= N3 @-@ class battleship =

The N3 class was a dreadnought battleship class designed for the Royal Navy after World War I , incorporating all the lessons learned from that conflict . They were very similar in design to the G3 @-@ class battlecruiser , but had larger guns and thicker armour . They were never ordered due to signing of the Washington Naval Treaty in 1922 , which limited the size and armament of battleships to 35 @,@ 000 long tons (36 @,@ 000 t) and no gun bigger than 16 inches (406 mm) .

= = Background = =

In 1916 the US had declared its intention to create a Navy " second to none " ; Congress had authorized the building of a large number of battleships and battlecruisers . In response , the Japanese government also began a large programme of warship building (the 8 @-@ 8 fleet) . Two improved Revenge @-@ class hulls were rebuilt into the two Renown @-@ class battlecruisers by the Royal Navy during the war . The only new capital ships laid down during the war were the Admiral @-@ class battlecruisers . Their design had been called into question after the Battle of Jutland in 1916 and three ships of this class were cancelled , leaving only Hood to be completed to a modified design .

The US plan had been delayed by the wartime need to build smaller vessels . Nevertheless , estimates by the Admiralty were that by the early 1920s the Royal Navy would be behind in ships . By the beginning of 1920 , the Americans had completed one battleship since the end of World War I and had five more building . Seven more were intended to be laid down in 1920 ? 21 , six of these were the very large and powerful South Dakota class , armed with twelve 16 @-@ inch guns . The Japanese had finished one battleship since the end of the war and had three more under construction . To correct this state of affairs , the Admiralty initially planned to build three battleships and one battlecruiser in Fiscal Year (FY) 1921 ? 22 and again in FY 1922 ? 23 , but this was changed to four G3 @-@ class battlecruisers to be built first , presumably to be followed by the same number of battleships the following year .

A pair of designs were prepared in June 1920 , derived from the ' ' U @-@ 4 ' ' battleship design of 1914 , of ships with displacements of about 50 @,@ 000 long tons (51 @,@ 000 t) and armed with eight or nine guns , in four twin or three triple gun turrets mounting a new 18 @-@ inch (457 mm) gun then under development . The only limitation of the design was the inability to use British dockyards and pass through the Suez Canal . The most unusual feature of these designs was that none of the turrets were superfiring , presumably to keep the centre of gravity as low as possible and avoid the extra weight required for tall , superfiring barbettes .

The designs were revised in October and split into separate battleship and battlecruiser designs . The battleship designs were given letters of the alphabet from L through N , with the use of triple or double gun turrets shown by 3 or 2 respectively . Both ' L2 ' and ' L3 ' had superfiring guns and the armour was reduced to a 15 @-@ inch (381 mm) inclined waterline belt while the main armoured deck was 8 inches (203 mm) thick (9 inches (229 mm) where it sloped to meet the belt) . They both had a designed speed of 25 knots (46 km / h ; 29 mph) and had transom sterns . ' L2 ' displaced 52 @,@ 100 long tons (52 @,@ 900 t) , but ' L3 ' was a thousand tons lighter . ' M2 ' and ' M3 ' followed in November and December and were very different from the earlier designs .

'M2 ' and ' M3 ' sacrificed fire directly astern by moving the rear turret (s) amidships in order to save weight by shortening the length of the armoured citadel . Compared to the earlier , more conventional , designs , ' M2 ' saved 1 @,@ 540 long tons (1 @,@ 560 t) and ' M3 ' 1 @,@ 740 long tons (1 @,@ 770 t) . More weight was saved by reducing the designed speed to 23 ? 23 @.@ 5 knots (42 @.@ 6 ? 43 @.@ 5 km / h ; 26 @.@ 5 ? 27 @.@ 0 mph) and using only two propeller shafts , although it was thought that this would improve manoeuvering power over four smaller propellers . These changes saved 4 @,@ 350 long tons (4 @,@ 420 t) for ' M2 ' and 5 @,@ 000 long tons (5 @,@ 100 t) for ' M3 ' over their predecessors . A lengthened version of ' M3 ' was chosen for further development as N3 and approved in November 1921 .

= = Description = =

Most noticeable of the N3 design was the concentration of the main battery forward of the bridge and machinery spaces . A related feature of the design was the tower bridge structure behind the first two gun turrets . This provided a better and more stable foundation for fire @-@ control equipment , greatly improved accommodation and protection from the weather .

The N3 battleships were significantly larger than their predecessors of the Revenge class . They had an overall length of 820 feet (249 @.@ 9 m) , a beam of 106 feet (32 @.@ 3 m) , and a draught of 33 feet (10 @.@ 1 m) at deep load . They would have displaced about 48 @,@ 500 long tons (49 @,@ 300 t) , nearly double the displacement of the older ships . They had a complete double bottom 7 feet (2 @.@ 1 m) deep .

The ships would have had two geared steam turbine sets , each of which drove one propeller shaft , in two engine rooms forward of the boiler rooms . This allowed the funnel to be placed further aft and increased the ability of the rear turret to fire to the rear . The turbines would have been powered by small @-@ tube boilers intended to produce a total of 56 @,@ 000 shaft horsepower (42 @,@ 000 kW) . The ships ' maximum speed would have been about 23 knots .

Housing the main armament in triple turrets was new to the Royal Navy though British companies had been involved in the production of triple gun turret designs for other navies . The choice of a high muzzle velocity with a relatively lighter shell was taken from the German practice ; it ran counter to previous British guns such as the BL 15 @-@ inch Mark I gun of 42 @-@ calibre length which were lower @-@ muzzle @-@ velocity weapons firing heavy shells .

= = = Armament = = =

The N3 design mounted nine 45 @-@ calibre BL 18 @-@ inch guns in three triple gun turrets , designated ' A ' , ' B ' , and ' X ' from front to rear . The guns had a maximum elevation of 40 ° . As none of these guns was ever completed and test @-@ fired , sources differ on their exact specifications . Naval historian John Campbell quotes the projectile weight as 2 @,@ 916 pounds (1 @,@ 323 kg) fired at a muzzle velocity of 2 @,@ 650 ft / s (810 m / s) , but Alan Raven and John Roberts cite a 2 @,@ 837 pounds (1 @,@ 287 kg) fired at a muzzle velocity of 2 @,@ 700 ft / s (820 m / s) . The N3s carried a secondary armament of sixteen BL 6 @-@ inch Mk XXII guns in superfiring twin turrets . Four turrets were sited around the forward superstructure and four at the stern . The guns could elevate between ? 5 ° and + 60 ° . They fired 100 @-@ pound (45 kg) projectiles at a muzzle velocity of 2 @,@ 945 ft / s (898 m / s) . Their maximum range was 25 @,@ 800 yd (23 @,@ 600 m) at 45 ° elevation . Their rate of fire was five rounds per minute .

An anti @-@ aircraft battery of six QF 4 @.@ 7 @-@ inch Mk VIII guns was included . They had a maximum depression of -5 ° and a maximum elevation of 90 ° . They fired a 50 @-@ pound (23 kg) high explosive shell at a muzzle velocity of 2 @,@ 457 ft / s (749 m / s) at a rate of eight to twelve rounds per minute . The guns had a maximum ceiling of 32 @,@ 000 ft (9 @,@ 800 m) , but an effective range of much less . The ships were intended to carry four 10 @-@ barreled mountings for the 40 @-@ millimetre (1 @.@ 6 in) QF 2 @-@ pounder Mk VIII gun (commonly known as a pom @-@ pom) , two abaft the funnels and two at the stern . Each barrel was provided with 1300 rounds of ammunition . The gun fired a 40 @-@ millimetre (1 @.@ 6 in) .91 @-@ pound (0 @.@ 41 kg) shell at a muzzle velocity of 1 @,@ 920 ft / s (590 m / s) to a distance of 3 @,@ 800 yards (3 @,@ 500 m) . The gun 's rate of fire was approximately 96 ? 98 rounds per minute .

Like previous classes of British battlecruisers , a pair of submerged , broadside @-@ firing torpedo tubes were planned for these ships . Their compartment was located just forward of the ' A ' shell room on the platform deck . Six 24 @.@ 5 @-@ inch (620 mm) torpedoes per tube were to be carried in peace @-@ time , but this would increase to eight in wartime . These Mark I torpedoes had a warhead of 743 pounds (337 kg) of TNT and were powered by oxygen @-@ enriched air . They had two speed settings which governed their range : either 15 @,@ 000 yards (13 @,@ 716 m) at 35 knots (65 km / h ; 40 mph) , or 20 @,@ 000 yards (18 @,@ 288 m) at 30 knots (56 km / h ; 35 mph) .

= = = Fire @-@ control = = =

The main guns of the battleships could be controlled from any of the two director @-@ control towers (DCT) . The primary DCT was mounted at the top of the forward superstructure . Another was mounted on the roof of the conning tower in an armoured hood . Each main gun turret was provided with a 41 @-@ foot (12 @.@ 5 m) coincidence rangefinder in an armoured housing on the turret roof . The secondary armament was primarily controlled by two DCTs mounted on each side of the bridge . The anti @-@ aircraft guns were controlled by a high @-@ angle control system mounted on the mizzenmast . Each pom @-@ pom mount had its own director and there was also a height @-@ finder aft . Two 15 @-@ foot (4 @.@ 6 m) torpedo rangefinders were located on the sides of the funnels .

= = = Armour = = =

A first for any British dreadnought was the use of the all or nothing protection scheme in the N3s and G3s . Medium @-@ thickness armour had proven to be useless in stopping heavy @-@ calibre shells during World War I so the vital areas of the ship were protected by the thickest possible armour and the rest of the ship was left unarmoured . Use of this system was pioneered by contemporary U.S. Navy battleship designs starting with the Nevada class . However , this system of protection required that the armoured citadel should have enough reserve buoyancy to keep the ship stable even if the rest of the hull was riddled by gunfire .

The waterline belt of the N3 had a maximum thickness of 15 inches (381 mm) thick with the top of the armour angled outwards . This angle increased the armor 's relative thickness to horizontal , close @-@ range fire , albeit at the cost of reducing its relative height which increased the chance of plunging shellfire going over or under it . It ran some 463 feet (141 @.@ 1 m) , from 9 feet (2 @.@ 7 m) forward of ' A ' barbette to the rear of the after 6 @-@ inch magazine . For about 115 feet (35 @.@ 1 m) , it reduced to 13 @.@ 5 inches (343 mm) over the engine and boiler rooms . The belt had a height of 14 feet 3 inches (4 @.@ 3 m) , of which 4 feet 6 inches (1 @.@ 4 m) was below the designed waterline . The lower edge of the belt abreast the magazines was continued down another 3 feet (0 @.@ 9 m) by a 4 inches (102 mm) thickness of high @-@ tensile steel inclined at 36 ° to prevent a shell from reaching the magazines via a wave trough at high speed . The ends of the belt terminated in 14 @-@ inch (356 mm) transverse bulkheads . The 8 @-@ inch (203 mm) armoured deck matched the length of the waterline belt and sloped down to meet the upper edge of the belt . It extended forward over the torpedo compartment which had a separate transverse bulkhead protecting it that was 9 inches (229 mm) thick . The steering gear was protected by a deck and bulkhead 6 inches (152 mm) thick .

The turret faces were 18 inches (457 mm) thick while their sides were probably 14 inches (356 mm) in thickness , and the roof was 8 inches thick . The armour of the barbettes and the conning tower was 15 inches thick and the conning tower 's communications tube to the upper deck was 8 inches thick . The fire @-@ control director atop the conning tower was protected by an armoured hood 4 to 6 inches thick .

The anti @-@ torpedo bulges of the N3 were internal to the hull and were intended to withstand the explosion of a 750 @-@ pound (340 kg) torpedo warhead . They consisted of an outer air space , an inner buoyancy space and the 2 inches (51 mm) thick torpedo bulkhead . The bulkhead was situated about 16 feet (4 @.@ 9 m) inboard from the side of the ship . Postwar tests done on a replica of this system showed that filling the buoyancy space with water rather than the sealed steel crushing tubes as used in Hood was just as effective and weighed less .

= = Cancellation = =

The four N3 battleships were never ordered because the Washington Naval Treaty , an arms limitation treaty under negotiation at the time , forbade construction of any ship larger than 35 @,@

000 tons . Many of the aspects of their design ultimately were incorporated into the two Nelson @-@ class battleships , and they are often described as being a cut @-@ down N3 . Indeed , the Nelsons received the design designation ' O3 ' , marking them as next in the design sequence , although they used the guns intended for the G3 battlecruisers for cost reasons and to comply with the Treaty 's 16 @-@ inch limitation on main armament .