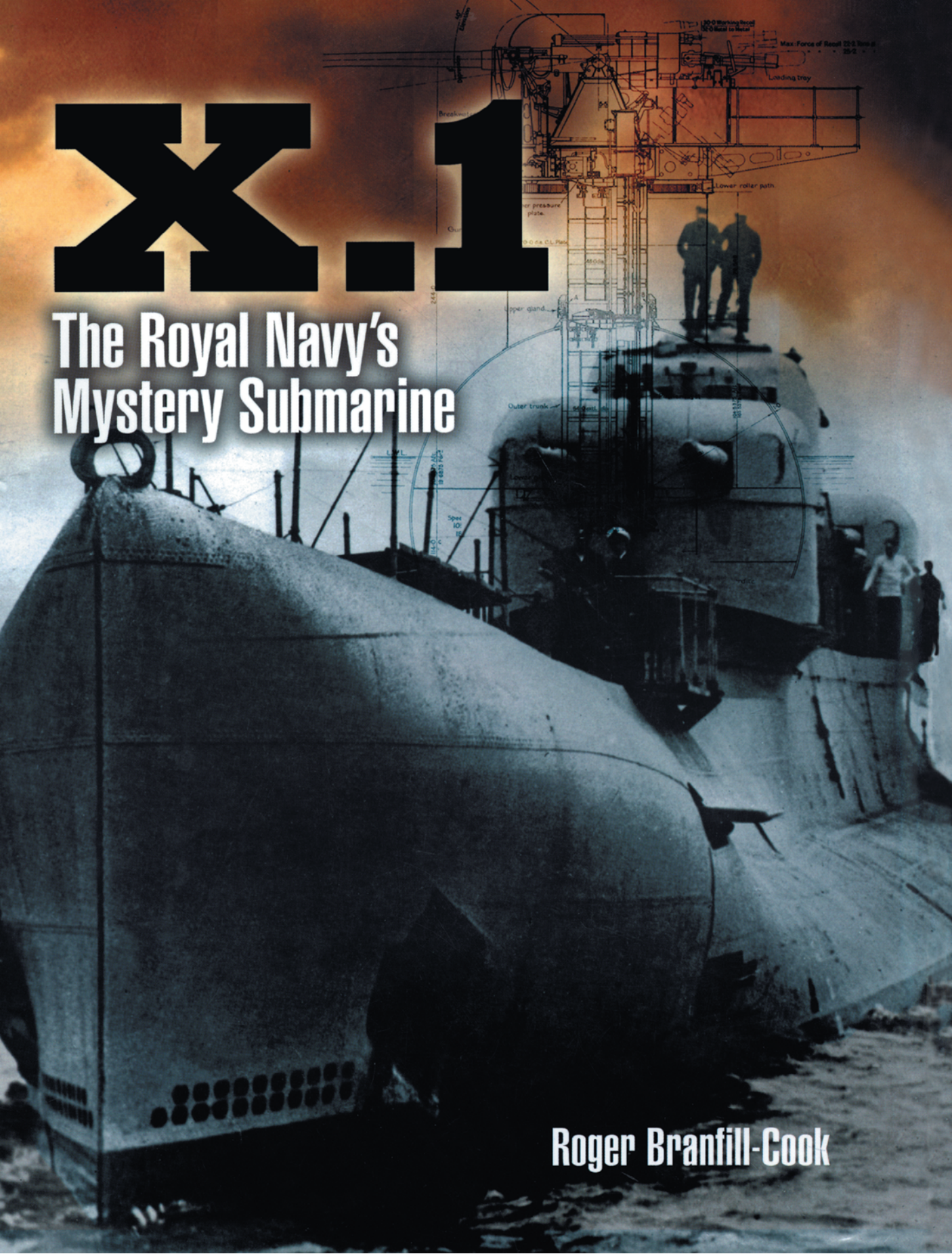
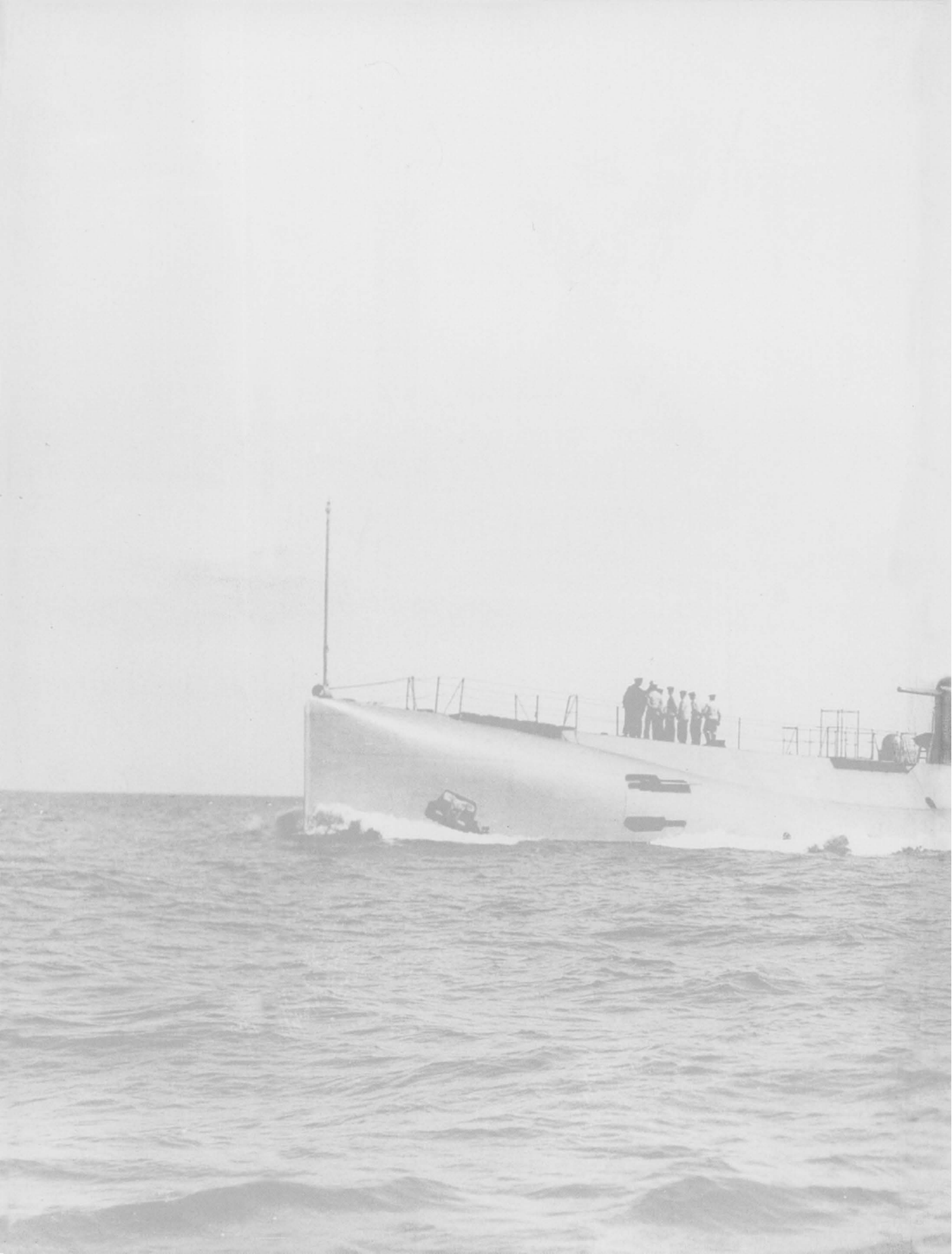
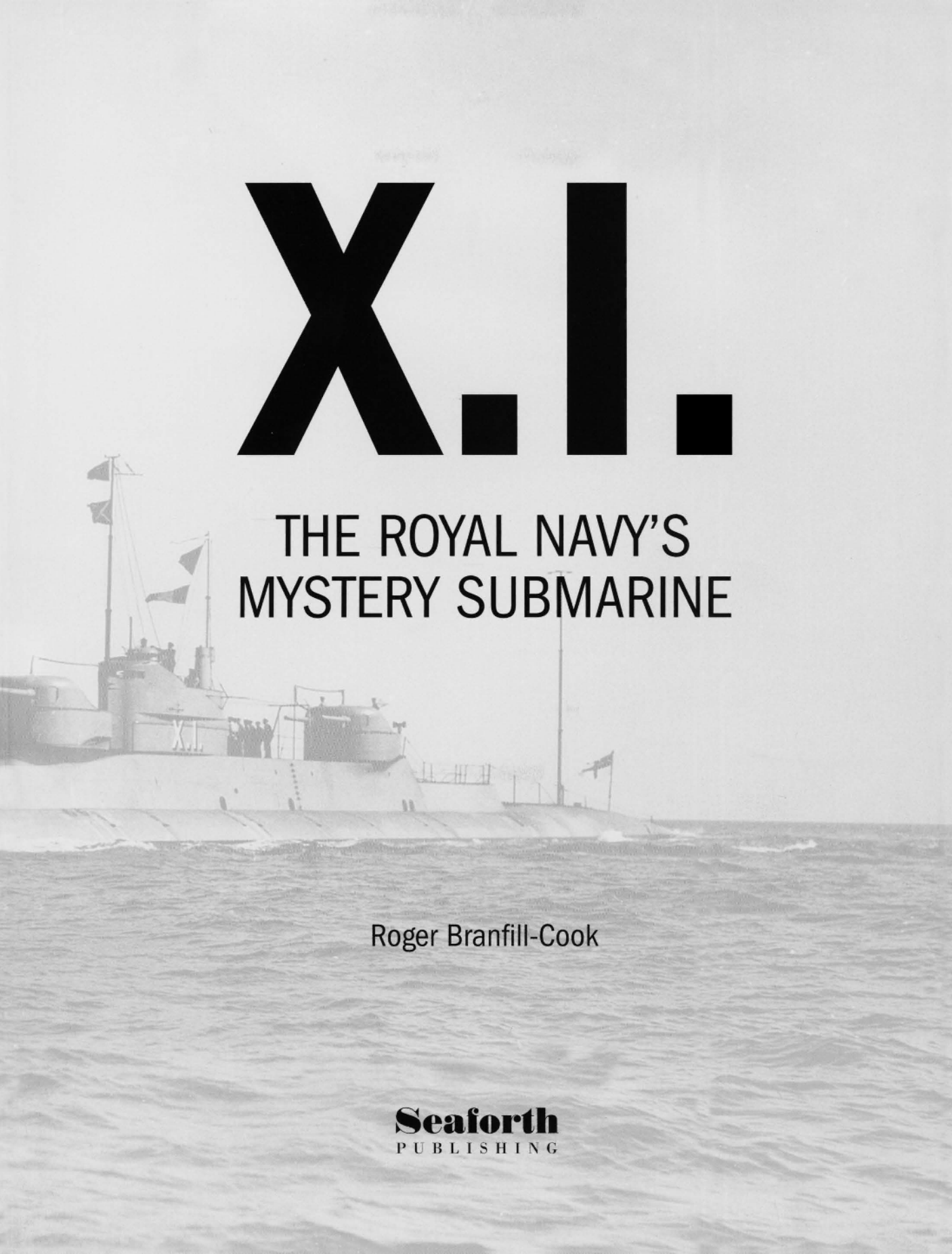

X.1
The Royal Navy's Mystery Submarine
Roger Branfill-Cook

X.I.

THE ROYAL NAVY'S MYSTERY SUBMARINE





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Roger Branfill-Cook

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Contents

FOREWORD BY

Rear Admiral Mark Anderson

The concept for His Majesty's Submarine *X.1* was born from the bitter experience of the First World War, where the lone combatant, holding wide areas of ocean at risk, once again took centre stage. *X.1* was designed to inflict devastating effects on naval and mercantile shipping, on the morale of those operating them and on the nations dependent on those supplies. Against the economic and political backdrop of the post-Great War era, naval architects sought to make a reality a submerged raider that was equally at home below and above the waves; carrying a potent armament and capable of conducting deadly ambush, she was conceived to bring fear to shipping, and to dominate a maritime area of operations whilst remaining largely unseen and untouchable.

In the modern context, *X.1* became the capability demonstrator for submerged sea power; a precursor of what was to come decades later, she was the modern nuclear attack submarine of her generation. As with any innovative submarine build programme, concept and reality only came together with skill and effort, sweat and tears. *X.1* suffered from severe first-of-class teething problems in much the same way that we do today, yet despite the additional weaponry, proved to have very sound underwater handling characteristics. Unfortunately, her design concept did not match the context of the interwar years in which she operated; she paid the price of being ahead of her time and her potential in the conflict to come lay unappreciated. Her detractors, with their various agendas, ensured that she would be dismissed as a waste of taxpayers' money. Her lasting legacy to us was to prove that large submarines could dive and surface safely and that such a potent underwater capability can provide both fighting power and a powerful deterrent to an opposing maritime power. Even the threat of such a submarine being present would come to make an enemy think carefully about the risk to his capability and ambitions. A role most ably demonstrated during the Falklands Conflict.

Roger Branfill-Cook's superbly researched book succeeds in shining light on the truth surrounding the capability of *X.1* and the military and political conditions that acted as a backdrop to her short career in the Royal Navy.

Rear Admiral Mark Anderson
Commander Operations &
Rear Admiral Submarines, Royal Navy
January 2009 to March 2011

Introduction

Submarine cruisers have a great capacity to stir the imagination. The notion that a powerfully-armed vessel can rise to the surface in a deadly ambush, despatch an enemy vessel in a hail of shells, then simply slide away back into the depths has fascinated the submarine designers of Tsarist Russia, Imperial Germany, Great Britain, the USA, France and the Third Reich.

Traditionally, the cruiser type of vessel, successor to the classic sailing frigate, is both the protector and the predator of distant mercantile routes worldwide. A lone frigate or corsair, far from base and support, was always vulnerable to falling in with a faster or more powerful opponent. The Great War gives us the examples of *Königsberg* and *Emden*, and the Second World War was to produce many others – including the fatal first and last cruise of the *Bismarck*. Therefore the cruiser submarine, with her ability to hide from a hunter by simply submerging, seemed to many to be the ideal type of ocean raider. It was no surprise that La Royale should christen their own giant cruiser submarine after the great French corsair captain, Robert Surcouf.

The Royal Navy's sole example of a cruiser submarine, the *X.1*, has long been dismissed as a failure, and a colossal white elephant. She was the only major British warship designed after the First World War which was withdrawn from service before the outbreak of the Second. Her heavy gun armament was her most obvious feature, and this was perhaps her most contentious aspect. It is undeniable she had great potential if correctly used in a surface action role. Paradoxically her very success doomed her to a half-life existence, neither fish nor fowl, spurned both by the exponents of the surface cruiser force, and by the submariners who favoured the more stealthy underwater attack. From the chequered history of her advanced propulsion machinery, it is clear she fell far short of her designers' ambitions. However, alternative engines *did* later become available, which could have been fitted in *X.1* to cure her chronic mechanical problems.

Every writer who mentions *X.1*, however, completely misses the most important aspect of this monster vessel. The resounding success of her design was her docile underwater handling. Designed to prove once and for all that a huge submarine vessel could be dived with safety, *X.1* bridges the gap between the clumsy and deadly monster British submarines of the Great War – which tended to kill their own crews more readily than those of enemy ships – and all the large Royal Navy submarines which followed her, right up to present-day nuclear boats. In retrospect, her greatest failing was that her concept failed to address the political context of the age into which she was launched.

The 'X' in her pennant number stands for 'experimental', but it also brings an air of 'mystery', and the story of *X.1* is no stranger to mystery and subterfuge. This volume aims to lay to rest once and for all the deliberate, and innocent, misinformation spread about *X.1*, and tell the true story of the Royal Navy's extraordinary secret weapon and her crew.

Acknowledgments

The inspiration for this book, and much of the information contained therein, came from the Royal Navy Submarine Museum in Gosport. This excellent heritage site has four submarines to view, and a collection ranging from Art to Weapons systems. Full details can be found on their website: www.submarine-museum.co.uk.

My thanks and appreciation for their help and patience go out to the following individuals and organisations. Even when some research may have drawn a blank, they have always provided me with alternative sources to investigate.

Debbie Corner of the Photographic Section, Margaret Bidmead and George Malcolmson of the Archive Section, Alan Ferris, Volunteer Librarian, RN Submarine Museum, Gosport.

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Lesley Richmond of the Hunterian Museum, Glasgow.

Sharon Hinde of The Dock Museum, Barrow-in-Furness.

The Staff of the British Newspaper Library, Colindale.

The Staff of the Public Record Office, Kew.

Elizabeth Rees of Tyne & Wear Archive Services.

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Gaëlle Dumont of Heller-Joustra SA.

David Bowen of Humbrol Ltd.

John Date of the Royal Institution of Naval Architects.

John Snyder of White Ensign Models, for his expertise on colour schemes.

The Photographs

For what was supposed to be a top-secret weapon system, a comparatively large number of photographs of *X.1* were taken – no doubt because she was at the time the world's largest submarine, but also because,

Left: Sir Arthur W Johns, KCB, CBE (1873–1937). Sixth Director of Naval Construction, responsible for the majority of Royal Navy submarine classes in the Great War, and the designer of the *X.1*. Born in 1873 at Torpoint, Cornwall, Arthur William Johns entered Devonport Dockyard as a Shipwright Apprentice at the age of 14. After heading the list of all apprentices in his examination year, he moved to Greenwich Royal Naval College as a probationary Assistant Constructor. In 1895 he qualified with the coveted First Class Professional Certificate. After several minor assignments, he worked on the design of Captain Scott's Antarctic research vessel, the *Discovery*, as well as the *King Edward VII* class pre-dreadnoughts and the Royal Yacht *Alexandra*. Promoted to the rank of Constructor in 1911, in the following year he began his long association with Royal Navy submarine design, becoming responsible for the later 'E' class vessels, and the succeeding 'F', 'G', 'H', 'J', 'K', 'L', 'M' and 'R' classes. In 1916 he was set to investigating rigid airship construction, and designed the successful *R.33* and *R.34*, the latter airship being the first machine to make a two-way air crossing of the Atlantic (in July 1919). In November 1920 A W Johns was confirmed as Assistant Director of Naval Construction, and it was in this capacity that he was responsible for the design of *X.1*. Made a CBE (Commander of the British Empire) in 1920 as a reward for his War service, he was made a CB (Companion of the Bath) in 1929, and in 1933 he was created a KCB (Knight Commander of the Bath). A lifelong scholar, Sir Arthur became a member of the Institute of Naval Architects in 1904, presenting many thought-provoking papers to that august body, and was elected a Vice President of the Institute in 1931. Promoted to Director of Naval Construction in January 1930, the last major vessel for which Sir Arthur was responsible was the new aircraft carrier HMS *Ark Royal*. Her first captain was full of praise for her aircraft-handling arrangements, stating that in the first 400 hours' flying, not one single airman had been injured taking off and landing. In the same period, he sagely concluded, if the same young men had been ashore driving their motorcars and riding their motorbikes, quite a few of them would have ended up in hospital. Sadly, early in 1936 illness forced Sir Arthur to retire, and he died on 13 January 1937.

with her unique outline, she was a shapely vessel, and very photogenic. However, in contrast only two on-board photographs seem to have survived – if indeed any others were ever taken – and there are no internal shots in existence. The two pictures of her upper control room are, in fact, photographs of the wooden mock-up built at Chatham Dockyard and used to plan out the layout of the multiple controls and fittings which had to be shoe-horned inside.

Some photographs of worse-than-average quality are included, on the grounds that they illustrate interesting features or events. Most were taken with a Kodak 'Box Brownie' or similar 'pocket' camera, and are typical of the snapshots of the era.

In recreating the odyssey of *X.1*'s peacetime service in the Mediterranean, I have unashamedly used photographs taken by the crew members of 'L' class submarines, notably *L.27*. Some of these are typical shots of submariners at play, but others illustrate the actual cruises in which *X.1* participated.

Photographic and Line Drawing Credits

Page 8 the photo of Sir Arthur W Johns appears by kind permission of the Royal Institution of Naval Architects.

Plans of the 'K' class and 'M' class boats by kind permission of Mr John Lambert; the cutaway photograph of *M.1* is by the Author.

U 155 on page 14 is a US Navy photograph which appeared in <<L'ALBVM DE LA GVERRE 1914-1918>> published by *L'Illustration*.

The line drawings of *K.26* and *U 139* appear in *Submarines of World War Two* and are reproduced by permission of Erminio Bagnasco.

The cartoon of the Battleship Bombing Experiment: *The Chicago Herald*.

Vickers gun turret and mechanism drawings, Admiralty Fire Control Clock and Fire Control Table drawings, details of the Asdic fitted to *X.1*, photos used by the *Daily Herald*, the photo of Commander Colin Mayers and the cutaway drawing of a 5.25in Mk II turret: Public Record Office, Kew.

The photographs of the Admiralty Fire Control Clock and Straddle Indicator were taken by the Author with the co-operation of the staff of HMS *Belfast*; the photographs of the sub-calibre 2pdr barrel and case were taken by the Author with the help of Mr Chris Henry of 'Explosion!'.

Sub-calibre cutaway on page 49: Hampshire Record Office, Item Ref 109M91/GL127.

The basis for the periscope view of *Akikaze* is derived from the box art for PIT-ROAD destroyer kit W13, *Minekaze*, and is reproduced by kind permission of the artist, Mr Y Takani.

The illustration of a Mark IV torpedo is reproduced from *Britain's Wonderful Fighting Forces* by Captain Ellison Hawks.

The frontispiece, the photos of *U 126* on page 25, of *X.1* on pages 61 (upper), 65, 78 (upper and lower), the upper control room photos on page 66, the rangefinder blueprint, and the Ship's Plans: the National Maritime Museum, Greenwich.

The excellent drawings of the interior of *X.1* are reproduced by kind permission of David Hill, being selected from an extensive range of internal views of *X.1*.

Captain Gilbert H Roberts on page 90 and Admiral Beatty on page 98: the Imperial War Museum.

The map of the Mediterranean in 1929 is taken from the *Atlante Internazionale del Touring Club Italiano*, in the David Rumsey Map Collection, by permission of Cartography Associates, at www.davidrumsey.com.

The Salmon postcard of *X.1* is reproduced by permission of J. Salmon Ltd.

Illustrated London News cutaway on page 105 and photos of *Narwhal* on pages 105 and 110: the Newspaper Library, Colindale;

Narwhal, *Nautilus* and *Argonaut* on pages 109, 110, 111 and 112: Naval History and Heritage Command, Washington Naval Yard.

The Heller box art for *Surcouf* is used with the kind permission of Humbrol Ltd and of Heller-Joustra SA.

The photograph of the wreck of the Japanese submarine *I-1* off Guadalcanal is reproduced by permission of the New Zealand Defence Force, Torpedo Bay Museum.

The illustrations of the Besson MB-41.1, Watanabe E9W1, Yokosuka E14Y1, Aichi *Seiran* and the Arado Ar 231 appear in *Warplanes of the Second World War Volume Six – Floatplanes*, by William Green and Dennis I Punnett.

The line drawing of the Type XI U-Boat is reproduced from *U BOAT* by Eberhard Rössler;

The photograph of the rear of a 5.25in turret: The Vickers Photographic Archive, Barrow Museum Service, Cat No. 4909.

All other photographs and illustrations are reproduced with the kind permission of the RN Submarine Museum, Gosport.

CHAPTER 1

Giant Submarines

Russian Plans

In warships, the old adage that 'Size Does Matter' seems to be true. It was the Imperial Russian Navy which had built the first armoured cruiser, and they aimed to be in the forefront of development of the latest naval weapon, the submarine. Buying in experience from several foreign inventors, the Russians were the first customers for German U-boats, purchasing the electric prototype *Forelle* and ordering the *Karp*, *Karas* and *Kambala* from Germaniawerft in 1904. In 1906 they went on to build the second submarine in the world with a diesel engine, the *Minoga*, and laid down the first submarine minelayer, the *Krab*. A Russian submarine commander was the first to try out his own design for a snorkel device. And it was to be the Russian Navy which first conceived the idea of a 'cruiser submarine'.

As early as 1911 a Russian designer named Zhuravlev proposed a submersible cruiser of 4,500 tons, powered by eight diesel engines for a surface speed of 26 knots, and armed with no less than five 4.7in guns, plus torpedoes and mines. For surface action she would be protected by up to 3in of armour plate. Needless to say, the industrial capacity of Tsarist Russia was quite incapable of building such a vessel, although under the impetus of wartime a reduced design was actually drawn up in December 1916, for a 20-knot cruiser submarine displacing 3,000 tons submerged and mounting four 4in guns. This project paralleled a similar German design of the time. the chaotic industrial conditions which stymied Russia's war production, and the political turmoil of the following year, doomed these cruiser submarines to remain on the drawing board.

A later project for three 'fleet submarines', armed with two twin 130mm gun turrets and endowed with a surface speed of 24 knots was drawn up by the Soviet Navy in 1930. Once again, however, technical difficulties led the struggling Soviets to downgrade the boats' armament to just two single 100mm guns, when they were completed as the *Pravda* class.

Royal Navy Monster Boats

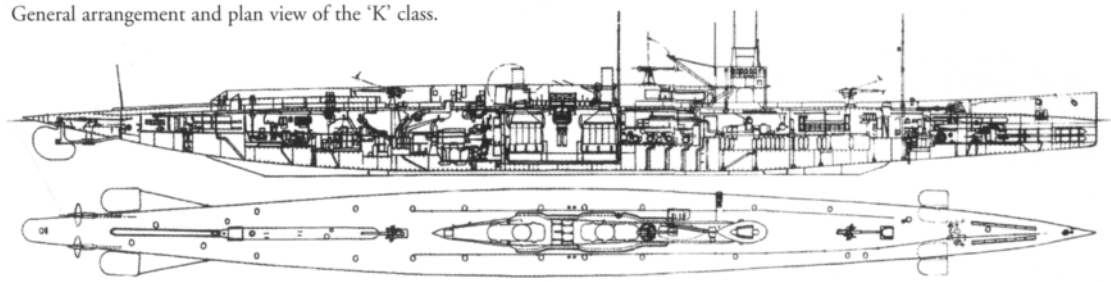
Mr A W Johns served on the Submarine Development Committee of 1915, when the question of building submarine cruisers for '*guerre de course*' was discussed, but dismissed, since the German merchant fleet had been swept from the seas by then. However, during the Great War the British Admiralty went on to build large numbers of giant submarines, with disappointing results.

They had been alarmed by rumours of high speed German U-boats – one was credited with the phenomenal surface speed of 22 knots. Survivors from the old battleship *Formidable* reported – mistakenly – that the U-boat which sank them had kept pace with their old pre-dreadnought in the teeth of a gale. Admiral Fisher himself was convinced that at least two German U-boats could achieve 19 knots. So it was decided to build high speed 'Fleet Submarines' to accompany the dreadnoughts on sweeps of the North Sea. In the spring of 1915, Commodore Sydney Hall had told Lt Cdr Godfrey Herbert (who eighteen months later would take command of the ill-fated *K.13*) that the Admiralty were considering a new class of 'submersible steam-driven destroyers'.

HMS *Dreadnought* had not only ushered in a new class of all-big-gun ships – giving her name to the type – but her turbine engines had also significantly raised the maximum speeds of this new class of battleship. If a foreshortened range was accepted, the turbine-engined ships could also maintain their higher maximum speed for much longer periods compared with the old reciprocating-engined vessels. If a submarine were to keep pace with the dreadnought squadrons on offensive sweeps then she would need to be able to maintain at least 21 knots – the speed of the main battlefleet – or even exceed this speed to be able to take up an ambush position and lie in wait for retreating or damaged enemy battleships. Diesels could not yet give speeds matching that of a dreadnought, so the Admiralty had turned, fatally, to steam power for its new class of fleet submarines. The result was the dreaded 'K' class (or 'K for Killer', as some crews named them).

Their steam turbines certainly gave these monsters a high surface speed, but at a terrible price. The enormously long and narrow (and flimsy) hulls were pierced by a multitude of openings, for retractable funnels, ventilators and the like, which all had to be closed by remote control before they dived. The

General arrangement and plan view of the 'K' class.



'K' Class Specifications

Displacement: 1,883 tons surfaced/2,565 tons submerged

Length: 338ft; Beam: 26.66ft

Twin screws: Geared steam turbines 10,500shp plus auxiliary diesel 800bhp = 24/25 knots surfaced/electric motors 1,400hp = 9 knots submerged

Up to 2 x 4in guns plus 1 x 3in AA; *K.17* had 5.5in; 8 x 18in torpedo tubes (4 bow, 4 beam)

Crew: 60 officers and men

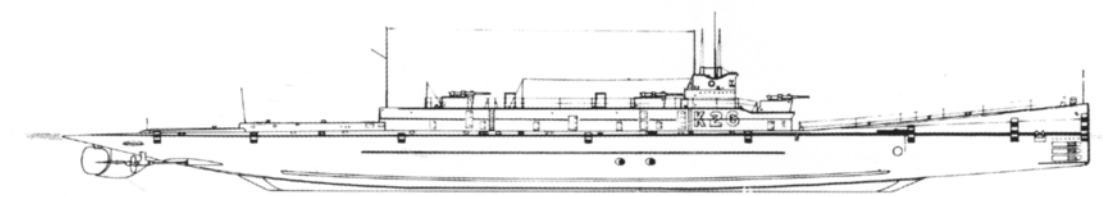
slender hull – copied from cruiser designs – brought severe hydrodynamic problems. When a 'K' boat dived, the water pressure on the long flat plane of her deck would tend to force her into a much steeper dive than planned. Conversely, when she was rising to the surface, the hull suffered from an unwanted lift force about one-third of the distance back from the bows, leading to a steeper than planned rise.

The extreme size brought other problems to a crew desperately attempting to compensate for this perverse hydrodynamic behaviour. The distances between the commander and the crew members operating the hydroplanes and ballast controls throughout the enormous length of a 'K' boat made co-ordinated effort extremely difficult, and delays in relaying commands could be fatal.

And when a 'K' boat dived, all hell usually broke loose. Most of the tragi-comic unintentional crash dives by 'K' boats usually ended in an embarrassing thump into the sea bed nose-first. Commander Ernest Leir's *K.3* even dived out of control when carrying the young Duke of York, the future King George VI. But it was no laughing matter when the unfortunately-numbered *K.13* dived in the Gareloch. More than half her crew and the members of the dockyard staff on board for the trial drowned when her engine room vents were accidentally left open and she was unable to surface.

A 'K' boat was 338ft long, and at periscope depth it took only a slight miscalculation in trim, or a dive

K.26, last of the breed and the only example of the so-called 'Improved K' class. Completed and commissioned exactly two months before *X.1* was launched, *K.26* served alongside *X.1* in the 1st Submarine Flotilla at Malta, and survived until 1931.



***K.26* Specifications**

Displacement: 2,140 tons surfaced/2,770 tons submerged

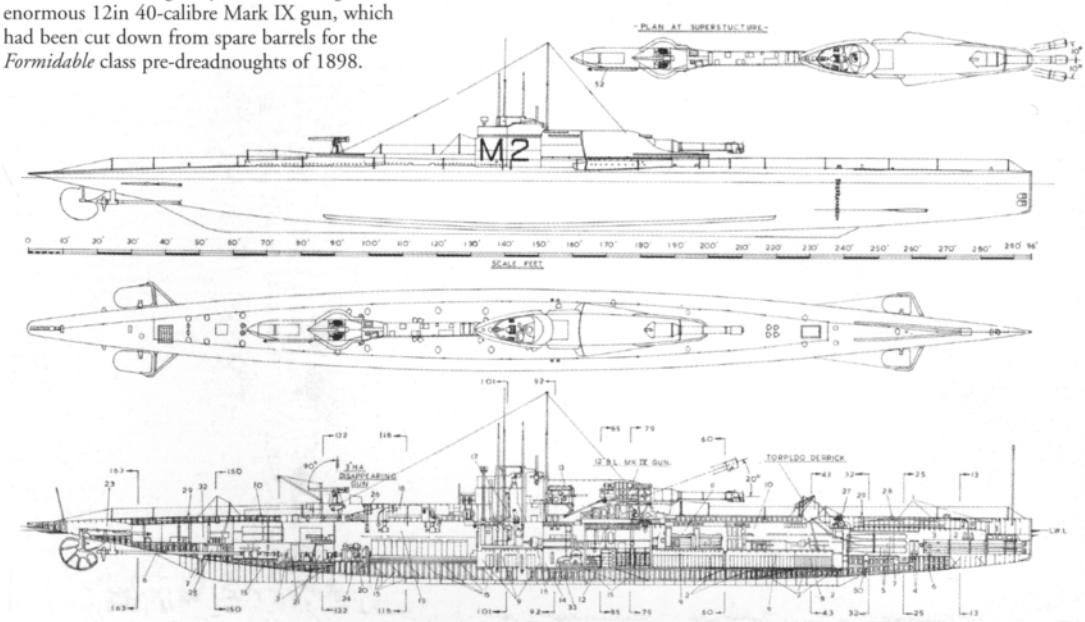
Length: 351½ft; Beam: 28ft

Twin screws: Geared steam turbines 10,000shp plus auxiliary diesel 800bhp = 23.5 knots surfaced/electric motors 1,400hp = 9 knots submerged

3 x 4in guns; 10 x 21in torpedo tubes

Crew: 65 officers and men

The 'M' class as originally built, showing the enormous 12in 40-calibre Mark IX gun, which had been cut down from spare barrels for the *Formidable* class pre-dreadnoughts of 1898.



'M' Class Specifications

Displacement: 1,600 tons surfaced/1,950 tons submerged

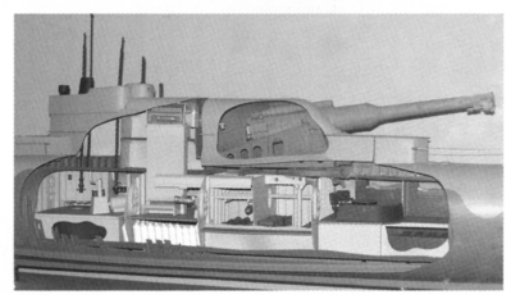
Length: 296ft (*M.1*)/305ft (*M.2* & *M.3*); Beam: 24½ft

Twin screws: Diesels 2,400bhp = 15.5 knots surfaced/electric motors 1,600hp = 9.5 knots submerged

1 x 12in/40 gun; 1 x 3in AA gun; 2 x .303in Lewis machine guns;

4 x 18in (*M.1*)/4 x 21in (*M.2* & *M.3*) torpedo tubes (all forward)

Crew: 60–70 officers and men



A cutaway model of *M.1* in the Science Museum, London, showing the armament arrangements.

accidentally steepening, to send the bow plunging to a depth where the pressure of water might easily crush the hull, and this was probably the cause of the loss of *K.5*, which tragically disappeared off the Atlantic shelf during Fleet Exercises in January 1921.

The three huge 'Mutton Boats' of the 'M' or 'Monitor' class which followed were almost as clumsy, weighed down by an enormous 12in gun of the type mounted on pre-dreadnought battleships. It is difficult at this distance to appreciate why the 'M' class were built in the first place. With adequate aerial spotting they could be useful for bombardment of a lightly-defended coastline, but the effect of their slow-loading single 12in gun could only ever be considered as having a nuisance value and of no real military significance, and the gun had to be aimed by pointing the whole submarine at the target. As coast bombardment types they were completely outclassed by the surface monitors, in the design of which the Royal Navy excelled. And lacking the huge side bulges of these surface monitors with their 12in, 14in, 15in and even 18in guns, the submarines were highly vulnerable to attack by mine, torpedo and remote control explosive motor boats – as used by the Germans to defend their seaward flank in Belgium.

The contemporary notion that an 'M' boat could

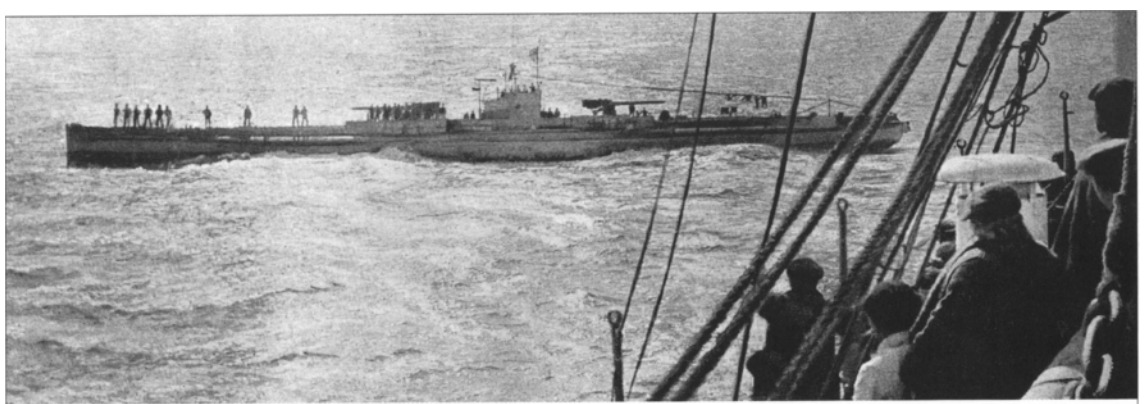
compensate for the comparative lack of success of submarines using torpedoes, by taking a single pot-shot at a passing German capital ship with their 12in gun, must rate as high fantasy or even worse. The gun itself, after the initial shot, could only be reloaded on the surface. Hit or miss with the first round, exposing their position in their classic 'dip-chick' manoeuvre would bring down a hornets' nest of destroyers, and the large and cumbersome 'M' boat's chances of survival would be minimal.

The wreck of *M.1* was discovered off Portland in 1999, and reconstruction of the circumstances of her loss showed just how difficult these monsters were to control under water. The daughter of one of the crewmen, Able Seaman H G Jewell who was lost with *M.1* in 1925, recalled her father's unease about the handling of the top-heavy boat, and his premonition on his last leave ashore that he might not survive the planned exercise. When *M.2* was also lost with her whole crew in 1932, old sailors recalled that the keels of the 'M' class had originally been laid down as units of the 'K' or 'Killer' class.

The U-Cruisers

It was to be Imperial Germany which built the first practical cruiser submarines. They were to serve as the inspiration for many prototype vessels between the wars. Many distinguished naval authors feel that the German construction of U-Cruisers was a failure. A large boat absorbed a disproportionate amount of scarce dockyard labour and equally scarce materials, while being able to accomplish nothing that the medium-sized boats could not do equally well. Mr A W Johns, designer of *X.1*, closely studied surrendered German U-boats and presented his findings to the Institute of Naval Architects in 1920. His audience agreed with him that, in every respect besides the horsepower of their diesel engines, Royal Naval submarines of the Great War compared favourably with the German boats. In particular he noted that the larger U-boats took twice as long to build as the standard units.

German U-boat commanders also preferred the smaller boats. German design in any case tended to isolate the commander in the conning tower above the control room. The widely-separated crew operating a long boat presented severe problems of co-ordination, and split-second co-ordination between all members of the diving team was precisely what safely submerging an early submarine required. The big U-Cruisers were difficult to control, according to Commander Fechter, a former U-boat captain writing in *Marine Rundschau*. He felt a small boat gave one centralised control.



One of the ex-mercantile U-Cruisers (probably the *U 155*) inspects the Spanish liner *Infanta-Isabel-de Borbon* off Cadiz on 18 March 1918. Note that the U-Boat is 'rigged' for surface running, with washing hung out to dry! Her crew obviously think they have little to fear, armed as she is with two huge 15cm guns.

***U 155* Specifications**

Displacement: 1,512 tons surfaced/1,875 tons submerged

Length: 65m; Beam: 8.9m; Draught: 5.3m

Twin screws: Diesels 760bhp = 9.5 knots surfaced/electric motors 800hp = 7.5 knots submerged

Using diesels + electric motors on the surface = 12.4 knots

2 x 15cm/45 guns; 2 x 8.8cm AA guns; 2 x 50cm torpedo tubes (bow), 18 torpedoes

Crew: 56–76 officers and men

Why then did the Kaiser's Navy persevere with these large U-Cruisers? The answer is partly logistical, and partly psychological. All the German cruisers stationed overseas in 1914 had been quickly run to ground and destroyed. Apart from raiders disguised as merchant ships, no cruiser replacements were sent out, as they could hardly be expected to survive the Royal Navy's surface blockade of Germany. Submarine cruisers, on the other hand, could evade the naval blockade and continue to show the flag in distant waters. And very large submarines could carry much more fuel, ammunition and supplies for extended cruises.

German designers had gained valuable experience with the handling of large, long-range submersibles with the four mercantile '*Deutschland*' class unarmed cargo vessels, designed to circumvent the British naval blockade of the North Atlantic. As early as September 1916 the German Navy had decided to convert a second batch of four mercantile submarines under construction into long-range corsair cruisers, to carry the numbers *U 151* to *U 154*.[1] When the entry of the USA into the war rendered the mercantile submarine redundant, the surviving trio from the first batch were also converted to combat use as *U 155* to *U 157* (the *Bremen* having been lost in the meantime). In order to raise the low speed of the three ex-mercantile boats, they were fitted with new propellers which allowed the use of both diesel engines and battery power driving their electric motors, for boosting surface speed in an emergency. The Royal Navy was able to study this engine arrangement in detail when the *U 155*, ex-*Deutschland*, was handed over to the UK in 1918.

At the same time the Imperial German Navy threw itself into a major construction programme of extremely large U-Cruisers of a new design. Their plans included the heavily-armed cruisers of Projects 46 and 46a and the armoured cruisers of Project 47.

Because of the time delay in designing 4,000bhp diesel engines, the latter vessels were dropped in favour of the ultimate U-Cruiser of the Great War, Project 50, or *Kreuzer 44*. This huge vessel, also known as *UD 1*, with a surface displacement of 3,800 tons, was to be powered by steam turbines for high surface speed. The Germans accepted the larger-than-normal number of openings in the pressure hull which steam power required, but looked to solve the major problem of retained boiler heat when dived, by adopting the special 'diving boiler' patented by Schäfer and Wölke – which was contained in a tank free to flood with seawater when the vessel submerged, thus dissipating the heat.[2]

Due to the deteriorating war situation, the lack of raw materials, and a severe manpower shortage – especially of trained construction workers – only four of the planned fourteen U-Cruisers laid down were actually completed prior to the Armistice, and the armoured steam turbine boats of Project 50 never left the drawing board.

Nevertheless, the first of these large vessels (Project 46) were commissioned, with names as befitting their large size and cruiser status:

U 139, named *Kapitänleutnant Schweiger* in German service, was taken over by the French Navy, rechristened *Halbronn*, and served until July 1928, not being broken up until eight years later. The French Navy was very impressed with her armament arrangements: *U 139*'s two 15cm (5.9in) guns each fired up to fourteen rounds a minute, fed by an armoured and powered ammunition hoist from refrigerated magazines. When submerged the gun barrels were sealed watertight by a tompion at the muzzle and by a special short cartridge case in the breech. After surfacing, the 3m base stereoscopic rangefinder could be raised by compressed air to a height of 7.5m (more than 24 feet) above the waterline, giving an excellent spotting facility out to a useful effective range. Her conning tower was armoured to a maximum of 90mm, and the above-water portions of her hull to 35mm thickness.

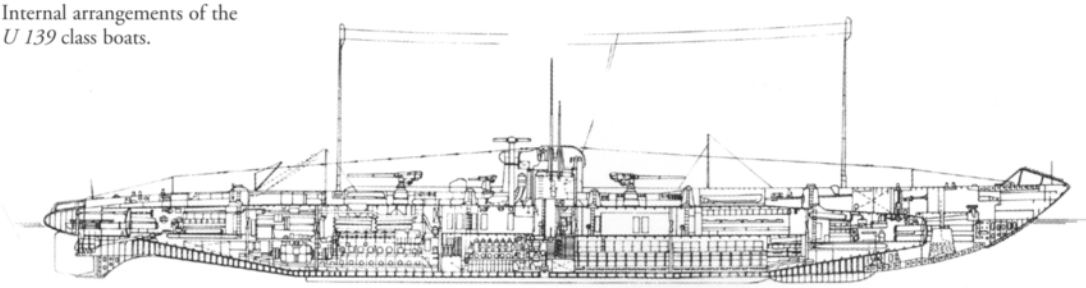
This heavy armament and armour meant that *U 139* was very clumsy underwater, but on the surface she was very stable and provided a good gun platform.

U 140 was named *Kapitänleutnant Otto Weddigen*. She was ceded to the USA in 1919, and two years later was sunk as a target to fulfil the terms of the Versailles Treaty. In the interim no doubt the US Navy took full advantage to test and copy the design, features of which were to appear some years later in the Americans' own submarine cruiser designs.

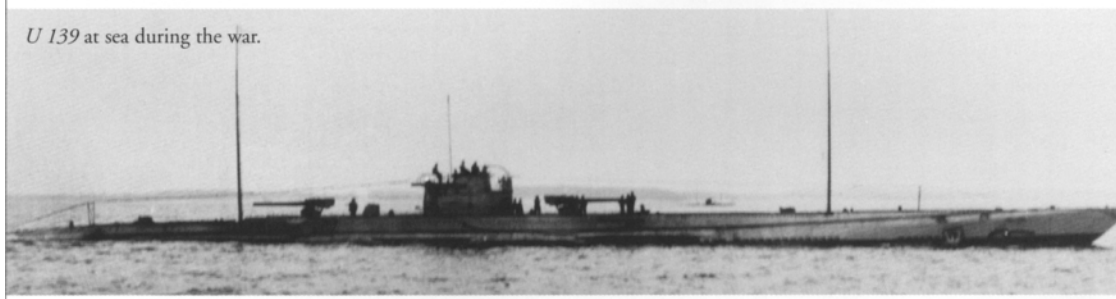
U 141 came to the UK in 1918, and was not scrapped until 1923, after use as a target for firing trials. Key aspects of the class design, such as the thick pressure hull, the horizontal rangefinder for her 5.9in guns, and a separate diesel generator for battery charging, were to reappear in *X.1*. Her name, if she was allocated one, did not accompany her into British hands.

A fourth cruiser, the ***U 142***, was the only vessel to be completed under Project 46a, with slightly larger displacement (2,158 tons surfaced/2,785 tons submerged). With a nominal range of 20,000 miles,

Internal arrangements of the *U 139* class boats.



U 139 at sea during the war.



***U 139* Class Specifications**

Displacement: 1,930 tons surfaced/2,483 tons submerged

Length: 94.7m; Beam: 9m

Twin screws; Diesels 3,500bhp = 16 knots surfaced/ electric motors 1,780hp = 8 knots submerged

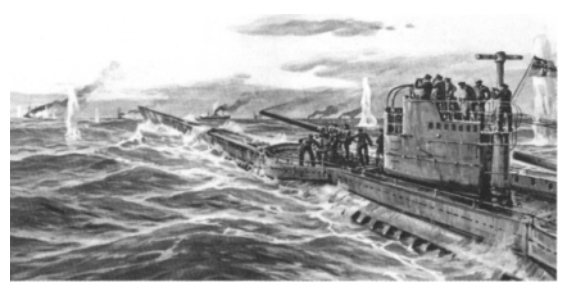
2 x 15cm guns; 2 x 8.8cm AA guns; 6 x 50cm torpedo tubes (4 bow, 2 stern);

Crew: Between 62 and 80 officers and men

and carrying two 15cm guns, two lighter guns and twenty torpedoes, the British Admiralty considered her to be a most formidable antagonist. The Armistice found her not quite ready for sea. She was broken up in Germany in 1919, as were her uncompleted sisters still on the stocks.

Thus it can be seen that the Imperial German Navy not only continued with the design of U-Cruisers, but persevered in their construction – even when the deteriorating war situation should have required the concentration of all available manpower and materials on the rapid construction of much smaller boats. This penchant for 'blue water U-boats' was to return to feature prominently in Admiral Raeder's ill-fated 'Z-Plan' twenty years later.

In the meantime, the ceded U-Cruisers, and the plans of *U 117* and *U 142* which Germaniawerft and Vulkan were permitted to sell to the Japanese in 1920, made a great impression on the Allied Navies, and their descendants were to take to the water in some numbers in the inter-war period.[3] And the first of these, incorporating many of the lessons of the U-Cruisers, would be *X.1*.



A painting by the famous German marine artist Willy Stöwer: 'U-Boot-Kreuzer im Gefecht (1 Oktober 1918)', depicting a supposed attack on an escorted convoy of armed merchant ships. An escort and several of the merchant ships are replying to the fire of the unnamed U-Cruiser. The number of shell splashes around the escort at left may indicate that a pair of U-Cruisers has concentrated to overwhelm a convoy. The low height of the 15cm guns above the waterline, in comparison to the turrets on *X.1*, means that they can only be served efficiently in relatively calm conditions. The painting also reveals the rangetaker perched on the rear of the conning tower, at the short-based rangefinder which could only be used on the surface. Obviously, fire control relies on the officers on the relatively low conning tower spotting the fall of shot with binoculars. Moreover, they are dangerously exposed to blast from the aft 15cm gun.

CHAPTER 2

Design Criteria

A Ship of Extremes

Given the moves by the British after the First World War to outlaw the submarine as a weapon of war, a contemporary observer would have been at a loss to explain why the Admiralty conceived, and then continued with the construction of the vessel which was to become *X.1*. She could be described as the latest, and possibly the very last example of the 'Fisher Doctrine', emphasising speed and gunpower over all other qualities – and even to excess – which had led to the spectacular failures of the 'K' class submarines during the Great War and later the 'M' boats. And of course, the Silent Service was no stranger to the contradictions built into her conception and possible future employment, given the ambivalent attitude of the Admiralty towards the earliest submarines. After all, it was no less a personage than Rear Admiral Wilson VC, Third Sea Lord and Controller of the Navy, who in 1900 had dubbed the submarine as a 'damned un-English weapon'. Wilson, who had won his VC on land during the Sudan campaign, went further when he declared that we should 'treat all submarines as pirates in wartime and . . . hang all the crews'. And this when the first five out of hundreds of these 'un-English weapons' had already been ordered from Vickers in Barrow for the Royal Navy.

The secrecy which was to surround *X.1* all through her chequered career began with a total news blackout, leading to the most fantastic rumours which persisted for years. She was to have an incredible speed of *33 knots*, to keep up with the *Hood* and other fast warships . . . She would carry guns bigger than 12in, or else an armament of six 5.5in guns . . . She would be difficult to dive and control underwater, just like the old 'K' boats and the U-Cruisers. In fact her secrets were not to be displayed to the British public at large, who had paid for her, until August 1930. This was more than seven years after her launch, when she had returned home from the Mediterranean with a large question mark against her future. During Chatham's Navy Week members of the public were allowed on board her for the first time, and to coincide with this event the *Illustrated London News* of the same month published a large cutaway drawing.

X.1 was to be a ship of extremes. At the time of her launch she was the largest, the longest and the deepest-diving submarine in the world. Her designers intended her to be also the fastest diesel-powered submarine, and she was to carry the heaviest surface armament ever fitted in a submarine. Finally, she was to be the most controversial submarine design the Royal Navy ever produced, and the subject of the longest-lived policy of deliberate misinformation ever attempted by the Admiralty.[1] The success or otherwise of that policy of misinformation can be seen in Chapter 11.

Captain Nasmith's Preferences

When *X.1* was laid down in 1921 the Admiralty was seriously considering the possibility of war with Japan. It was becoming clear that the Anglo-Japanese Alliance which was due to expire in July 1921 was unlikely to be renewed a third time, in view of the frenetic naval race which was taking place between Britain, the USA and Japan. The Imperial Japanese Navy was eagerly planning new super-dreadnought classes armed with ten 16in and even eight 18in guns.

The starting point for *X.1* was the committee on designs, which after 1919 interviewed the most successful submarine officers of the First World War. The majority opinion, led by Captain Martin Nasmith of *E.11* fame, called for the development of a long-range submarine capable of raiding enemy commerce, and with a powerful gun armament to drive off escort vessels.

The committee's views were taken to heart in that the new experimental submarine planned for in the 1921/22 Estimates would carry a large gun armament. However, although it was to be *X.1*'s most obvious visual feature, her gun armament did not start out as the prime consideration for her conception. In fact it probably came a poor third.

Design Aims

She was to be experimental in three major areas:

Her designed surface speed

The fastest diesel boats during the Great War had

Martin Nasmith VC won his Victoria Cross during the Dardanelles campaign, for his exploits in disrupting Turkish supplies being sent to Gallipoli. Told to 'go and run amuck in the Marmora', he braved the nets and minefields of the Narrows in *E.11*, and began his first patrol in Turkish waters on 20 May 1915. On his triumphal return he asked for a deck gun, to greatly increase his chances of scoring damage on the enemy when far from a friendly port and carrying only a limited supply of precious torpedoes. Again, some enemy vessels were too small to rate a torpedo, and there were tempting opportunities to shell enemy troops and installations ashore. Subsequent incursions were made by boats armed with 6pdr, 12pdr and even 4in deck guns. They fought it out on the surface with armed Turkish ships, shelled railways and troop columns, and bombarded powder mills. Lt Cdr Bruce in *E.12* had even taken on and defeated a battery of Turkish field guns with his 4in gun. The damage Nasmith and his fellow commanders were able to inflict was considerable, and at one point threatened to destroy the morale of the Turkish V Army facing the ANZAC troops. During the Second World War, Martin Nasmith made an important contribution to the Battle of the Atlantic against Hitler's U-boats, by recommending the introduction of Rescue Ships in convoys, to pick up torpedoed seamen. The twenty-nine Rescue Ships would go on to save more than 4,000 men from the sea.

been the 'J' class, whose maximum surface speed of 19.5 knots was felt to be disappointing. It fell some two knots short of allowing them to operate as 'fleet submarines', accompanying the dreadnought battleships and battlecruisers on sweeps. This failure had led directly to a reversion to steam power for the succeeding 'K' class. In this area *X.1* was also to be a bitter disappointment.

Underwater control and diving trim

The disastrous experience with the preceding 'K' class had shown that it was far from easy to safely dive and control such huge submersibles. The 'K' class were so long and narrow, with large flat deck areas, and initially, a lack of buoyancy forward, that they frequently dived out of control and struck the sea bed. Their crews' difficulties were compounded by the fact that their very length made control cumbersome. The commander and diving officer were so far removed from the planesmen fore and aft that their orders had to be relayed by remote control – voice tubes or telephone. This control problem had been noted by U-boat commanders who preferred the smaller classes to the large U-Cruisers for that very reason. Most of the inadvertent dives to the bottom by 'K' class subs ended merely in embarrassment. However, on Thursday 20 January 1921 during Fleet exercises off the Atlantic Shelf, it is likely *K.5* went out of control when diving, exceeded her safe diving depth of 150ft and was lost with six officers and fifty-one men.

The quick-blow tanks built into the last of the 'K' class, the *K.26*, were intended as a safety device, in case the sub took on a steep diving angle by the bow. Cdr Raikes' proposals to fit quick-blow and quick-flood tanks at both ends of *X.1* were the key to her complete success in underwater handling, as demonstrated by her flawless diving, underwater control and surfacing performance.

For a corsair submarine, especially one with no scout aircraft embarked (as would be carried by *M.2*, the French *Surcouf* and many later Japanese boats) the necessity to dive rapidly under control was essential. The ability to surface rapidly in good control was equally crucial to her role as a surface gun platform to take her opponents by surprise. Her secondary role of underwater ambusher with a heavy bow torpedo outfit also required handiness when submerged. In all these respects *X.1* met or exceeded the hopes of her designers.

Surface gunpower

'What can submarines do? They can be built to do anything that a surface ship can do and can "get there" unseen to do it, but when there they cannot do it as well.' So wrote the Technical History Section of the Admiralty in 1921.

The *X.1* was built to test theories on how to successfully operate a corsair submarine, designed to range far from base on extended patrols to disrupt and destroy enemy convoys and communications, in an oceanic context. Examination of captured U-

Cruisers had revealed the potential of a large long-range raider carrying a heavy surface armament. However, the Armistice had intervened before many U-Cruisers could show their form in actual combat situations, and the U-boat war had hinged on the efforts of smaller boats – which could operate as far away as the US coast but relied on stealth and torpedoes rather than gunpower. Drawing on successful Allied developments of the latter part of the Great War, it was to be expected that enemy convoys would be escorted by sloops or frigates, but also by first-rate destroyers. Recent experiences told submariners how difficult it was to sink or disable one of these fast, highly manoeuvrable, shallow-draft opponents.[2] Imperial Germany's High Seas Fleet had launched and commissioned 235 destroyers. The number lost to all causes, principally mining, was sixty-eight ships – of which only four were torpedoed

X.1 seen from her bulbous bow, showing her forward turret.