed on the day of her launch – 31 October 1914 – with the River Clyde seen in the foreground. In this view her teak backing can be seen, laid down as a base for her side armour. After her launch it took another ten months to complete the process of fitting her out.

HMS *Royal Oak*, pictured just after the outbreak of World War II. All of the *Royal Sovereign* class were considered to be prone to rolling, and this photograph captures her dramatic lean to starboard as she alters course.

The *Royal Sovereign* Class

The *Queen Elizabeth* class was the last group of battleships to be designed by Sir Philip Watts. He retired in 1912, taking up a directorship of the Armstrong Whitworth Company, and was succeeded by Sir Eustace Tennyson d'Eyncourt (1868–1951). The new Director of Naval Construction was faced with the task of designing a fresh series of battleships, the core of the 1913 Programme. His brief was to create a type of battleship armed with 15in guns that was both cheaper to build than the *Queen Elizabeth* class, and which could use either coal or fuel oil as a means of propulsion. In effect, his new class of ships would be a retrograde step in terms of warship design.

The *Royal Sovereign* Class

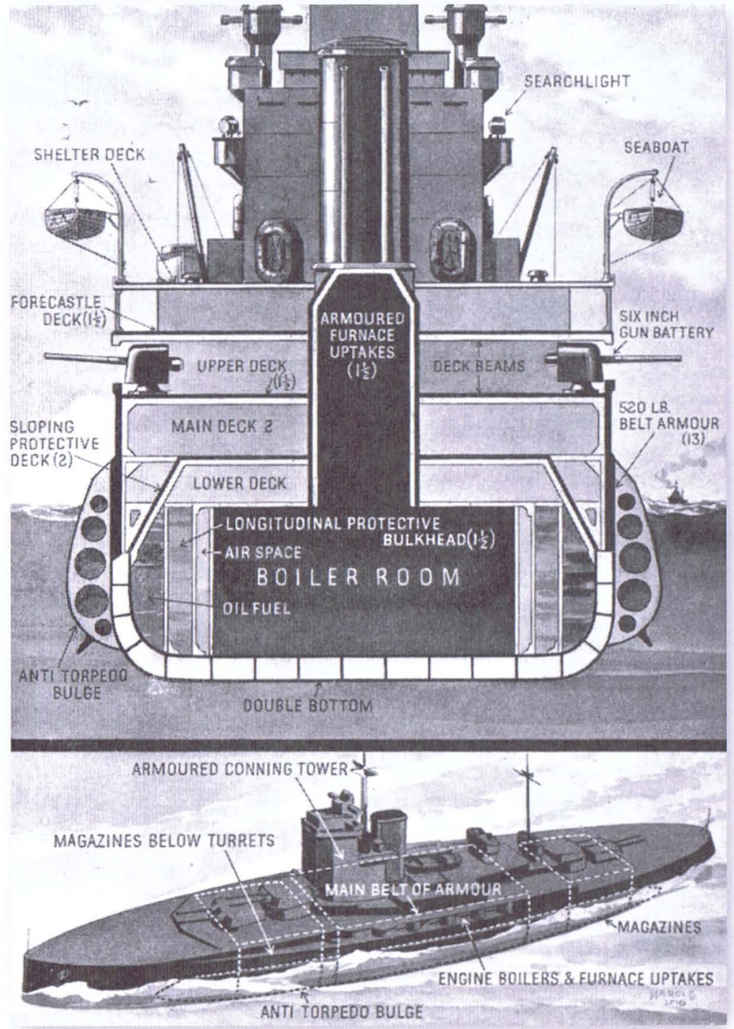
Ship	Builder	Laid Down	Launched	Commissioned	Fate
Ramillies	Beardmore Shipyard, Clydebank	12 November 1913	12 September 1916	September 1917	Broken up 1948
Resolution	Palmer's Shipyard, Jarrow, Tyneside	29 November 1913	14 January 1915	December 1916	Broken up 1948
Revenge	Vickers Shipyard, Barrow-in-Furness	22 December 1913	29 May 1915	March 1916	Broken up 1948
Royal Oak	Devonport Dockyard	15 January 1914	17 November 1914	May 1916	Sunk by U-boat 14 October 1939
Royal Sovereign	Portsmouth Dockyard	15 January 1914	29 April 1915	May 1916	Broken up 1949
Renown	Palmers Shipyard, Clydebank	–	–	–	Re-designed as a battlecruiser 1914
Repulse	John Brown Shipyard, Clydebank	–	–	–	Re-designed as a battlecruiser 1914
Resistance	Devonport Dockyard	–	–	–	Cancelled August 1914

Before the cost restrictions were imposed, Tennyson envisioned a ten-gun battleship, with two twin and two triple turrets. This idea was rejected due to a lack of experience in the design of these larger turrets. A return to five twin turrets was also rejected, leaving him with an arrangement similar to the earlier fast battleships, with eight 15in guns, in four twin turrets. The requirement to be able to use both fuel types was eventually abandoned, and so these ships – originally dubbed the *Revenge* class – were finally powered by fuel oil alone. This change had been made after construction began, and was the result of lobbying by Fisher, who returned to his post as First Sea Lord following the outbreak of war.

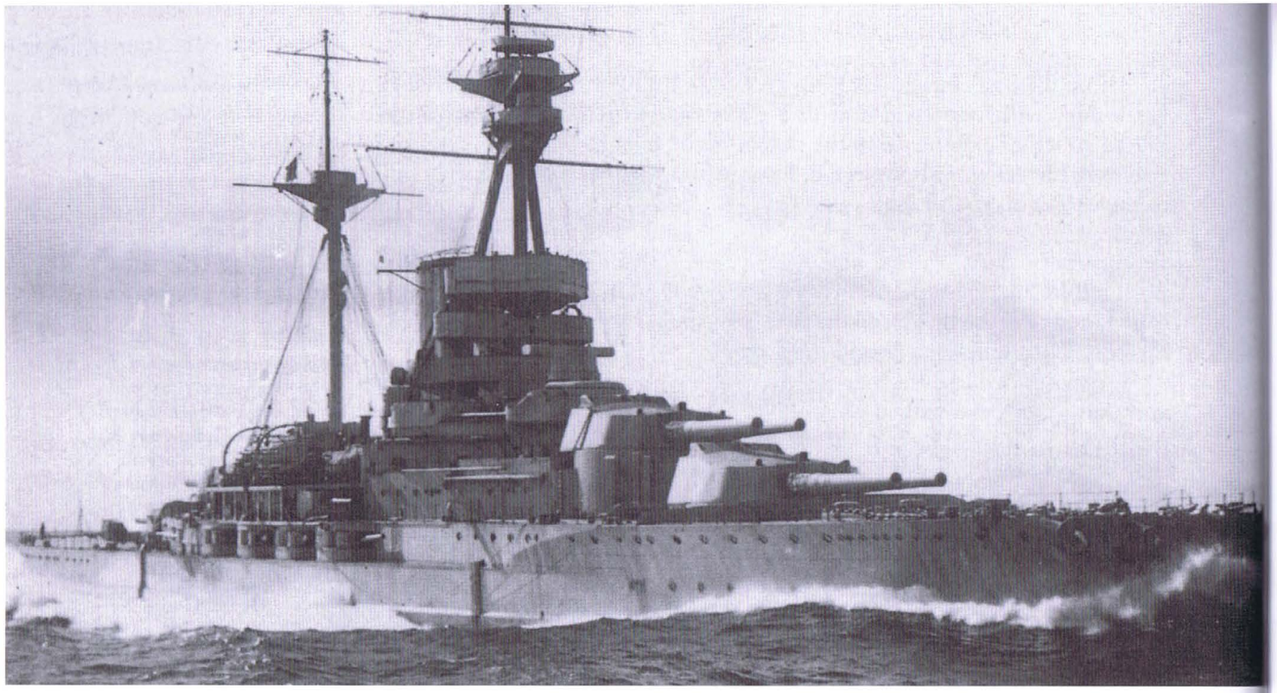
The most obvious difference between the two classes of 15in gun battleships was that the later ships had one funnel, and were slightly smaller than their predecessors. However, thanks to improvements in their armoured protection they actually had a marginally heavier displacement than the vessels of the *Queen Elizabeth* class. They were also 20ft shorter, and had a slightly narrower beam. The major saving was in propulsion – these vessels were equipped with 18 boilers, serving direct-drive turbines, which gave the battleships a top speed of 21 knots. This made them slower than Watts' fast battleships, but similar in speed to the rest of the British battlefleet.

They were less stable than previous super-dreadnoughts, and so the vessels were prone to leaning excessively when turning. Nevertheless, Tennyson's protective scheme was substantial, and the waterline belt armour extended 5ft below the waterline, and had a uniform thickness of 13in. This armoured belt also extended all the way to the main deck, and while it narrowed to just 1in towards the bow and the stern, the degree of armoured protection was actually superior to the protection afforded the *Queen Elizabeth* class vessels.

The original Programme called for the building of eight battleships in this class, but by the time World War I began only five had actually been laid down. The Admiralty immediately stopped the production of any more capital ships, and one of these cancelled contracts was the *Resistance*,



This diagram was designed to explain to wartime naval recruits how armour protected a battleship from enemy fire. This cross section of a *Royal Sovereign* class battleship shows very clearly how the belt armour and anti-torpedo bulges protected the hull sides, while deck armour located beneath the superstructure helped to safeguard the battleship from plunging fire.



HMS *Revenge*, photographed during exercises held off Orkney in early 1917. She joined the Grand Fleet in time to participate in the Battle of Jutland in May 1916, when she fired her guns in anger at the German battleship *König*. Her appearance is typical of the *Royal Sovereign* (or *Revenge*) class battleships before their inter-war refits.

which was due to be laid down in Devonport later that year. The two remaining ships – *Repulse* and *Renown* – were subsequently re-designed as battlecruisers. Of the five battleships already under construction, three had been laid down in late 1913, in commercial shipyards. Work began on the remaining two vessels – *Royal Oak* and *Royal Sovereign* – in the royal dockyards of Portsmouth and Devonport in January 1914.

Four of these battleships entered service in 1916 – and two of them participated in the Battle of Jutland. The commissioning of HMS *Ramillies*, built in the John Brown Shipyard in Clydebank, was delayed due to damage caused to her rudder when she was being launched, and so she only joined her sister ships in Scapa Flow in September 1917. This delay was also caused by a modification to her design. While she was being built it was decided to add anti-torpedo bulges to her hull. These were 7ft-wide compartments that ran along her waterline, and narrowed away towards bow and stern. It was soon found that these bulges helped to reduce the heeling of the ship when she turned, and consequently made the *Ramillies* a more stable gun platform than the other ships of the class. Anti-torpedo bulges were soon fitted to all the 15in gun battleships in the fleet.

The *Revenge* class (soon renamed the *Royal Sovereign* class) proved to be useful additions to the fleet, but their lack of speed was a problem. Consequently, during the inter-war years the *Queen Elizabeth* class battleships retained their value, while the slower *Royal Sovereign* class vessels became increasingly obsolete, as newer, faster battleships entered service. The naval treaties of the inter-war years saw the scrapping of much of Britain's old dreadnought fleet, but the *Royal Sovereign* class survived, largely because despite their lack of speed they still carried 15in guns. While they would be modernized, they were still essentially battleships designed for an earlier age; consequently by 1939 their value was limited, and they were relegated to secondary duties, where they were unlikely to encounter modern German, Italian or Japanese battleships on the high seas.

Construction and Armament

It has often been said that the building of a major warship represents the pinnacle of technological achievement at the time of its construction. This was certainly true in the years before the outbreak of World War I. The process of warship construction took at least two years, from the first laying down of the keel until the final commissioning ceremony. Typically, it took around a year from being laid down until the battleship was ready to be launched. The process of fitting out then took another 18 months or so, at which point the warship was handed over to the Royal Navy, who commissioned her. After around a month of crewing and taking on stores, she was ready to join the fleet.

Britain was fortunate in having at least ten private shipyards capable of undertaking the job of construction, as well as two major naval dockyards. Of these private yards, the majority were on the River Clyde near Glasgow or the River Tyne near Newcastle. Hulls were built using well-established methods of construction. After the laying of the keel a series of steel frames were erected, and this then formed the skeleton for the rest of the construction. Joints and steel plates were riveted rather than welded, although welding was used in later refits of these battleships, and in the construction of the anti-torpedo bulges.

A series of transverse watertight frames divided the ship into compartments, and while these offered a degree of watertight integrity, larger open spaces for machinery and propeller shafts tended to break up some of these compartments. Longitudinal strength was provided by stringers and beams, creating a complex but strong structure. Then came the hull sides – the armoured protection. These consisted of steel plates, secured to a teak wood backing. Steel deck plates were secured in place, leaving gaps for turrets, machinery spaces, magazine hoists and other through-deck structures.

After launching, the warship would be towed alongside a wharf, and the fitting out process would begin. This involved fitting the battleship with her boilers, turbines, propeller shafts and other parts of the propulsion systems, the securing and sealing of fuel tanks, the construction of all internal features, and of course the fitting of her armament. The 15in guns carried by these battleships, at the time of their construction, were the largest pieces of naval ordnance in the world. They were mounted in four 750-ton turrets, which

***Royal Sovereign* class**
(as built)

Displacement: 28,000 tons (standard)

Dimensions: Length: 624ft 3in overall; Beam: 88ft 6in; Draft: 28ft 6in

Propulsion: Four Parsons turbines, 18 Babcock & Wilson boilers, producing 40,000 steam horsepower

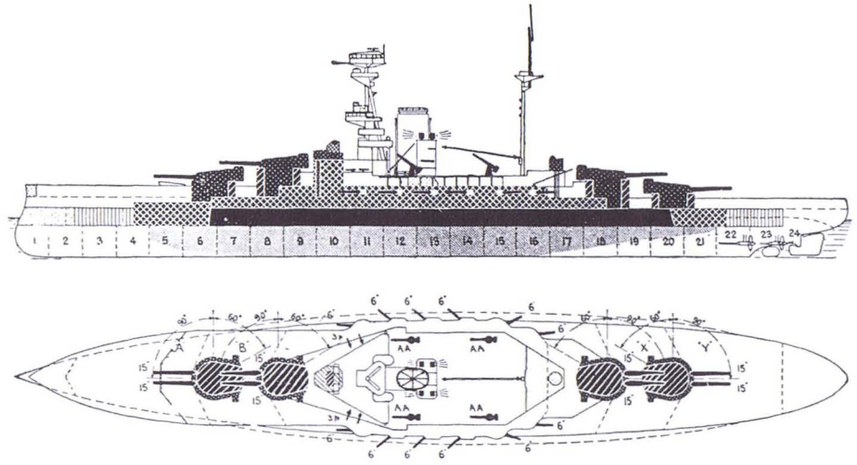
Maximum speed: 21 knots

Fuel oil capacity: 3,400 tons

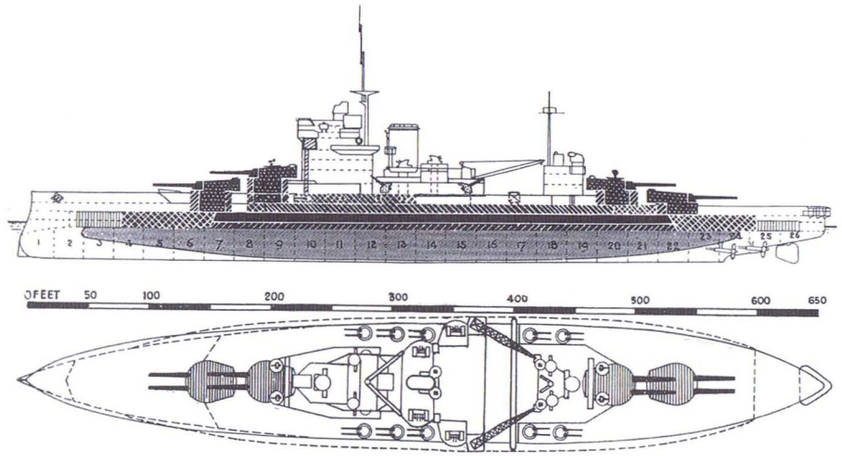
Armament: 8 x 15in Mark I BL guns, in four twin turrets; 14 x 6in guns in single casemate mounts; 2 x 3in anti-aircraft guns in single mounts; 4 x 3-pdr saluting guns in single mounts; 4 x 21in submerged torpedo tubes

Armour: Belt: 6–13in; Bulkheads: 4–6in; Barbettes: 4–10in; Turrets: 13in (on front face); Conning tower: 11in; Decks: 1–3in

Complement: 997 officers and men



The distribution of protective armour of a *Royal Sovereign* class battleship, as portrayed in a wartime copy of *Jane's Fighting Ships*. Protection was concentrated in the belt, and its thickness diminished dramatically at both ends. Additional armour protected the turrets, conning tower and secondary gun positions.



The armour of a *Queen Elizabeth* class battleship, delineated in *Jane's Fighting Ships*. The concentration of protection in armoured belts was augmented during the inter-war years by increasing the thickness of deck armour. This offered extra protection against plunging fire.

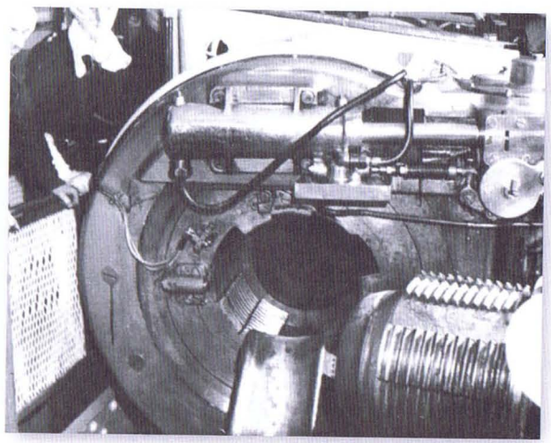
were usually fabricated elsewhere, then transported to the shipyard for installation. Once all this was completed, the ship would be commissioned and following acceptance trials the builders would officially hand her over to her new crew.

Building the first of these 15in gun battleships was a major risk for the Admiralty, as there was no guarantee that when the time came for commission, the guns themselves would be ready. The Elswick Ordnance Company, however, assured Sir Philip Watts that the guns would be designed, tested and ready in time. In effect, the guns were rushed into production. Yet such was the confidence of Rear Admiral Moore, Director of Naval Ordnance, that his only stipulation to Elswick was that they would have one gun made available four months before the rest, to allow the Navy to learn how to operate it in time to train up the crews.

The guns were ready in time, and they proved a resounding success. Their construction had been veiled by secrecy – in all official documents they were referred to as '14-inch experimental guns' in an effort to confound enemy spies. The guns themselves were a masterpiece of engineering, built by winding some 170 miles of steel wire over a rifled tube. Each barrel weighed around 100 tons, and was over 54ft long, and at Jutland it was discovered that they could accurately fire a 15in shell at enemy ships over 19,000 yards (17 nautical miles) away, at their maximum elevation of 20 degrees.

BELOW
The crew of a port 15in gun in one of the turrets of HMS *Warspite*, waiting for the order to commence firing. Gun crews wore protective anti-flash hoods and gloves while working inside the turret.

BELOW RIGHT
The breech of a port 15in gun on a *Queen Elizabeth* class battleship. On the left is the gun loading and hoist control position. The loading process was mechanical, and both shell and charge were moved into place by a loading arm.



Even more importantly, during their service life these guns were improved, as was the propellant and the shells themselves, and by 1939 most of the 15in gun battleships were capable of elevating their guns to 30 degrees, which meant that range was increased. During the Battle of Calabria in July 1940, HMS *Warspite* succeeded in hitting the Italian battleship *Giulio Cesare* at a range of 26,000 yards (12.8 nautical miles). The effectiveness of this gun, and the proof of Rear Admiral Moore's faith in it, was the fact that it still posed a lethal threat to modern enemy capital ships after quarter of a century of service.

15in Breech Loader, Mark I			
Calibre:	15in	Rate of fire:	Two rounds per minute
Date of design:	1912	Weight of shell:	1,938lb
Date first in service:	1915	Shell types:	High-explosive; armour-piercing
Length of bore:	42 calibres (630in)	Weight of propellant charge:	490lb ('super charge')
Length of barrel:	650in	Muzzle velocity:	2,575fps
Weight of gun:	100 tons	Maximum range:	36,500 yards (after 1934)
Mounting:	Twin Mark I N (1934 Modification)	Ammunition storage per gun:	100 rounds
Maximum elevation:	30 degrees (after 1934)	Estimated barrel life before replacement:	335 rounds

Range and Penetration (given for armour-piercing shells)

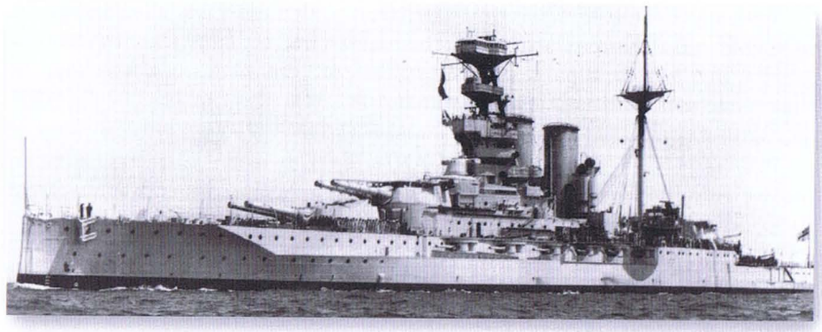
Gun elevation	Range	Strike velocity (feet per sec)	Angle of descent	Flight time
2.5 degrees	5,000 yards	2,312fps	2.5 degrees	6 seconds
5 degrees	10,000 yards	2,063fps	5 degrees	13 seconds
8 degrees	15,000 yards	1,852fps	10 degrees	21 seconds
12 degrees	20,000 yards	1,683fps	15 degrees	30 seconds
16 degrees	25,000 yards	1,560fps	22 degrees	40 seconds
21.5 degrees	30,000 yards	1,497fps	30 degrees	51 seconds
28 degrees	35,000 yards	1,496fps	38 degrees	65 seconds
30.25 degrees	36,500 yards	1,507fps	41 degrees	70 seconds

Service Modifications

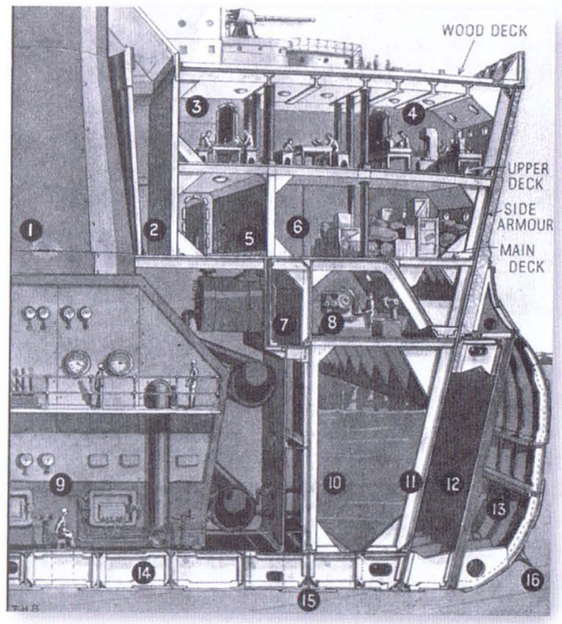
When these battleships entered service, they began long and illustrious naval careers, many of which lasted for more than 30 years. It was therefore inevitable that they would be modified over time in an attempt to maintain their value to the Navy. Consequently, all these battleships underwent quite extensive refits during their careers, while at other times weapons systems or equipment were added, removed or moved around. These alterations fell into three broad groups. The first were the alterations made during World War I, many of which came about as a result of the lessons learned at the Battle of Jutland, or as a reaction to the growing threat posed by aircraft and submarines. This was followed by the major 'half life' refits of the 1920s, when the battleships underwent extensive modifications to their propulsion systems and their appearance.

Next, the *Queen Elizabeth* class battleships all underwent an even more extensive refit during the 1930s, which in many cases involved a complete redesign of superstructure, marked improvement to armament and fire

RIGHT
HMS *Barham*, photographed during the early 1920s, before her 1924 refit. All of the *Queen Elizabeth* class fast battleships looked similar to her before their first round of refits. Note the flying-off platforms mounted on top of 'B' and 'X' turrets.



BELOW
This partial cross section of a *Queen Elizabeth* class battleship provides us with a clear indication of how the anti-torpedo bulge and the belt armour protected the vessel from torpedoes and shells.
1: Funnel
2: Air space
3–4: Mess spaces & workshops
5: Passageway
6: Stores
7: Airlock
8: Auxiliary machinery space
9: Boiler room
10: Fuel oil
11: Protective longitudinal bulkhead
12–13: Torpedo bulge compartments
14: Double bottom
15: Docking keel
16: Bilge keel

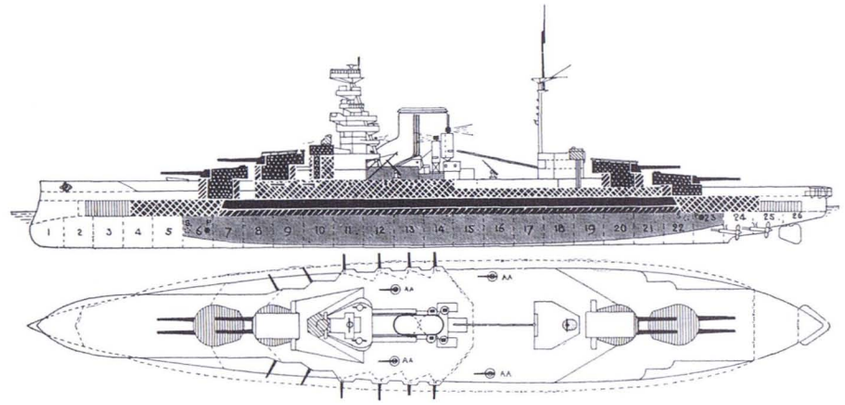


control, and a reinforcement of armoured protection. These changes meant that when Britain entered World War II in September 1939, the majority of the battleships had been fully modernized, and were able to participate in the naval struggle that lay ahead. Finally, the ships were almost all damaged at some stage during the war, and two were actually lost to enemy action. The battleships that remained all underwent modifications as the war progressed, mainly involving the increase of anti-aircraft armament, or the introduction of improved fire control and radar systems. In other words, the appearance and effectiveness of these battleships changed throughout their careers, and throughout World War II.

Queen Elizabeth class modifications

The first modifications began before most of the ships even joined the fleet. It was found that the after 6in casemate guns fitted to *Queen Elizabeth* were difficult to use, so four were removed, and of these, two were re-sited as deck guns, on either side of the shelter deck. The other four battleships incorporated this modification before they entered service. Other wartime changes to the class included the strengthening of deck armour, to protect against plunging fire, with an additional 1in of plate added above the magazines. 'Flying-off platforms' for spotter planes were added to the tops of 'B' and 'X' turrets, while improvements were also made to the suite of searchlights and the gunnery direction equipment.

Warspite was the first battleship of her class to undergo a major refit (1924–25), when anti-torpedo bulges were added and her twin funnels were trunked together into a single large stack, with a distinctive curve along its forward edge. Four 4in anti-aircraft guns were added, her anachronistic submerged torpedo tubes were removed and her fire control systems were improved. *Malaya* underwent the same modifications in 1924–26, followed by *Valiant* (1925–26) and *Queen Elizabeth* (1926–27). Flying-off platforms were added or removed seemingly at will during the following decade, and light anti-aircraft guns were further additions, but otherwise these ships remained largely unaltered for a decade.

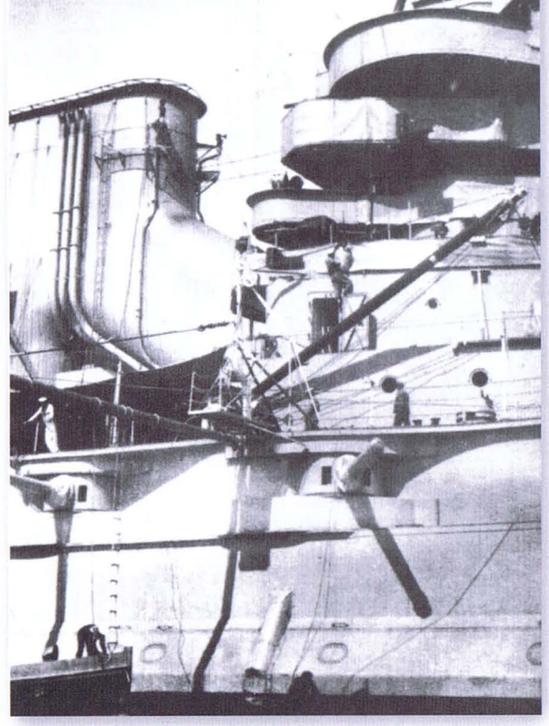


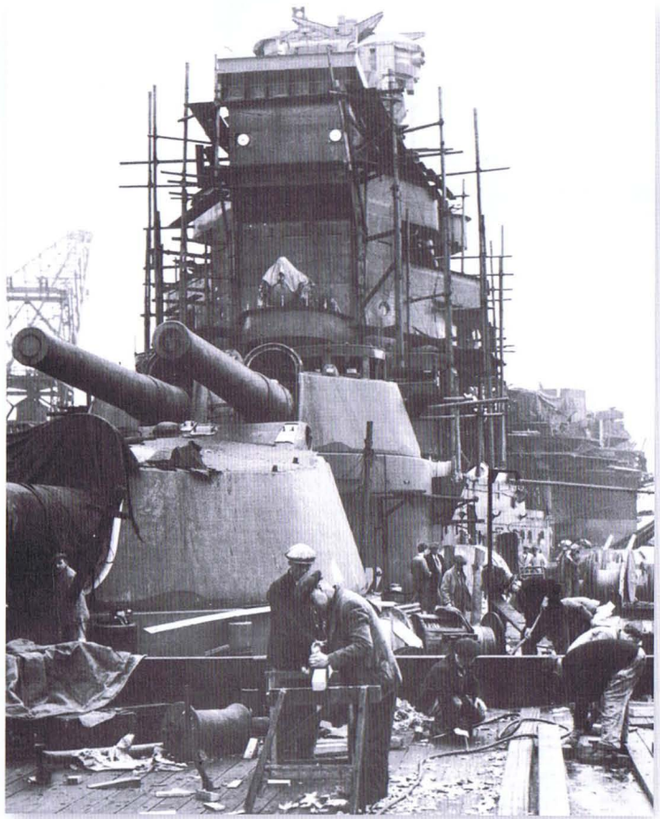
The armoured protection of HMS *Barham*, as seen in *Jane's Fighting Ships*. Her bridge structure was unarmoured, as were her bow and stern. She remained the least modified of all the *Queen Elizabeth* class battleships by the time the war began in September 1939.

The inter-war funnel and bridge arrangement of HMS *Warspite*, in a detail from a photograph showing how she looked in the late 1920s. In 1934–36 the battleship underwent another extensive modernization, during which the appearance of both her superstructure and funnel were heavily altered.

Four of the five *Queen Elizabeth* ships were extensively modified during the 1930s. The exception was *Barham*, which only underwent her first major refit in 1931–34. Anti-torpedo bulges were fitted, her armour was increased by 5in over her magazines and 6in over her casemates, while in 1938 four 4in guns in twin mountings were added in lieu of her existing 4in pieces. Otherwise, she retained her inter-war appearance until her loss in November 1941. However, all her sister ships underwent far more extensive modifications. *Warspite* and *Malaya* endured a major refit in 1934–36, *Valiant* in 1937–39 and *Queen Elizabeth* in 1937–41. In the process, the superstructure of *Warspite* was removed and her forward super-structure replaced by a gas-proof 'citadel', a block-like structure based on those fitted to the new *Nelson* class battleships. This citadel was also fitted to the *Queen Elizabeth* and *Valiant*. *Malaya* received an improved forward superstructure, but in effect it looked little different from the previous assemblage.

Other improvements included the significant increase of deck armour, the replacement of boilers and turbines, the alteration of main armament to permit a gun elevation of 30 degrees, and the upgrading of anti-aircraft armament. This last improvement involved the replacement of 4in anti-aircraft guns. In *Warspite* and *Malaya* four 4in guns in twin mounts were added, but in *Queen Elizabeth* and *Valiant* the modification was even more extensive. In both vessels the secondary armament of 6in guns was removed, and the casemates plated over. In their place went 20 4.5in dual-purpose guns, capable of engaging both ships and aircraft. They were mounted in ten twin turrets, five countersunk into the deck on each beam. *Warspite* also had her fore and aft 6in guns removed on each





HMS *Queen Elizabeth*, photographed during her pre-war refit in Portsmouth Dockyard (1937–41). One major feature of this refit was the increase of elevation of her main armament to 30 degrees. In this photograph, the raised gun mantle on 'B' turret is clearly visible.

beam, which meant she now carried eight 6in casemate guns, while *Barham* and *Malaya* still carried 14 6in guns apiece.

Light anti-aircraft guns were fitted, each battleship receiving four eight-barrelled 2-pdr 'pom-poms' and two quad-mounted machine guns. Other improvements included the installation of a new High Angle Control System (HACS) capable of directing anti-aircraft fire for both the heavy and the light anti-aircraft guns. Finally, all flying-off platforms were removed, and replaced by transverse catapults that straddled the shelter deck and a hanger capable of holding up to four aircraft. For the most part these were Fairey Swordfish seaplanes, although *Queen Elizabeth* operated Supermarine Walrus seaplanes after she completed her major refit.

This period of upgrade was the last major refit before the outbreak of World War II. In fact, the *Valiant* was still completing her refit when the war began, although she rejoined the fleet in late November 1939. *Queen Elizabeth* only completed her refit in late January 1941, as work had to be delayed when she was towed from Portsmouth to Rosyth on the Firth of Forth, in an attempt to keep her out of range of German bombers. All five fast battleships of the *Queen Elizabeth* class were modified during the war, and a list of these alterations is given below. However, these pre-war refits meant that when the war began, they were all considered first-line capital ships, capable of taking on the more modern battleships of the German Kriegsmarine, or the Italian Supermarina.

B

HMS *VALIANT* OFF SALERNO, 16 SEPTEMBER 1943

A veteran of the Battle of Jutland, HMS *Valiant* was extensively modified shortly before the outbreak of World War II. She saw service off Norway in 1940, and then took part in the attack on the French fleet at Mers-el-Kébir before joining the Mediterranean Fleet. In May 1941 she was damaged during an air attack of Crete, and she was damaged again in December, during the Italian midget submarine raid on Alexandria. After being repaired in Durban she served with the Eastern Fleet and Home Fleet, before returning to the Mediterranean in the summer of 1943.

On 15 September (D+6) she and her sister ship HMS *Warspite* provided naval gunfire support during the amphibious landings at Salerno, the *Warspite* supporting the American sector, and the *Valiant* assisting the British on the northern flank of the beachhead. The bombardment continued the following day, but on the afternoon of 16 September the fleet was subjected to an air attack, during which the *Warspite* was hit by a German glider bomb. Despite the obvious danger, HMS *Valiant* continued to support the troops until nightfall, when she steamed away to safety under cover of darkness. The plate shows the *Valiant* as she would have looked that afternoon, firing her 15in guns at enemy targets around the town of Nocera, between Salerno and Naples.

The *Queen Elizabeth* class battleships at the outbreak of World War II

HMS *Queen Elizabeth*, HMS *Valiant*

Displacement: 31,795 tons (standard)
Dimensions: Length: 645ft 9in overall; Beam: 90ft 6in; Draft: 28ft 9in
Propulsion: 4 Parsons turbines, 8 Admiralty boilers, producing 80,000 team horsepower
Maximum speed: 24 knots
Fuel oil capacity: 3,400 tons
Armament: 8 x 15in Mark I BL guns, in 4 twin turrets; 20 x 4.5inch DP guns in 10 twin turrets; 4 x 8-barrelled 2-pdr 'pom-poms'; 4 x quad machine guns
Aircraft: 2 Walrus seaplanes, 1 double-ended steam catapult
Armour: Belt: 6–13in; Bulkheads: 4–6in; Barbettes: 4–10in; turrets: 13in (on front face); Conning tower: 11in; Decks: 1–5in
Complement: 950 officers and men

HMS *Warspite*

Displacement: 31,315 tons (standard)
Dimensions: Length: 645ft 9in overall; Beam: 90ft 6in; Draft: 28ft 9in
Propulsion: 4 Parsons turbines, 6 Admiralty boilers, producing 80,000 steam horsepower
Maximum speed: 24 knots
Fuel oil capacity: 3,400 tons
Armament: 8 x 15in Mark I BL guns, in 4 twin turrets; 8 x 6in guns in single casemate mounts; 8 x 4in anti-aircraft guns in twin mounts; 4 x 8-barrelled 2-pdr 'pom-poms'; 4 x quad machine guns
Aircraft: Two Walrus seaplanes, one double-ended steam catapult
Armour: Belt: 6–13in; Bulkheads: 4–6in; Barbettes: 4–10in; Turrets: 13in (on front face); Conning tower: 11in; Decks: 1–5in
Complement: 950 officers and men

HMS *Barham*, HMS *Malaya*

Displacement: 27,940 tons (standard)
Dimensions: Length: 645ft 9in overall; Beam: 90ft 6in; Draft: 28ft 9in
Propulsion: 4 Parsons turbines in *Malaya* (Brown & Curtis turbines in *Barham*), 24 Babcock & Wilson boilers in *Malaya* (Yarrow boilers in *Barham*), producing 56,000 steam horsepower
Maximum speed: 23 knots
Fuel oil capacity: 3,400 tons
Armament: 8 x 15in Mark I BL guns, in 4 twin turrets; 14 x 6in guns in single casemate mounts; 8 x 4in anti-aircraft guns in twin mounts; 4 x 8-barrelled 2-pdr 'pom-poms'; 4 x quad machine guns
Aircraft: 2 Walrus seaplanes, 1 double-ended steam catapult
Armour: Belt: 6–13in; Bulkheads: 4–6in; Barbettes: 4–10in; Turrets: 13in (on front face); Conning tower: 11in; Decks: 1–5in
Complement: 950 officers and men

Wartime Modifications

HMS *Queen Elizabeth*

September 1942–June 1943: Quad machine guns removed. 1 single and 4 twin 20mm guns added.
October 1943: 16 twin 20mm guns added.

HMS *Warspite*

August–December 1941: Quad machine guns removed. 13 single 20mm guns added. Type 271, 281 and 284 radars fitted.
January 1942: Fairey Swordfish replaced by Supermarine Walrus seaplanes.
June 1942: 2 single 20mm guns added. Type 271 radar replaced by Type 273.
May–June 1943: Aircraft facilities removed. 1 single 20mm gun added.
June 1944: Remaining 6in guns removed, and casemates plated over. 4 single 20mm guns replaced by twin 20mm guns. Type 284 radar replaced by Type 274. 15 single 20mm guns added.

HMS *Valiant*

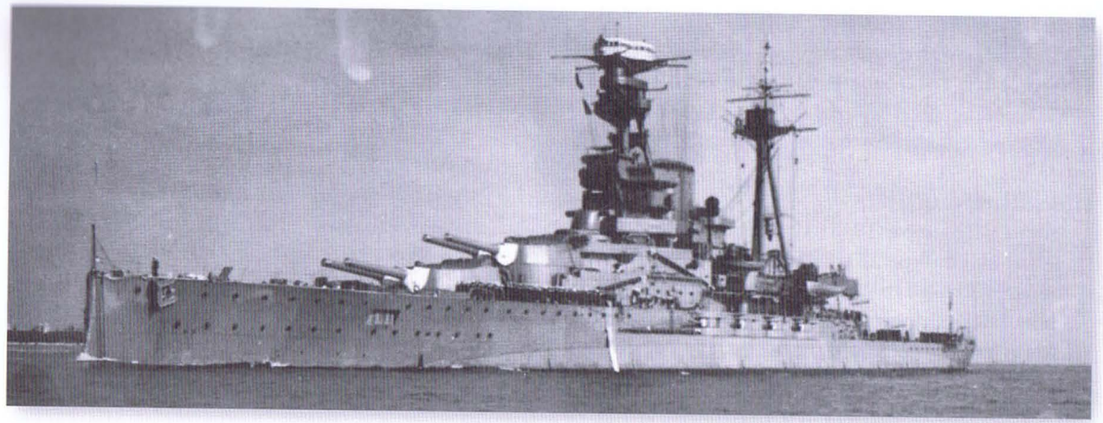
December 1939: Type 279 radar fitted.
March 1942: Fairey Swordfish replaced by Supermarine Walrus seaplanes.
April–July 1942: 10 single 20mm guns added. Type 279 radar replaced by Type 273, 281, 282, 284 and 285.
March–April 1943: Quad machine guns removed. 15 single and 6 twin 20mm guns added. Aircraft facilities removed. Type 284 radar replaced by Type 274.
February–May 1943: 10 single 20mm guns added.
July-August 1944: 20 single 20mm guns removed, and replaced by 6 8-barrelled and 2 4-barrelled 2-pdr 'pom-poms', and 12 single 40mm guns.

HMS *Malaya*

July 1941: Quad machine guns removed. 11 single 20mm guns added. Type 281, 282, 284 and 285 radars fitted.
October 1941: Fairey Swordfish replaced by Supermarine Walrus seaplanes. Remaining torpedo tubes removed. Deck armour increased to 5in over magazines, and 3.5in over engines.
September 1942: 4 single 20mm guns added.
October–December 1942: Aircraft facilities removed. 2 twin 4in guns added. 2 8-barrelled 2-pdr 'pom-poms' added. 2 single 20mm guns added.
January 1943: 2 single 20mm guns added.
September 1943: Remaining 6in guns removed, and casemates plated over. 20 single 20mm guns added.
March 1944: 8 single 20mm guns added.

HMS *Barham*

January–April 1940: 2 quad machine guns added. 2 8-barrelled 2-pdr 'pom-poms' added.
July 1941: Fairey Swordfish replaced by Supermarine Walrus seaplanes.



HMS *Royal Oak*, shortly before the outbreak of World War II. The line of her anti-torpedo bulge, which was added during her 1922–24 refit, is clearly visible above her waterline. These protective features were of a slightly different design from those of her sisters, as they lacked the steel tubes that filled much of the bulge space in her consorts. The bulges were unable to prevent her from sinking in October 1939.

Royal Sovereign class modifications

The *Royal Sovereign* class ships never underwent the extensive refits that allowed the *Queen Elizabeth* class battleships to maintain their status as frontline capital ships. While they were all refitted during the 1920s, the propulsion systems of these battleships were hardly altered, which meant that these battleships became increasingly unable to keep up with the rest of the battlefleet. All of these vessels received minor modifications during the course of World War I, however. The most significant of these improvements was the addition of an extra 1in of deck armour over the magazines. In addition, flying-off platforms were fitted to 'B' and 'X' turrets.

During the early 1920s, all of the five battleships in this class underwent their first refit. *Ramillies*, *Resolution* and *Revenge* already had basic anti-torpedo bulges fitted to them, and these were added to *Royal Sovereign* in 1920–21 and to the *Royal Oak* in 1922–24, the latter benefiting from a slightly improved design of torpedo protection. Between 1924 and 1927, all five battleships had their anti-aircraft armament increased, first by replacing the two single 3in guns with two single 4in pieces, and then augmenting them with two additional 4in guns. At the same time, the pair of 6in guns mounted in casemates on the upper deck was removed, leaving the battleships with six 6in casemate guns on each beam. In 1924 a funnel cap was added to the *Resolution*.

C

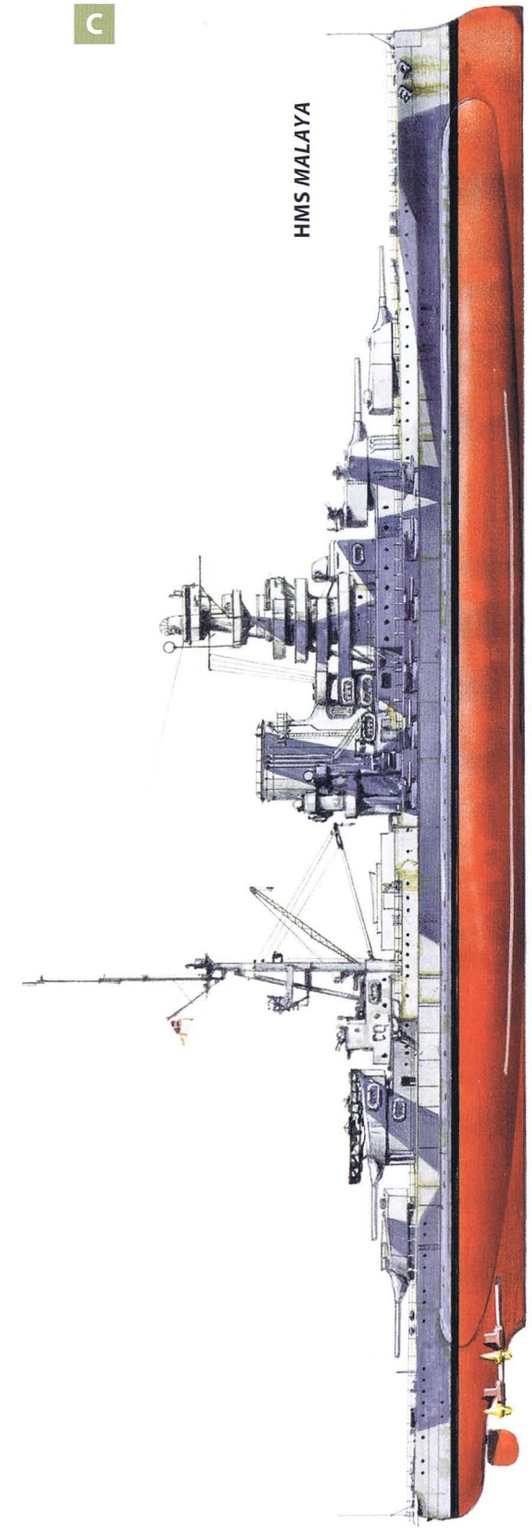
HMS *MALAYA* (1943) AND HMS *BARHAM* (1941)

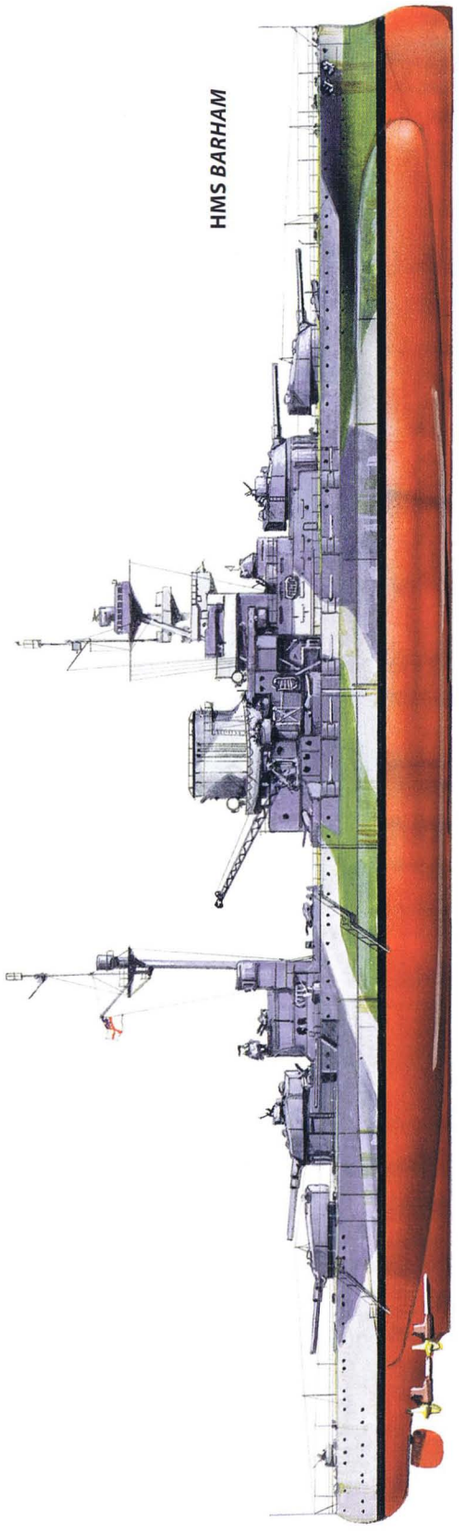
While all five battleships of the *Queen Elizabeth* class were modified extensively during the inter-war years, HMS *Barham*'s and HMS *Malaya*'s upgrades were essentially completed by 1938. They therefore retained their inter-war appearance throughout their wartime careers.

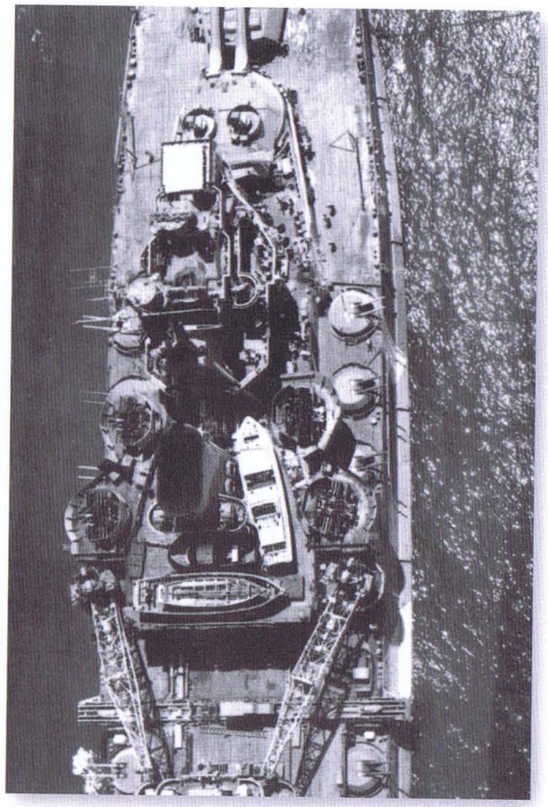
Taking her name from the Federated Malay States who paid for her, HMS *Malaya* was already a battle-hardened veteran in 1939, having fought at Jutland in 1916. She served with 'Force H' in the Mediterranean until March 1941, when she was torpedoed and badly damaged by *U-106*. After extensive repairs in New York Navy Yard she returned to the fray, serving as an escort for the Malta convoys. Her catapult and aircraft were removed in 1942 to make room for extra anti-aircraft guns, and in 1943 she returned to Britain, where she was placed in reserve until a brief return to service in support of the D-Day landings in 1944.

HMS *Barham* was another veteran of Jutland, and she too formed part of 'Force H', based in Gibraltar. She saw action against the Vichy French fleet at Mers-el-Kébir and Dakar, and against the Italians off Cape Matapan. However, her luck ran out in November 1941, when she was torpedoed by *U-331* off the Egyptian coast. She sank within minutes, and blew up as she capsized, taking most of her crew down with her.

C







ABOVE
The forecastle of HMS *Royal Oak*, shortly before the outbreak of World War II. The director tower at the front of her tripod foremast is clearly shown, the same tower that still stands sentinel over the wreck of the battleship in Scapa Flow.

ABOVE RIGHT
An aerial view of the forward superstructure of HMS *Queen Elizabeth*, pictured as she left the Philadelphia Naval Yard in October 1943, after an extensive refit. This view highlights the substantial number of heavy and light anti-aircraft guns that protected the ship during the later years of World War II.

The ageing battleships survived the paring down of the fleet during the 1920s. More than any other reason, they were retained because of their still-powerful armament and a lack of money to replace them. Another round of refits between 1931 and 1934 saw the removal of all submerged torpedo tubes, the replacement of flying-off platforms with a catapult mounted on 'X' turret (designed to operate the Fairey Swordfish floatplane) and the introduction of light anti-aircraft defences in the form of two 8-barrelled 2-pdr 'pom-poms' and two quadruple machine guns. *Revenge* never received a catapult when her flying-off platforms were removed. The catapult fitted to *Royal Sovereign* was removed in 1936, but was never replaced. The catapult was also removed from *Ramillies* in 1938.

Other modifications made during the 1930s included improvements to bridge structures, and the replacement of fire control and HACS directors with more modern versions. The only battleship of the class to undergo a more extensive refit was the *Royal Oak* (1934–36), which had her deck armour strengthened by 4in over her magazines, and 2.5in over her engine rooms. She also had two twin 21in torpedo tubes fitted, one on either beam. During this refit her four single 4in guns were replaced by four twin 4in guns in Mark XIX mounts, which greatly improved her heavy anti-aircraft capability. The same guns replaced the earlier single 4in pieces in all of her four sister ships in 1938–39. At the same time, a funnel cap was fitted to the *Revenge*. By the time World War II broke out in September 1939, all five ships of the class had been modernized, but were no longer considered to be worthy of frontline duties.

The *Royal Sovereign* class battleships at the outbreak of World War II

Royal Sovereign class (1939)

Displacement: 28,417 tons (standard)
Dimensions: Length: 624ft 3in overall; Beam: 88ft 6in beam; Draft: 28ft 6in
Propulsion: 4 Parsons turbines, 18 Babcock & Wilson boilers, producing 40,000 steam horsepower
Maximum speed: 21 knots
Fuel oil capacity: 3,400 tons
Armament: 8 x 15in Mark I BL guns, in 4 twin turrets; 12 x 6in guns in single casemate mounts; 4 x 4in anti-aircraft guns in twin mounts; 2 x 8-barrelled 2-pdr 'pom-poms'; 2 x quad machine guns. In addition Royal Oak carried 2 x twin 21in torpedo launchers
Aircraft: 1 Fairey Swordfish floatplane, 1 single-ended steam catapult on 'X' turret (Note: only carried on *Resolution* and *Royal Oak*)
Armour: Belt: 6–13in; Bulkheads: 4–6in; Barbettes: 4–10in; Turrets: 13in (on front face); Conning tower: 11in; Decks: 1–4in (1–6in on *Royal Oak*)
Complement: 997 officers and men.

Wartime Modifications

Royal Sovereign

December 1939: Funnel cap added.
May–June 1941: Quad machine guns removed. 10 single 20mm guns added.
August–October 1941: 2 quadruple 2-pdr 'pom-poms' added.
January–October 1943: Deck armour increased to 6in over magazines. 14 single and 6 twin 20mm guns added. 2 forward 6in casemate guns removed. Type 273, 279, 282, 284 and 285 radars fitted.

Revenge

July–August 1941: Quad machine guns removed. 10 single 20mm guns added. 2 quadruple 2-pdr 'pom-poms' added. Type 279 and 285 radars fitted.
September 1943: 2 forward 6in casemate guns removed.
May 1944: All 8 15in guns removed.
March 1945: All light anti-aircraft guns removed.

Royal Oak

No modifications were made before she was lost in action on 14 October 1939.

Resolution

April–September 1941: Quad machine guns removed. 9 single 20mm guns added. Type 279 and 285 radars fitted.
March–April 1942: Deck armour increased to 6in over magazines. 1 single 20mm gun added. 2 quadruple 2-pdr 'pom-poms' added. Type 284 and 273 radars fitted.
September–October 1943: 2 forward 6in casemate guns removed.
June 1944: Catapult removed.
March 1945: All 8 15in guns removed. Light anti-aircraft guns removed.

Ramillies

December 1940–January 1941: Quad machine guns removed. 10 single 20mm guns added. 2 quadruple 2-pdr 'pom-poms' added.
September 1942–June 1943: Type 273, 279, 282, 284 and 285 radars fitted.
March 1944: 3 single 20mm guns added.

D HMS *WARSPITE* (1943)

One of the most famous warships of World War II, HMS *Warspite* was the archetypal British battleship, taking part in every theatre of war, from the Pacific to the Mediterranean and home waters.

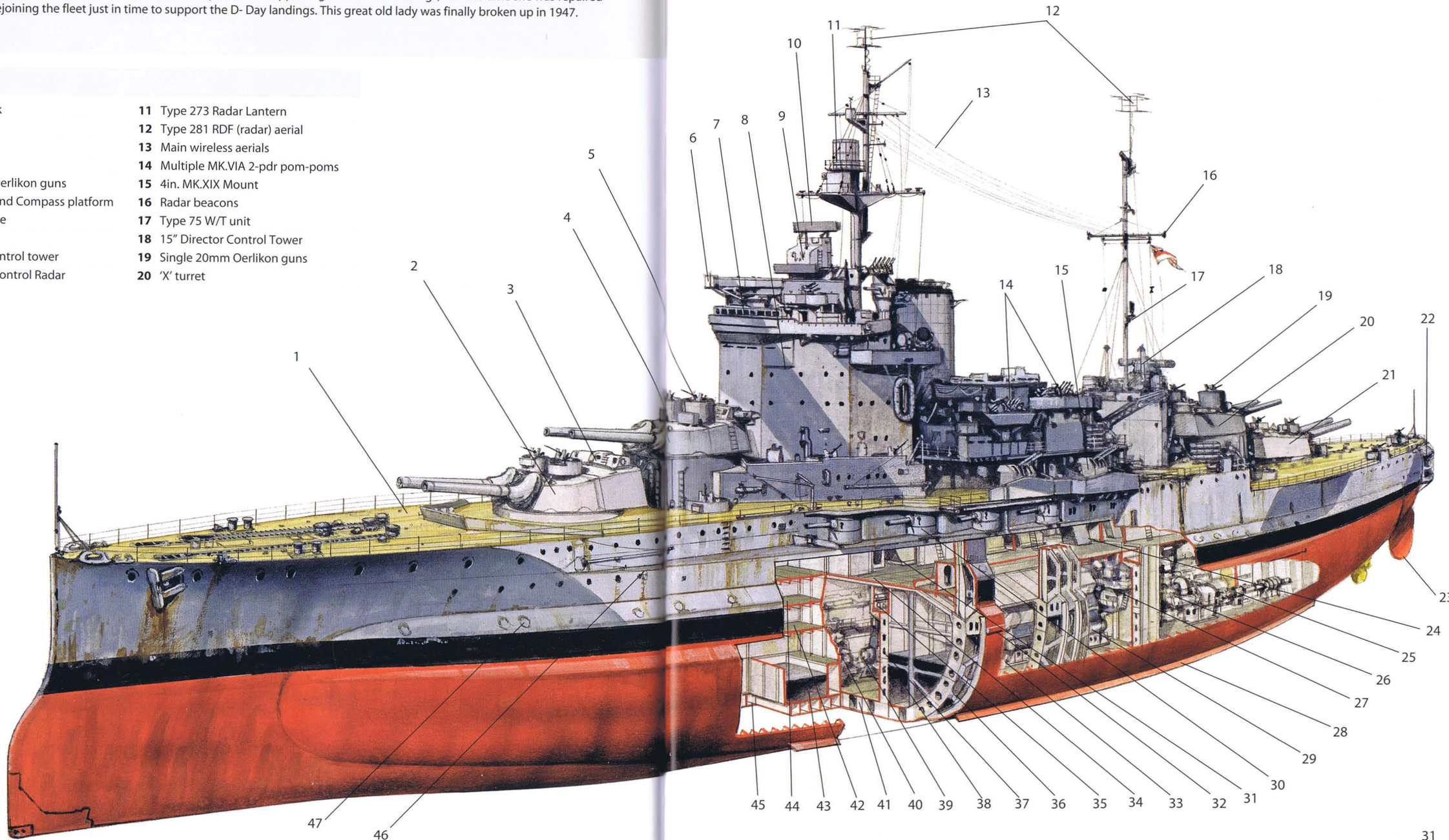
She entered service in 1915, just in time to take part in the Battle of Jutland (1916), and for the next three decades she served the Royal Navy with distinction. In 1939 she joined the Home Fleet, and in April 1940 she led the British naval attack on Narvik (Second Battle of Narvik), which resulted in the annihilation of eight German destroyers. She was then transferred to the Mediterranean, and in July 1940 she was in action again, engaging the Italian navy at the Battle of Calabria. In March 1941 she played a major part in the British victory at the Battle of Matapan, but two months later she was damaged by a German bomb off Crete. After extensive repairs in the United States she joined the Eastern Fleet, and served in the Pacific until early 1943. She was damaged again later that year while supporting the Salerno landings, but this time she was repaired in Britain, rejoining the fleet just in time to support the D- Day landings. This great old lady was finally broken up in 1947.

KEY

1 Forecastle deck
2 'A' turret
3 Rangefinder
4 'B' turret
5 Single 20mm Oerlikon guns
6 Upper bridge and Compass platform
7 Admiral's bridge
8 Conning tower
9 15" Director Control tower
10 Type 284 Fire Control Radar
11 Type 273 Radar Lantern
12 Type 281 RDF (radar) aerial
13 Main wireless aerials
14 Multiple MK.VIA 2-pdr pom-poms
15 4in. MK.XIX Mount
16 Radar beacons
17 Type 75 W/T unit
18 15" Director Control Tower
19 Single 20mm Oerlikon guns
20 'X' turret

KEY (cont.)

21 'Y' turret
22 Stern walk
23 Port rudder
24 Boiler room vent supple
25 Wing gear room
26 Wing turbine room
27 Ventilation supply
28 Bilge keel
29 No. 6 boiler
30 6in. MK.XII guns
31 Funnel hatch
32 Bulge fender
33 No. 4 boiler
34 Middle deck
35 Cable passage
36 Bulge
37 Longitudinal bulkhead
38 Oil fuel tanks
39 No. 2 boiler
40 Turbo forced draught fan
41 Double bottom bracket-type frame
42 Platform deck
43 Diesel oil tank
44 Lower deck
45 Vertical keel and centre-line bulkhead
46 Upper deck
47 Bulge manhole covers



SERVICE HISTORY, 1939–45

The *Queen Elizabeth* Class

HMS *Queen Elizabeth*

When the war began, the *Queen Elizabeth* was in Portsmouth, undergoing a major refit. Due to German bombing raids on the port, she was moved to Rosyth in the Firth of Forth in December 1940, and rejoined the fleet the following month. She was based in Scapa Flow until May 1941, when she was sent to the Mediterranean to help protect the Malta convoys. She then supported the evacuation of Crete on 28–31 May. On 19 December 1941, she was badly damaged in Alexandria Harbour by mines laid by an Italian midget submarine. Her engine rooms flooded, and she settled on the harbour bottom. After makeshift repairs, she was refloated and sent to Norfolk, Virginia, for repairs (June 1942–June 1943).

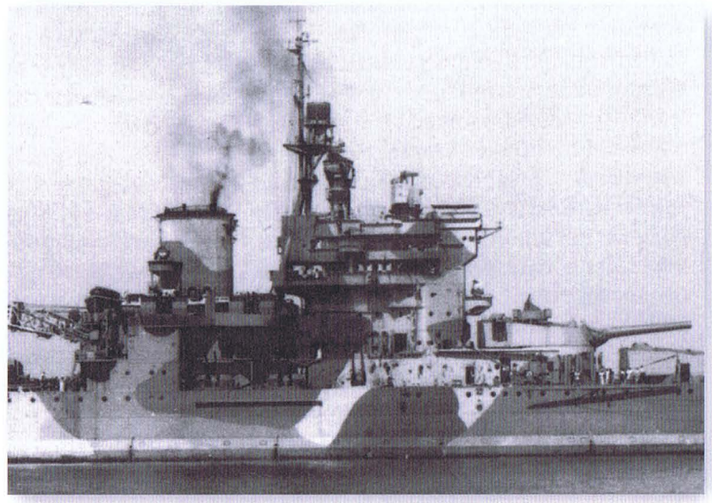
On completion of the repairs, *Queen Elizabeth* rejoined the Home Fleet, before being sent to the Far East in December 1943. She arrived in Colombo in January 1944, and spent the remainder of the war serving with the Eastern Fleet. During this period she participated in attacks on Surabaya, Sabang and the Adaman Islands, and fired in support of amphibious landings during the Arakan campaign and the capture of Rangoon. She finally returned home in August 1945, and was placed in reserve. *Queen Elizabeth* was finally paid off in May 1948, and was broken up later that summer.

HMS *Warspite*

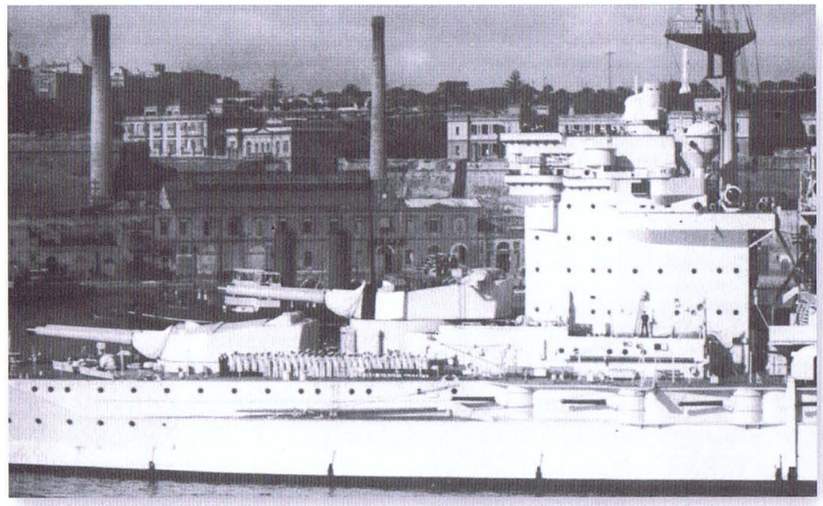
The *Warspite* began the war in Gibraltar, but after escorting a transatlantic convoy she joined the Home Fleet as its flagship in December 1939. In April 1940 she took part in the Second Battle of Narvik, sinking two German destroyers, and narrowly missed by the torpedo attack of a U-boat, which was eventually sunk by *Warspite's* Swordfish. In May she returned to the Mediterranean, and on 9 July she took part in the Battle of Calabria, when she damaged the Italian battleship *Giulio Cesare*.

In August 1940 *Warspite* bombarded Bardia, an attack she repeated the following January. In March 1941 she took part in the Battle of Matapan, which resulted in the sinking of three Italian cruisers, and on 22 May she was damaged during an air attack while covering the evacuation of Crete, causing extensive damage to her secondary batteries. After temporary repairs in Alexandria, she was properly repaired in Puget Sound, Washington State (August–December 1941), and in March 1942 she joined the Eastern Fleet.

The forward superstructure of HMS *Queen Elizabeth*, photographed in the summer of 1943 towards the end of her extensive refit in Philadelphia. *Queen Elizabeth* and *Valiant* were very similar, and could be readily told apart from their other sister ships.



After a year of relative inactivity, *Warspite* returned to Britain in May 1943, only to receive orders to sail for the Mediterranean. That summer she supported the landings on Sicily, then in September she



HMS *Warspite*, photographed as she entered Valetta Harbour in Malta, January 1938. She was fresh from her last major refit, and this photograph was taken when she first resumed active service, on the occasion of her joining the Mediterranean Fleet. It reveals the appearance of her new enclosed bridge superstructure, and the modifications made to her main armament.

participated in the Salerno landings. During this operation she was hit by a guided bomb launched from a German aircraft. She limped back to Malta, then returned to Rosyth, where she was partially repaired. In June 1944 she was back in action, supporting the Normandy landings, even though 'X' turret was inoperable. Damaged again, this time by a mine, she was patched up, then returned to the fray, firing her guns in support of the Walcheren landings in November 1944. She was then decommissioned and sent to the breaker's yard in March 1947, only to break her tow and run aground on the coast of Cornwall. The 'Grand Old Lady' was subsequently broken up where she lay.

HMS *Barham*

When the war began, *Barham* was ordered from the Mediterranean to Scapa Flow. In December 1939, however, she collided with and sank the old destroyer HMS *Duchess*, off the west coast of Scotland, then two weeks later she was torpedoed in the same area by *U-30*. Repairs took three months, and on their completion she returned to the Mediterranean, joining

HMS *Warspite*, pictured refuelling from a fleet tanker during a visit to the Seychelles in June 1942. The battleship spent a year with the Eastern Fleet, but saw no action until after her return to European waters in the spring of 1943.

HMS *Barham*, photographed during her service with the Mediterranean Fleet in the mid 1930s. She had just emerged from a major refit, during which her funnels were trunked together into a single large stack. Note the flying-off platform on top of 'X' turret.

'Force H' in Gibraltar in late August 1940. In September 1940 she was damaged again, this time by French shore batteries during operations against the Vichy French port of Dakar. She was repaired in Gibraltar, and in January 1941 she bombarded Bardia, and in March took part in the Battle of Matapan.

Two months later, in May 1941, she was off Crete when 'Y' turret was damaged during an air attack. She was repaired in Alexandria and Durban, and rejoined the fleet in August. On 24 November 1941, while operating off Sollum on the Libyan coast, she was struck by three torpedoes, fired by *U-331*. She rolled over and sank, blowing up in the process, and taking most of her crew down with her.

HMS *Valiant*

When *Valiant* emerged from refit in Devonport in November 1939, she was sent to the West Indies to 'work up' her crew, then escorted transatlantic convoys before joining the Home Fleet in Scapa Flow in January 1940. She covered operations off Norway in April, then in June she was ordered to Gibraltar, where she joined 'Force H'. The following July she helped destroy the Vichy French fleet at Mers-el-Kébir, then sailed to Alexandria, where she spent the remainder of the year bombarding Italian shore installations in North Africa and the Adriatic. In March 1941 she took part in the Battle of Matapan, but two months later she was damaged during an air attack during the evacuation of Crete. She was repaired in Alexandria, and was still in her home port on 19 December when she was damaged by a limpet mine, placed on her hull during a daring raid by an Italian midget submarine.

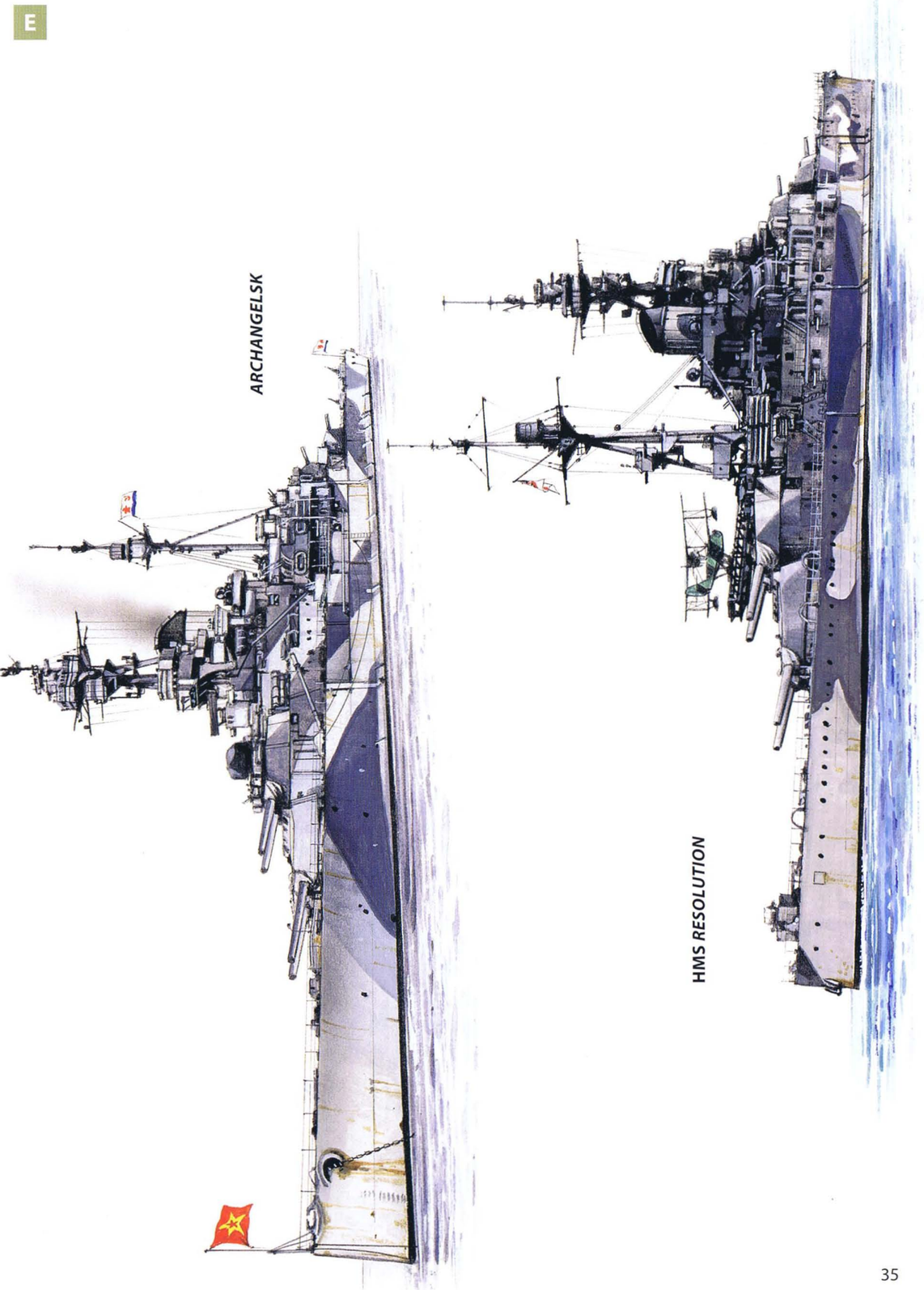
The *Valiant* was repaired in Durban, and in July 1942 she was transferred to the South Atlantic Command, where she remained without seeing any

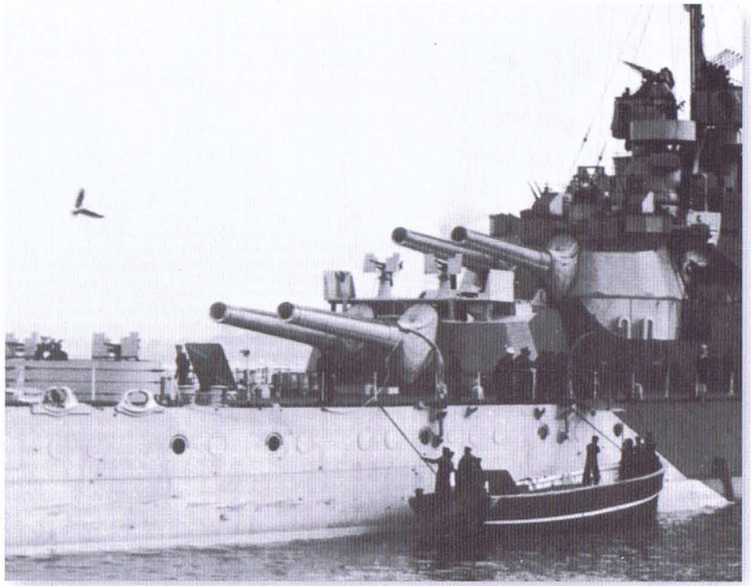
E

HMS *RESOLUTION* (1940) AND THE *ARCHANGELSK* (1944)

HMS *Resolution* began the war with the Home Fleet, and in April took part in the Norwegian campaign, where she was damaged by a bomb. In June she joined 'Force H' at Gibraltar, and participated in the attack on the Vichy French fleet at Mers-el-Kébir and Dakar, where she was torpedoed by a French submarine. After being repaired in the United States, she was sent to the Far East, arriving in the Indian Ocean in January 1942. She remained with the Eastern Fleet until November 1943, when she was ordered home, and placed in reserve. The plate shows the battleship as she looked during her time in the Indian Ocean.

HMS *Royal Sovereign* began the war in home waters, but by 1940 she was serving in the Mediterranean. During the Battle of Calabria in July, her lack of speed meant she was unable to keep up with the rest of Admiral Cunningham's fleet, so she never took part in the action. She was duly relegated to convoy escort duty, but in October 1941 she was ordered to the Indian Ocean, where she remained for a year. After an extensive refit in the United States *Royal Sovereign* returned to Britain, where in May 1944 she was handed over to the Russians, becoming the *Archangelsk*. She served with the Soviet Northern Fleet for the remainder of the war. The plate shows her as the *Archangelsk*, flying the Soviet naval ensign.





The stern of HMS *Valiant* in May 1943, showing her heavily improved anti-aircraft armament; 20mm guns are mounted on her quarterdeck and above 'Y' turret, while 40mm guns can be seen on her after superstructure.

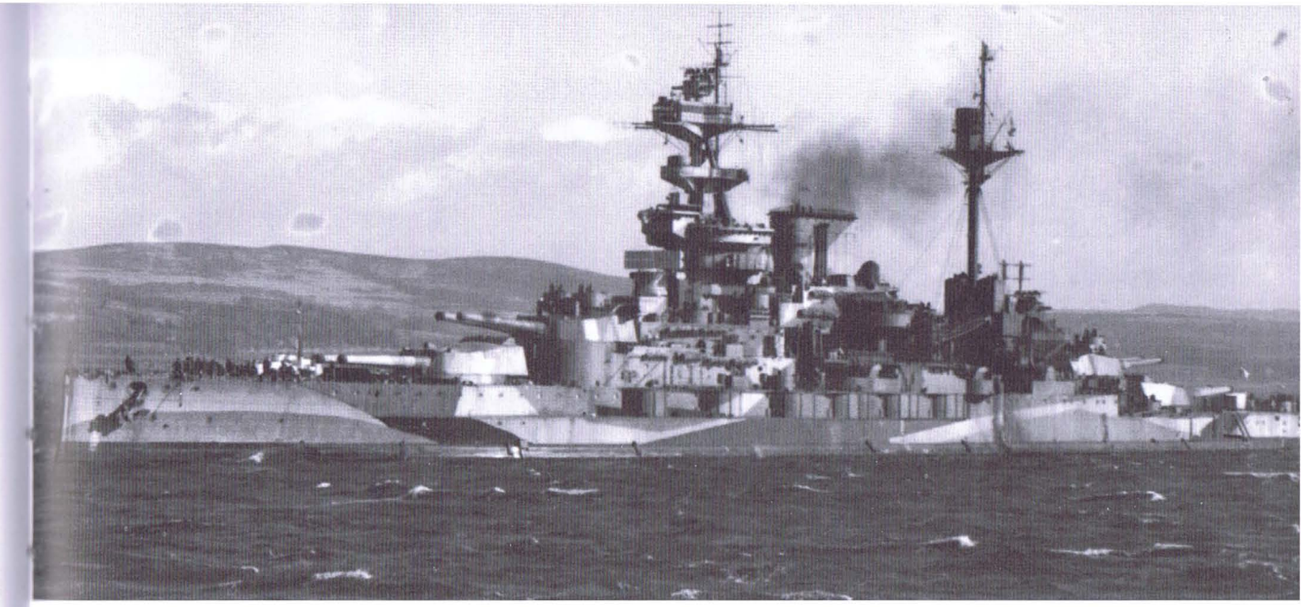
action until returning to Britain in early 1943. After a refit she was sent to the Mediterranean, where she supported the Allied landings in Sicily, Calabria and Salerno. She returned home in October, and in December was ordered to the Far East. She joined the Eastern Fleet in January 1944, and spent a year in the Indian Ocean, participating in attacks on Sabang and Surabaya. By January 1945 she was back in Devonport, remaining there for the remainder of the war. *Valiant* was decommissioned in 1948, and sent to the breaker's yard.

HMS *Malaya*

Appropriately enough for a mainstay of the pre-war Mediterranean fleet, *Malaya* was in Malta when war broke out. However, she was immediately ordered to transit the Suez Canal and join the Eastern Fleet, where she remained until December 1939. For the next six months she escorted transatlantic convoys, but in May 1940 she was ordered to the Mediterranean again, where she became flagship of the Mediterranean Fleet. In July she took part in the Battle of Calabria, and in August she bombarded Bardia. For the rest of the year she operated in support of the Malta convoys, or escorted troop shipments to Greece. In early 1941 *Malaya* was involved in an attack on Sardinia, and the bombardment of Genoa, but by March she was in the Atlantic, countering the threat posed by the German battlecruiser *Scharnhorst*.

On 20 March 1941, *Malaya* was damaged by a torpedo fired by *U-106*, and after limping into Trinidad she was sent to New York for repairs. These were completed by July, and in October she returned to the Mediterranean, escorting more Malta convoys and a few transatlantic ones. She rejoined the

HMS *Valiant*, photographed from a consort during operations in the Indian Ocean in May 1944. All of the *Queen Elizabeth* class battleships were known as having 'wet bows', as their somewhat top-heavy design meant that they were prone to dipping their bows into the oncoming waves, and shipping water over their forecastles.



By the time this photograph was taken of HMS *Malaya* as she lay at anchor off Greenock in the Firth of Clyde, shortly before the end of the war, her 6in secondary armament had been removed, and the casemates plated over.

Home Fleet in November 1942, but saw no more action, being placed in reserve in July 1943. The following summer she was re-activated, and in June 1944 she fired her guns in support of the Normandy landings. *Malaya* returned to Portsmouth in October, and was paid off when the war ended. She was finally scrapped in 1948.

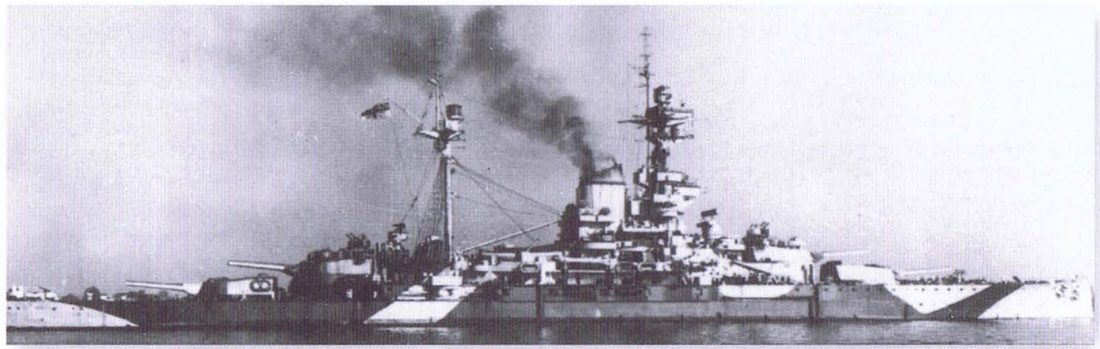
The *Royal Sovereign* Class

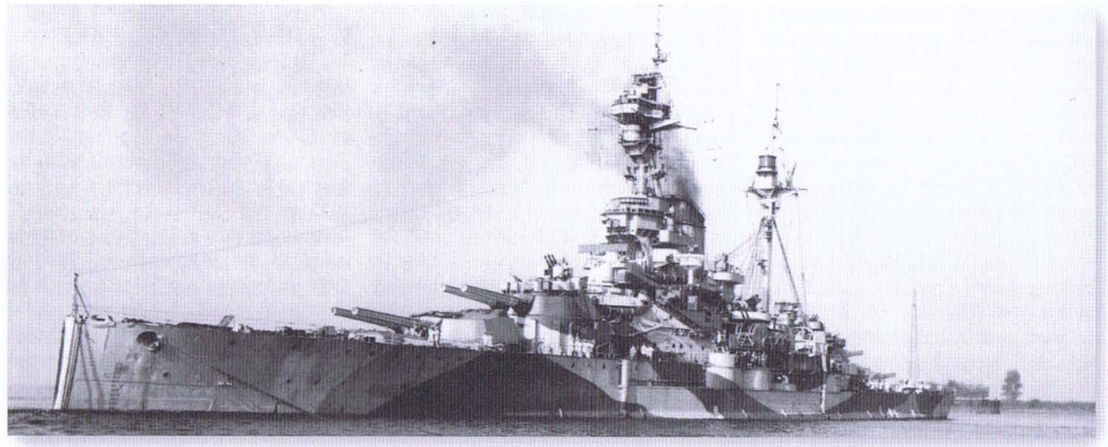
HMS *Royal Sovereign / Archangelsk*

In September 1939, the *Royal Sovereign* was in home waters, and was ordered to join the North Atlantic Escort Force, based in Halifax, Nova Scotia. She returned to Portsmouth to undergo a minor refit, and in May 1940 joined the Mediterranean fleet. A month later she took part in the Battle of Calabria, but her lack of speed meant she was unable to fire her guns in anger. In August she returned to transatlantic convoy duties, and continued to serve as the flagship of the Halifax-based force until August 1941, when she was sent for a refit in Norfolk, Virginia.

The following October she was transferred to the Eastern Fleet, and remained in the Indian Ocean until January 1944, being based first in Colombo, then in Kilindini, near Mombasa. During this period she underwent an extensive refit in Philadelphia (March–October 1943), and after her return

HMS *Royal Sovereign*, after she emerged from her extensive US repair and refit in October 1943. After this she remained unaltered until she was handed over to the Soviet Navy eight months later, when she became the *Archangelsk*.





HMS *Royal Sovereign*, photographed in the Delaware River in September 1943 as she emerged from an extensive refit in Philadelphia Navy Yard. During this refit, her anti-aircraft armament was increased, her suite of radar improved and her aircraft facilities removed.

to Britain in early 1944 was sent to Scapa Flow. On 30 May 1944, *Royal Sovereign* was transferred to the Soviet Navy, becoming the Soviet battleship *Archangelsk*. She remained with the Soviet Northern Fleet until the end of the war, and was returned to Britain in February 1949, where was scrapped shortly afterwards.

HMS *Revenge*

At the outbreak of war *Revenge* was in home waters, but spent the first year of the war chasing German raiders in the South Atlantic, or escorting transatlantic convoys as part of the North Atlantic Escort Force. In August 1940 she was ordered to Plymouth, where she could respond to an attempted German invasion, and in October she bombarded German invasion facilities at Cherbourg. By November *Revenge* was back in the North Atlantic, on escort duties, and in May 1941 she took part in the hunt for the *Bismarck*.

Shortly after this epic chase, she was ordered to the Far East, where for the next two years she served on convoy escort duties in the Indian Ocean, before finally returning to Britain in September 1943. She was placed in reserve, and apart from a brief trip to Tehran carrying the Prime Minister, she took no further part in the war. In January 1944 she was placed in reserve, and in May she suffered the indignity of having her 15in guns removed. *Revenge* was finally broken up in 1948.

F

HMS *REVENGE* (1940) AND HMS *RAMILLIES* (1941)

During the first years of the war, the majority of the battleships of the *Royal Sovereign* class were painted in a variety of disruptive camouflage schemes, the style of which depending on where they were based. For example, in the late summer of 1940, HMS *Revenge* was painted in the camouflage pattern shown here, which was known as the Unofficial Disruptive Camouflage Scheme – Home Fleet. She continued to sport it until the summer of 1942. By contrast, HMS *Resolution* retained her overall coat of medium grey until mid 1941, when she had a false white bow wave and dark grey wave-shaped waterline added, to disrupt enemy range finding.

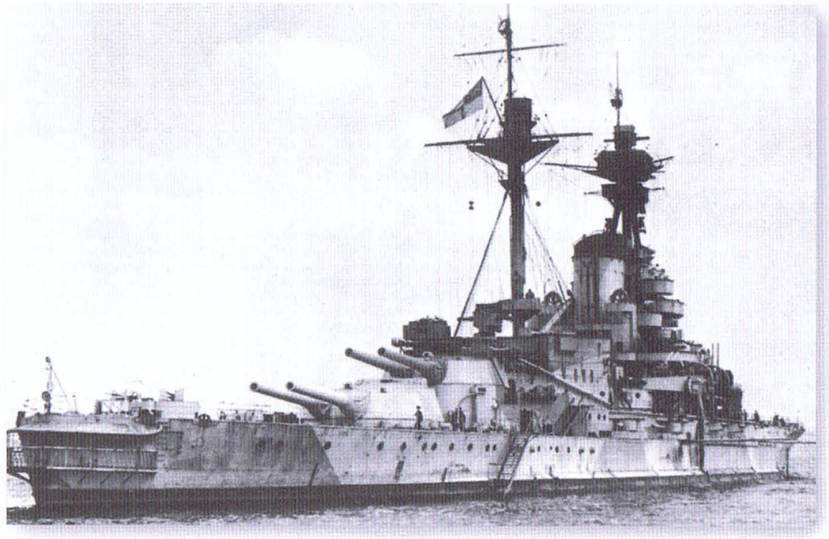
In August 1940, HMS *Ramillies* was given the graded camouflage scheme shown here – a variant of the Alexandria Camouflage Scheme that was used throughout the Mediterranean Fleet after Italy entered the war. The pattern was repeated on both sides of her hull and superstructure. A year later the graded elements were painted out, leaving her with a simpler two-tone grey scheme. In late 1943 she was repainted in the Admiralty Disruptive Camouflage Scheme.

F

HMS *REVENGE*

HMS *RAMILLIES*

HMS *Revenge* at anchor off Greenock in the Firth of Clyde, after her return from the Far East in September 1943. Unlike her sister ships, she retained a sternwalk. She could also be identified by her lack of a tripod mainmast.



BELOW LEFT
HMS *Royal Oak*, pictured from the deck of the drifter *Daisy II*, as she ferried libertymen from the battleship to Scapa Pier. The day after this photograph was taken, 14 October 1939, the battleship was torpedoed and sank at her moorings, taking two-thirds of her crew down with her.

BELOW
The director platform of HMS *Royal Oak* is still readily identifiable, on the peak of her foremast. The battleship now lies on her starboard side, and therefore the mast lies roughly parallel to the seabed. After almost 70 years beneath the waters of Scapa Flow, the ship is remarkably intact.

HMS *Royal Oak*

When the war began, the *Royal Oak* was under orders to sail to the Mediterranean, but these were cancelled, and she remained as part of the Home Fleet, based in Scapa Flow. On 13/14 October 1939, she was lying in the northern part of the anchorage, where her anti-aircraft guns were able to protect the Orkney town of Kirkwall, anchorage of the Northern Patrol. That night Korvettenkapitän Günther Prien steered *U-47* into the British anchorage, through a channel that was supposedly sealed by sunken blockships. He fired several torpedoes at the battleship, at least three of which struck her on her starboard side. She rolled over and sank within minutes, and 833 of her crew lost their lives. *Royal Oak* remains a war grave.

HMS *Resolution*

The *Resolution* began the war in home waters, but was soon ordered to Halifax as part of the North Atlantic Escort Force. She remained on convoy duties until April 1940, when she rejoined the Home Fleet, and participated in operations off Norway; she was slightly damaged in an air attack during the subsequent evacuation. In late June she joined 'Force H' at Gibraltar, and in early July she took part in the attack on the Vichy-French port of Oran. In

HMS *Resolution*, pictured in the spring of 1942 during Operation *Ironclad*, the conquest of Madagascar, which was controlled by the Vichy French. She functioned in a supporting role during the operation. Note the flying-off platform for a Walrus seaplane, mounted on top of 'X' turret.

September she was in action against the French once again, this time off Dakar, where she was hit by fire from shore batteries. Then on 25 September *Resolution* was torpedoed by the French submarine *Bévéziers*, losing all propulsive power. The stricken battleship was towed to Freetown in West Africa. After temporary repairs she was sent to Philadelphia, where she remained until September 1941.

After a brief sojourn with the Home Fleet, she was sent to the Far East, arriving in Colombo in March 1942. She became the flagship of the Eastern Fleet, and remained in the Indian Ocean for 18 months, before returning to Britain in September 1943. After a refit she was placed in reserve, and took no further part in hostilities. *Resolution* was broken up in 1948.

This detail of the forward superstructure and funnel of HMS *Resolution*, taken in mid 1943, reveals that while she still carried her largely redundant secondary armament, her anti-aircraft protection had been dramatically increased.

HMS *Ramillies*

After spending the last three years before the war as a training ship, HMS *Ramillies* was returned to operational duties when war was declared. The battleship sailed for the Mediterranean, where she was based in Gibraltar. As part of 'Force J', she participated in the hunt for the German pocket battleship *Graf Spee*, only returning to the Mediterranean in May 1940. She acted as cover for the attack on Taranto in November, and the damage inflicted on the Italian Fleet in the raid allowed the Admiralty to re-deploy the battleship elsewhere. Consequently, from January to August 1941 she performed convoy escort duties as part of the North Atlantic Escort Force. In February 1941 she came close to engaging the *Scharnhorst* and *Gneisenau*, forcing the German battlecruisers to break off a convoy attack. Three months later she also helped hunt down the *Bismarck*.

After being sent home for a refit (August–November 1941), *Ramillies* was ordered to the Indian Ocean, where in

HMS *Ramillies* lying off Greenock in the Firth of Clyde, June 1943. She had just rejoined the fleet, after an extensive repair necessitated by the damage caused by a torpedo launched from a Japanese midget submarine the previous year.

April 1942 she became the flagship for the British invasion of Madagascar. She was still anchored off Diego Suarez in Madagascar on 29 May when she was attacked by two Japanese midget submarines. A torpedo struck her on her port side, flooding the main magazine of 'A' turret and knocking out all electrical power. *Ramillies* limped into Durban, where temporary repairs were made, allowing her to return to Britain. These repairs were completed by June 1943, when she returned to the Indian Ocean for six months, only re-deploying to home waters in January 1944. In June she fired her guns in support of the Normandy landings, and in August those same guns covered the landings in southern France. After shelling the defences of Toulon, she returned home, where she was placed in reserve. *Ramillies* was finally scrapped in 1948.

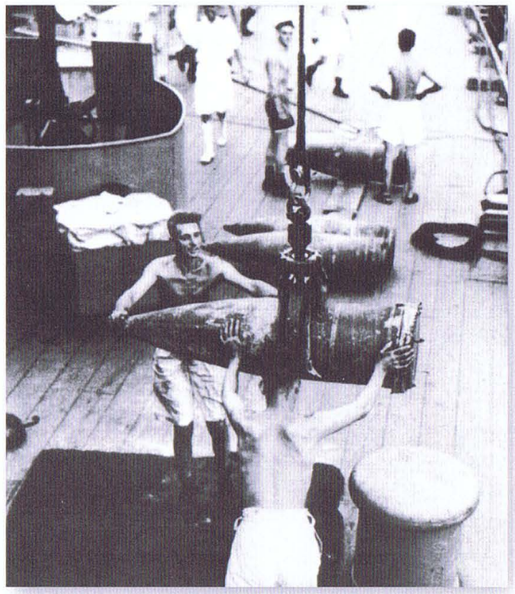
THE BATTLESHIPS IN ACTION

The ten battleships described above took part in many engagements, and suffered various disasters. In order to convey something of the way these veteran leviathans operated, we can take a brief look at two actions, one of which is a classic gunnery action, and the other an example of how the battleship crews responded when faced with a crisis. Both examples feature the *Queen Elizabeth* class battleship HMS *Warspite*.

G THE SINKING OF HMS *ROYAL OAK*, OCTOBER 1939

On the night of 13/14 October 1939, the *Royal Sovereign* class battleship HMS *Royal Oak* was at anchor in Scapa Flow in Orkney, one of the few warships left in the anchorage. She was in the northern part of the great natural harbour, where her anti-aircraft guns could offer some protection to the town of Kirkwall. The Admiralty considered Scapa Flow to be impregnable, but German reconnaissance flights had revealed a weakness. That night Korvettenkapitän Günther Prien, commanding *U-47*, managed to sneak his way into the anchorage through a poorly guarded channel. After searching Scapa Flow for a target, his lookouts spotted the *Royal Oak*.

Prien's first salvo of three torpedoes all missed, so he calmly turned his boat around and fired his stern tubes. At 0104hrs one of these torpedoes struck the battleship on or close to its starboard bow, possibly hitting the anchor cable. The duty watch on board thought the explosion was accidental, caused by a detonation in a forward storeroom. Repair teams went down to investigate, while the rest of the crew returned to their hammocks. Meanwhile, Prien had reloaded his bow tubes again, and 12 minutes later three torpedoes slammed into the starboard side of the battleship. She rolled over and sank in just 13 minutes, taking 833 of her crew down with her.



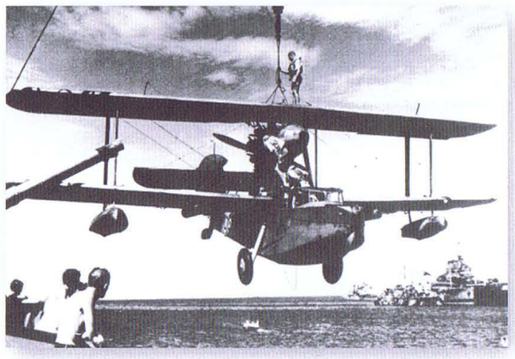
Loading 15in shells onto the deck of HMS *Warspite*, as the battleship lay off Kilindi, Mombasa, in March 1942. The shells had to be moved by hand to the ammunition loading hatch, where they were lowered down into the shell room.

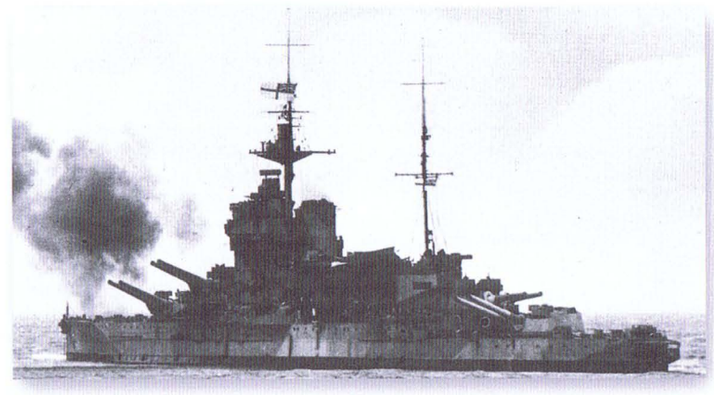
On 10 June 1940, Italy entered the war on the side of Germany. The first clash between the Royal Navy and the Supermarina took place less than a month later, on 9 July. The British were escorting a convoy from Malta to Alexandria, while the Italians were escorting another from Naples to Benghazi. When the two sides came into contact the Italians attempted to withdraw, and Vice Admiral Cunningham's force gave chase. Of all the British battleships, only Cunningham's flagship *Warspite* was fast enough to work her way into extreme range of the enemy. The brief engagement that followed became known as the Battle of Calabria (or the Battle of Punta Stilo). Visibility was around 15 nautical miles.

The action began at 1514hrs, when Italian heavy cruisers opened fire on a division of British light cruisers. Twelve minutes later *Warspite* came within range of the enemy, and fired her first salvo at a range of 26,400 yards (13 nautical miles). She fired ten salvos, and although no hits were scored, this was enough to force the Italians to retreat and probably spared the British light cruisers. Cunningham ordered the *Warspite* to sail in a circle, allowing the slower battleships *Malaya* and *Royal Sovereign* to catch her up. As she began her turn at 1533hrs, however, her lookouts spotted two Italian light cruisers. They were duly engaged, and eight more salvos were fired. Once again, although no hits were scored, the Italian cruisers escaped under the cover of a smoke screen.

There was now a brief lull in the action. Then at 1548hrs two Italian battleships appeared – the *Giulio Cesare* and the *Conte di Cavour*. Between them they carried 20 12.5in guns, which meant that *Warspite* was seriously outgunned. The range was a little over 26,000 yards (12.8 nautical miles). The Italians fired first, although for some reason the guns of the *Conte di Cavour* remained silent (possibly this measure was to avoid confusing the fall of shot of each Italian battleship). Some of the shots from the *Giulio Cesare* straddled the British battleship. By this time, the *Warspite's* gunnery staff had calibrated the range, and at 1553hrs the battleship returned fire. Rather than concentrating fire on the lead ship (*Giulio Cesare*), *Warspite* split her fire between both targets. She fired 13 salvos in seven minutes, or roughly one every 30 seconds. Then at 1600hrs Cunningham saw 'a great orange-coloured flash of a heavy explosion at the base of the enemy flagships's funnels. It was followed by an upheaval of smoke, and I knew she had been hit heavily at the prodigious range of thirteen miles.' In fact, this hit had struck the ship on her after funnel, setting off ammunition for her 37mm anti-aircraft guns at its base, and causing havoc on her shelter deck. The resulting flames were sucked down into the engine rooms, forcing parts of the engine spaces to be abandoned. In the process, six of the Italian battleship's 12 boilers were shut down, and her speed was reduced to just 18 knots.

A Supermarine Walrus seaplane being recovered by a 10-ton crane on board HMS *Warspite*, as the battleship lies at anchor in the Maldives, in 1942. These seaplanes were primarily used as gunnery spotters, although they could also be employed in a reconnaissance role.





During the D-Day landings, HMS *Warspite* operated in a naval gunfire support role, operating off both the British, Canadian and American beaches. She had just emerged from repairs after damage sustained off Salerno in September 1943, and 'X' turret remained out of commission, hence in this photograph it remains trained fore and aft.

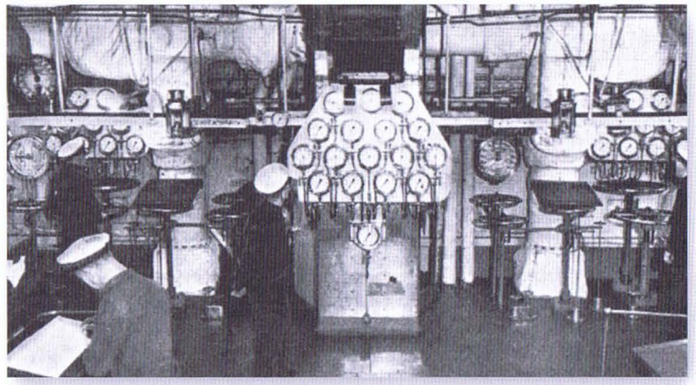
Immediately the two Italian battleships turned away, and began laying a smoke screen. *Warspite* gave chase, and fired four more salvos with her forward guns before the smoke hid the enemy from view. At that point *Malaya* came up and managed to add her own firepower to the engagement, firing five salvos at the fleeing enemy. All her shells fell short, and it was apparent that the Italians had successfully managed to break off the action. Cunningham called off the pursuit, and rejoined the rest of his fleet. The battle flared up elsewhere, involving light forces and an air attack, but it was clear the Italians were unwilling to press the British. As Cunningham put it later, 'never again did the Italians face up to the fire of British battleships.'

This brief action illustrates two points. The first was the problems involved in hitting an enemy target at long range, in relatively poor visibility. During the fighting the *Warspite* fired 31 full salvos and four partial ones, but only scored one hit. As the war progressed, accuracy would be greatly improved by the development of better fire control systems, and particularly by the introduction of fire control radar. Incidentally, the fire of her guns set fire to one of *Warspite's* aircraft, and the resulting blaze made the Italians think they had scored a direct hit on the British battleship. This incident shows that their ability to detect what was happening at that range was minimal.

Second, the hit had been scored at almost the maximum range of the *Warspite's* guns, a feat that would have been impossible before 1934, when the maximum elevation of her 15in guns was increased from 20 to 30 degrees. At such range accuracy was almost impossible, and luck was as important as judgement. However, it was also clear that the training of the British crews was markedly superior to that of the Italians. The Italian commander noted that the British fire was extremely accurate, while only one round fired by any of the Italian ships landed within 400 yards of *Warspite* during the entire engagement. The damage to the *Giulio Cesare* was minimal, but it seems her engine room crew panicked, making it harder for the Italian damage-control parties to do their job.

It is interesting to compare this with a similar situation, when the crew of the *Warspite* were forced to fight to save their ship. On 16 September 1943, *Warspite* was hit by two German radio-guided armour-piercing bombs, launched from aircraft while the battleship was operating in support of the Salerno landings. The first 3,000lb bomb hit the boat deck, and plunged through the port hanger, mess deck and boiler room before exploding, blowing a 20ft hole in the ship's bottom. The second bomb detonated beside the starboard boiler room – a near miss that still caused extensive damage to the side of the hull.

Several of the boiler rooms were flooded before the ingress of water could be contained. Power to her engines was lost, and all electrical power was cut, plunging the ship into darkness. The battleship began listing heavily, and also began drifting towards a minefield. Captain Packer ordered his damage-



The engine room of a *Queen Elizabeth* class battleship, showing the main control area where the senior engineering officer would supervise the engines and their operation by his staff. In the foreground an engineering artificer can be seen updating a logbook, a vital part of record keeping on board a battleship.

control teams to concentrate on the flooding, and finally steering was re-established using mechanical rather than electrical means. As two salvage tugs came to the rescue, one crashed into the battleship's side. A wit on the forecastle retorted: 'don't put any more holes in her – we've got enough already!' The tugs soon brought her under tow, however, leading her away from the minefield. Packer ordered compartments on the port side to be flooded, which helped counter-balance the worst of the list. At 4 knots the ship limped towards Malta, while her crews worked feverishly in the fetid heat and semi-darkness to keep the battleship afloat.

She nearly didn't make it. Caught in currents and whirlpools in the Straits of Messina, the *Warspite* nearly went aground, where she would be easy prey for the Luftwaffe. She was carried sideways on the tide, and all but one of her towlines parted. Somehow she passed through the straits without hitting anything, and once under tow again she headed towards the safety of Malta. After committing the bodies of the dead to the deep, the crew of *Warspite* brought their battered warship safely into port, ending a 60-hour battle for survival.

According to Captain Packer's diary, what carried the ship through was the spirit of the sailors. As he recalled: 'there was much fatigue, for no one had much stand-off during the past few days, and since the hit everyone was on their feet, either at the guns, hauling in wires, pumping, or shoring up ... bailing out compartments with buckets in this heat is hard work ... but they were all marvellously cheerful, willing and fatalistic.' This was the real secret of the Royal Navy. While we can record every technical nuance of these great battleships, and explain how they functioned, they were after all just ships. What really made them work – what made them true naval icons – were the men who sailed in them. Without the indefatigable humour, spirit and professionalism of the men of the Royal Navy, these venerable battleships would never have been able to achieve what they did, or to endure so much.

FURTHER READING

All the titles mentioned are still available, either in bookshops or in good libraries. Many explore aspects of our subject in more detail than has been possible in this short book, and are therefore recommended as a source for further study.

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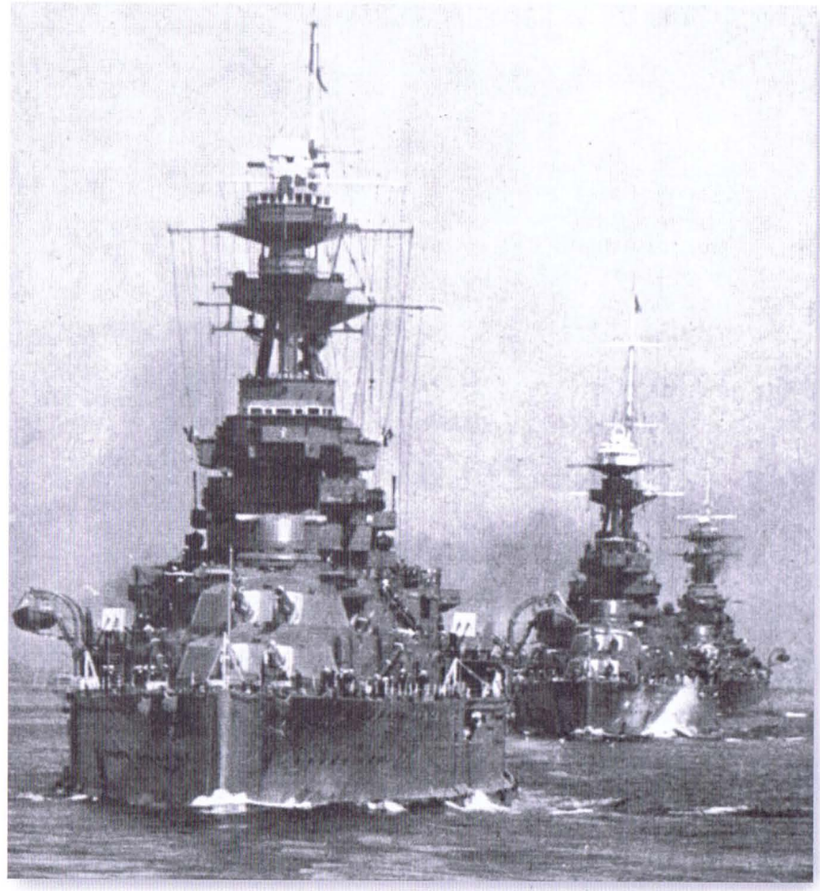

A stirring photograph of *Royal Sovereign* class battleships in line astern during a pre-war exercise. While such large-scale fleet manoeuvres were practised, they were rarely used during World War II, as battleships tended to operate individually, or as part of a balanced task force.

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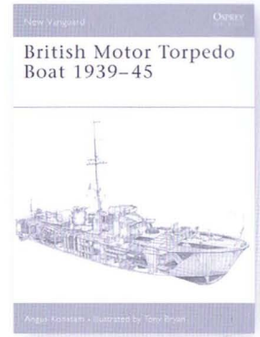

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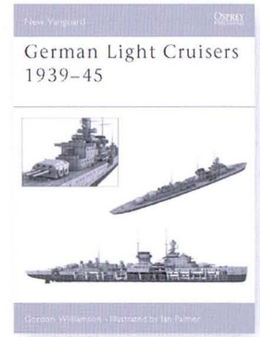

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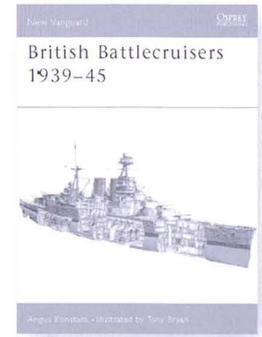

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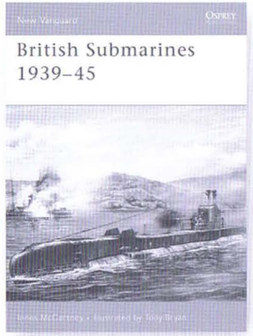

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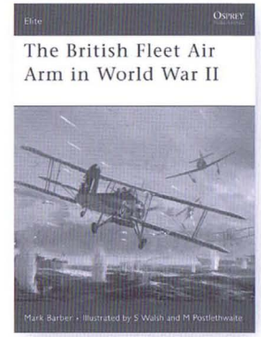

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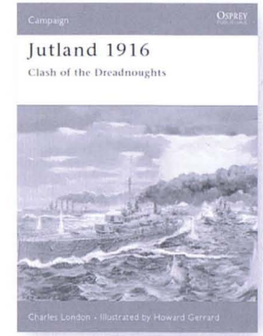

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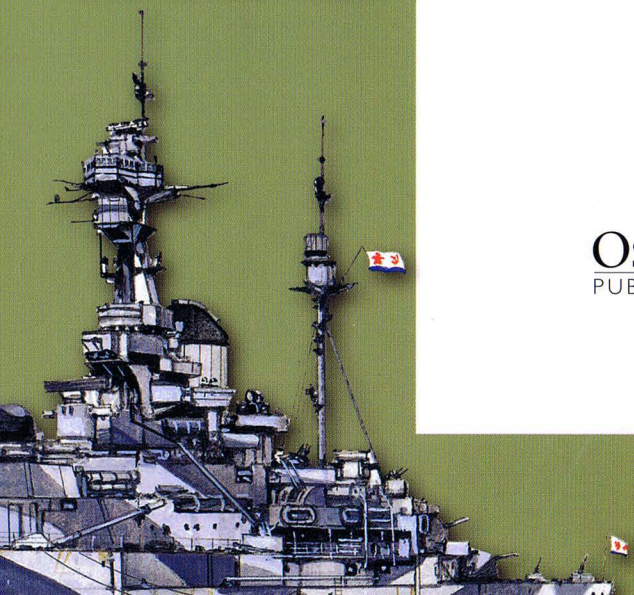

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