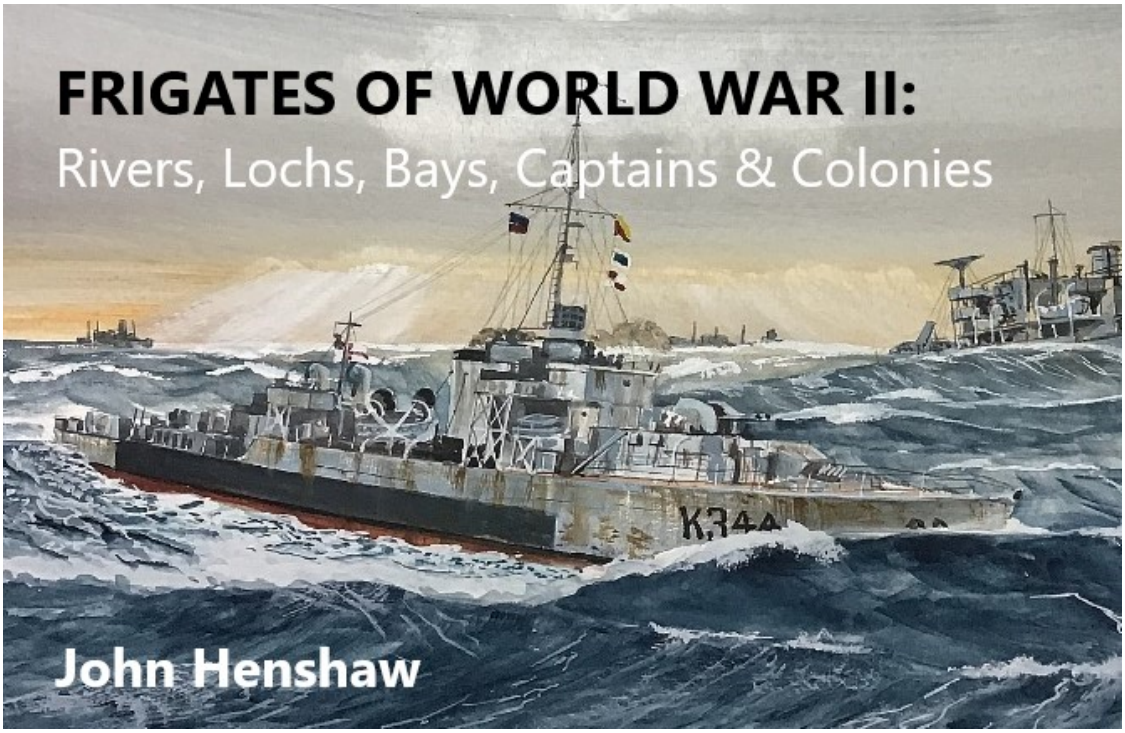


Frigates of World War II:

rivers, lochs, bays, captains & colonies

Painting by kind permission of Jim Rae.

John Henshaw
10 Inglis Court
Cape Schanck VIC 3939
wjdhenshaw@gmail.com

CONTENTS

DEDICATION

Dedicated to the memory of
Captain Frederick John (Johnnie) Walker, CB, DSO and 3 bars
3 June 1896 – 9 July 1944

Captain "Johnnie" Walker, on the bridge of HMS *Starlin*g directing his remarkably successful 2nd Escort Group by loud hailer, 25th February, 1944. He died of a stroke less than five months later due to overwork and exhaustion.
[commons.wikemedia.org]

ACKNOWLEDGEMENTS & NOTES ON THE DRAWINGS

One can only begin to write a book such as this from reading many other books. Brian Lavery's, *River-class Frigates and the Battle of the Atlantic* provided a mine of information on the River Class. Norman Friedman's several books were, as always, useful beyond measure and were constantly being referred to for the sort of detail I needed or to cross-check information gleaned from other sources. As always, thank you Norman. Patrick Boniface's book on the Lochs was useful and his detailed history of each and every ship provided an interesting look into the more personal aspects of their careers. David Brown's, *Atlantic Escorts: Ships, Weapons & Tactics in World War II,* was also a frequent reference. work. For information on frigate camouflage I am most indebted to Malcolm Wright's incomparable book, *British and Commonwealth Warship Camouflage of WWII: Destroyers, Frigates, escorts, Minesweepers, Coastal Warfare Craft, Submarines & Auxiliaries*.

But my drawings did not come from books written by others. They don't exist. That's why I wrote this book. I wanted to gather in one place all the information about the frigates of World War II – well, all the technical type information that I considered relevant to the average reader – and present this with my drawings at a constant scale (1:350) so that the evolution of the breed could be examined, so that one could see in one volume a substantial cross-section of the four principal classes of frigates that helped win that vital 2,073-day-long, Battle of the Atlantic.

The basis – the starting point - of the drawings was a rather indistinct two page drawing from the Historical Naval Ships Association (Booklet of General Plans, 1941, River Class Frigate, river.pdf ,6.4 MB PDF) It's not actually a booklet, just two sheets named: *River Class Frigates, General Arrangement, Profile & Foc'sle Deck, Scale 1/8" = 1 Foot.* It's not possible to read a date, but two things are interesting. First, the use of the term "Frigate" and, second, the fact that the armament consists of (or what appears to be) a twin 4-inch Mk XVI forward and a 12-pounder 12 cwt aft which makes this a Canadian-built and Royal Canadian Navy-manned frigate because the term frigate and this weapon fit was not current when the first River Class ships were built – they were referred to as "twin screw corvettes".

But, for all the drawing's age and lack of detail it was a start. I was able scale of it and produce on AutoCAD a profile and a deck plan with all of the basic elements in place – especially knowing the frame spacing. So, why was the frame spacing important? Ships are constructed on a modular basis – the frame spacings dictate where bulkheads and where other structural elements are located. Because I have to create my drawings by scaling off other drawings, when I work out a dimension and transfer it to my drawing, its relationship to the framing grid determines the final location. For instance, deckhouses and masts will line up with a frame because they will be supported on the beam that spans the frame or will be a continuation of the bulkhead beneath. Deck openings fit between deck beams. Scuppers, ventilators and portholes always fit between frames. Then I came across the Australian Department of Defence's drawing #A 015510 of the Improved River Class. This showed up some differences which muddied the waters but I was subsequently able to add considerable detail from this drawing augmented by all manner of detail obtained from any number of public domain sources, such as a General Arrangement drawing of HMS *Swale* as fitted on 23 March 1943, and a more detailed drawing from the CFB Esquimalt Naval and Military Museum in Canada of HMS *Spey*. Each of these allowed me to build up my base drawing and provided information that illustrated the changes that had been carried out over time. Would that I lived in England then I could have buried myself in the archives of the National Maritime Museum at Greenwich to ferret out builders' plans from its extensive collections.

The drawings have all been prepared by me using AutoCAD. With CAD you draw in 1:1 scale. That is, you draw the actual dimensions – or what you reckon to be the actual dimensions. If you had a printer and paper big enough, you could reproduce the plans full size.

While I work solely in the metric system, I have chosen to write the book using measurements in the Imperial system as this was the system of the time.

The purpose of the drawings is not to provide a definitive set of drawings, or a reference work for such model-makers who, having been one, tend to be a pedantic lot. Absolute and total accuracy to some is an obsession. My drawings should be viewed, therefore, as a means of making comparisons of one ship with another, to see the progression of the design from its beginnings and to identify what basic changes occurred. As such, the amount of detail on the drawings is by no means all-embracing. At 1:350 scale, a lot of that detail is lost anyway as, no matter how good a printer may be and using the finest line possible, it is simply not possible to distinguish all the detail. If I had the original drawings, I would have used them. In many instances, because the drawings or the photographs I have had to work from have been basic to say the least, I have had to make calculated guesses as to what sort of detail to include to give an overall impression rather than a definitive drawing. In order to give some idea of the likely arrangement of flag and signal halyards and radio aerials, I have chosen to draw all yards at 15 degrees from the horizontal except where there is a lattice mast where I felt that this looked wrong.

I trust readers will regard my drawings as descriptive rather than prescriptive – as a means of making comparisons between types rather than thinking of any one of them as being an absolutely factual representation. If I was ever fortunate to come across the builders' drawings it would give me great pleasure to make good all inaccuracies in a later edition.

CHAPTER 1 INTRODUCTION

Rear Admiral Sir Horatio Nelson wrote to Earl Spencer (First Lord of the Admiralty) six days after the Battle of the Nile ended:

> *My Lord, Mouth of the Nile, 9th August, 1798.*
>
> *Was I to die this moment, 'Want of Frigates' would be found stamped on my heart. No words of mine can express what I have, and am suffering for want of them.*

In the days of sail, in Nelson's period especially, frigates were the equivalent of World War I and II's light cruisers in that they were faster than the ships of the line – the battleships of the time, big, heavy, hard-hitting multi-decked ships that were designed to stand toe-to-toe with the opposition until one ship struck its colours. These ships could range from First Rate ships with three decks with 100-120 guns, Second Rate ships of 84-98 guns, Third Rate ships of 72-80 guns in two and three-deck types, of which a "seventy-four" was the most popular, down through two-decked ships of the Fourth Rate with 50 guns. The Fifth Rate ships were the single-decked frigates of around 30 guns. Compared with the First to Fourth Rate ships, frigates were relatively lightly built and lightly armed. Their speed and manoeuvrability allowed them to scout ahead of the fleet, make contact and then maintain contact with the enemy fleet, hopefully at a safe distance. They positioned themselves where they could signal the enemy's movements to their own fleet or sail back quickly with that information or, in a fleet battle, stand clear and act as transmitter of signals clear from the gun-smoke. The frigates were versatile ships and usually acted alone, as independent commands, harrying the enemy however and whenever possible, threatening trade routes, blockading ports, landing raiding parties, making general nuisances of themselves. They were, perhaps, the glamour ships of their day. Frigate commands were keenly sought for a chance of glory and possibly the distribution of valuable prize money from intercepted merchant ships. In many respects, they could be compared to those elegant and powerful Tribal Class destroyers that were conceived in the mid-1930's and which performed such prodigious tasks during World War II, often solo - and suffered as a consequence. One brings to mind the famous Altmark Incident when HMS *Cossack* steamed up a neutral Norwegian fjord and freed three hundred merchant seaman who were imprisoned on the German tanker *Altmark* having been captured when their ships were intercepted by the German pocket battleship *Admiral Graf Spee*. According to legend the Cossack's intervention was greeted with the cry, *"The Navy's here!"* and was the last action when naval cutlasses were used by a boarding party. Very 18th Century frigate-like!

American frigates tended to be larger and more heavily armed, probably because their relatively new navy initially lacked the larger ships of the line. Six frigates in particular, designed and built by Joshua Humphreys – often referred to as "The Father of the American Navy" - were what might be termed today as super-frigates. In a two-year undeclared war with France and, later, the War of 1812 with Britain, they were unbeatable in one-on-one actions. Their presence in the Mediterranean put an end to the Barbary Corsairs that had terrorised American merchant ships after the War of Independence.

The term frigate was carried on into the nineteenth century – into the age of warships with steam and sail combined – due to the fact that like Nelson-era frigates, the armament was carried on one single deck. There were "Steam Frigates" (which still carried sail to increase their range), "Screw Frigates" to distinguish them from "Paddle Frigates". Then the term simply dropped out of use in the late nineteen-century. After a period when frigate-like warships gained names like, "Protected Cruisers" (due to the use of armour), "Wooden Screw Corvettes" or "Colonial Sloops", the hierarchy neatly descended in this order: Battleships, Battle Cruisers, Heavy Cruisers, Light Cruisers, Torpedo Boat Destroyers (later simply called Destroyers) and minor warships like Sloops, Minesweepers and the like.

Modern frigates – especially those in the United States Navy – tend to be of the proportions (length and displacement) of World War II light cruisers and are often dedicated to one specific task: anti-submarine warfare. In this, they share at least one *raison d'être* with World War II frigates. While their armament for dealing with submarines is more sophisticated – helicopters, homing torpedoes, various types of missiles launched then directed by the ship's sonars – their purpose is the same; a dedicated sensor and weapons platform.

The subject matter of this book - the war-built frigates – were emergency measures and most were built to mercantile standards (Lloyd's Register Rules and Regulations) whereas warships are built to Milspecs – Military Specifications. Mercantile specifications were chosen for the sake of economy and speed of construction. It allowed shipyards familiar with building all manner of merchant type ships that were not accustomed to the more rigid naval methodology to engage in the urgent need for escort-type vessels. Milspecs were like belt-and-braces compared to mercantile standards. They were designed around survivability, an ability to sustain battle damage and, in recent decades, the built-in ability to accept refits as and when new technology came to the fore. That's not to say that the war-built frigates were the antithesis of this, that the mercantile standards meant that they were potential death traps. There were five instances of River Class frigates being torpedoed and being towed back to port and one (HMS *Cam*) where her own depth charges set off unexploded ammunition in a sunken wreck which caused considerable damage and casualties, but she too was towed back to port. While all were ultimately declared constructive total losses and scrapped, the point is they did not sink.

The following table will give some appreciation of the magnitude of the increase in the Royal Navy's fleet resulting from war-built corvettes and frigates (and the closely related Black Swan sloops not included):

TYPE	NUMBER BUILT	AVERAGE TONNAGE	TOTAL TONNAGE (standard)
Flower Class Corvettes	267	1,000	267,000
Castle Class Corvettes	44	1,060	46,640
River Class Frigates*	151	1,370	206,870
Loch Class Frigates	30	1,435	43,050
Bay Class Frigates	26	1,600	41,600
Colony Class Frigates	21	1,264	26,544
Captain Class Frigates**	78	1,293	100,854
***	**617**	**1,289**	**732,558**

*Does not include the RAN frigates

**Made up of two classes, Evarts and Buckley

***Does not include Minesweeping type vessels used as anti-submarine escorts such as Bangor, Bathurst (RAN) or Algerine classes etc.
Refer also to Chapter 4, Numbers Built

This book examines the reason the frigates of World War II were needed in the first place. It examines why the escort-type vessels that were in use, why those that were coming into service and why those that were being converted from other uses weren't considered suitable to effectively battle the German U-boats and describes how the frigate design evolved and developed to meet the requirements of, principally, the Battle of the Atlantic.

CHAPTER 2 THE BATTLE OF THE ATLANTIC

On 3 September, 1939 Britain's Prime Minister, Neville Chamberlain, broadcast to the nation the fact that a state of war existed with Germany as a result of Germany's invasion of Poland and Britain and France's alliance with Poland.

The Second World War, as it became to be known, had begun.

Nine hours later the transatlantic liner, SS *Athenia*, was torpedoed 250 miles north-west of Ireland by the German submarine, U-30 with the loss of 117 lives. German U-boats had been deployed ahead of the commencement of hostilities. The intention was clear. And so, commenced the Battle of the Atlantic; a battle that lasted 2,073 relentless days – just short of six years - until peace was signed on 7th May, 1945. Prime Minister Churchill is believed to have coined the phrase and later, said; *"The only thing that ever really frightened me during the war was the U-boat peril".* (Their Finest Hour)

He also said the Battle of the Atlantic was; *…the dominating factor all through the war. Never for one moment could we forget that everything happening elsewhere, on land, at sea, or in the air, depended ultimately on its outcome"*. (The Second World War. Vol 5, Closing the Ring)

Unlike other specific campaigns of the European war – The Battle of France, the Dunkirk Evacuation, the Norwegian Campaign, the North Africa Campaign, the Battle of Britain, the Invasion of Europe, to mention but a few – the Battle of the Atlantic occupied the whole of the period of the War, without respite. It was a battle that simply had to be won. It was, in its very essence, the difference between failure and success. The difference between Britain surviving or being subjugated by Germany.

Britain, an island nation, relied heavily on its trade routes to export its manufactured goods and to import its raw materials and foodstuffs. No other country was so vitally dependent on sea-borne trade (Denton). Sir Henry Newbolt summed it up in his poem, *'The King's Highway'.* The trade routes were just that – the King's Highway. The Empire's Highway.

Recognising this, in the First World War, Germany tried to starve Britain into submission through a then novel U-boat-driven blockade of the Atlantic trade routes. Germany was in turn blockaded by the Royal Navy in the North Sea, denying the German High Seas Fleet access to these sea lanes. Historians are divided as to whether the blockade ultimately brought Germany to its knees and precipitated the November revolution which led to the collapse of the Kaiser's administration and his exile.

While Britain had the world's largest merchant fleet in 1939 – 6,722 ships totalling 17,891,134 tons, losses to its fleet and the fleet of its allies, primarily via Germany's U-boat campaign and also via its commerce raider campaign, became greater than its ability to replace the lost ships. Had that downward spiral continued unabated, Britain would have reached the point where it would not be able to maintain the level of materiel necessary to conduct the war and to feed its people.

The end result of that is self-evident.

The Royal Navy defended these vital shipping lanes by immediately reverting to the lesson learnt in the last 18 months of World War 1 of assembling merchant ships into convoys, defended by as many escorts – mainly fleet destroyers at first – as could be spared. Convoys had proven their value in the days of sail with the concentration of and economy of force to ward off pirates and privateers. In Napoleonic times, marine insurers demanded a War Risks Premium one-third to one-half greater for ships sailing independently.

In the vast expanses of the Atlantic Ocean, one large convoy is harder to find than, say, the forty–odd individual ships it might contain all sailing independently on a similar route. Forty such ships are forty times more likely to be discovered than one. Given that a convoy might take between 15 and 20 days for an Atlantic crossing, depending on speed and the evasive route taken, and that there was about one sailing a week, there might be 10-20 convoys spread over an immense ocean at any given time and the chances of detection were quite small.

Throughout the Battle, sinkings of independently routed ships accounted for the largest proportion of sinkings. While some convoys suffered grievously – particularly when whole wolf-packs of U-boats made contact and attacked *en masse* – the large percentage of trans-Atlantic convoys arrived at their destinations intact. This may have been as high as 91.57% depending on how you interpret the many tables in Hague's excellent work, *The Allied Convoy System 1939-1945.* However, what can be deduced from the data is that something in the order of 96,000 merchant ships were convoyed in an average convoy size of 30 ships for a loss ratio of less than 1.0%.

While a convoy was a method of saving ships, it was also a method of destroying submarines. A convoy forced the opponent to come to it and accordingly gave the escorts opportunities to attack the submarines. Sinking them was not the escorts' stated objective - at least not until such time in the Battle of the Atlantic as the numbers of escorts available allowed this luxury. Until then, the object was, *"The safe and timely arrival of the convoy"* and to achieve this the escorts were to keep the submarines submerged where their inferior speed and range only under electric power made them less of a threat to a convoy.

The Battle of the Atlantic can be divided into relatively distinct periods.

1 September 1939 to June 1940 was marked by submerged daylight attacks on independent merchantmen.

While the German U-boat fleet was small, the British force available to the RN was also small and convoys were thinly protected and there were insufficient escorts to accompany convoys beyond 100 nautical miles west of Ireland. After two or three days' sailing, outbound convoys dispersed following independent routes. Inbound convoys were met a similar distance from Ireland. It not would be until much later in the battle that a port-to-port convoy defence would be available as more escorts – particularly Flower-class corvettes – became available. Submarine attacks were conventional: daylight at periscope depth and directed at the large number of merchant ships that were travelling independently or stragglers from convoys.

2 July 1940 to March 1941 was marked by a change of tactics and saw night surfaced attacks on convoys.

The fall of France allowed German long-range reconnaissance aircraft to patrol well out into the Atlantic and direct U-boats to convoys. Basing U-boats in French Atlantic ports considerably shortened transit times allowing more times for patrol. From September 1939 to July 1940, the ratio of U-boats in service to U-boats at sea was 2.35:1. From July 1940 to July 1941, the ratio of U-boats in service to U-boats at sea was 1.84:1 – and improvement of almost 22%. (Goodhart) The threat on invasion drained RN ships that would have escorted trans-Atlantic convoys from the Western Approaches to the south of England. June 1940 to February 1941 was known by the German submariners as *"The Happy Time".* Convoys were trailed in daylight and attacked on the surface at night, U-boats often entering the columns of the convoys.

3 April 1941 to December 1941 was marked by the increasing use of wolf-pack attacks and by the evasive routing of British convoys.

Instead of individual night attacks on the surface, wolf-packs became the norm. When a convoy was contacted, instead of attacking immediately, the wolf-pack was directed to the convoy so that by acting in concert the escort would be overwhelmed. At this time, the average number of escorts available to a convoy was only five. The new building program has been escalated and about 20 U-boats were being commissioned each month. Fortunately, the threat of invasion having been removed, largely due to Hitler's emphasis to the East and Operation Barbarossa, more escort ships became available and shore-based aircraft equipped with air-to-surface radar began to have an impact. Convoys became larger and more sophisticated in their routing with port-to-port escorts, the first of which occurred in May, 1941.

4 January 1942 to September 1942 was marked by attacks along the American eastern seaboard.

America's entry into the War gave Germany the opportunity to direct its U-boat activity against an unprepared foe. Admiral Ernest King, Commander in Chief of the United States Fleet, and an Anglophobe, would not accept the Royal Navy doctrine of convoys and persisted in a doctrine of allowing unescorted shipping and refused the loan of Royal Navy escort vessels. Losses were catastrophic – 698,000 gross tons in June alone when the convoy system was finally adopted. The Germans called it the *"Second Happy Time"*. U-boats sank ships faster than they were being built until about the end of 1942. Losses began to be reduced as convoy and other measures were introduced. Among these was an increased use of High Frequency Direction Finding ("Huff Duff") which allowed 105 out of 174 North Atlantic convoys to be diverted away from ambushes and for 23 convoys to partially avoid them. Sixteen were not so fortunate. Lack of targets saw German attention was redirected south to the less well defended soft spots, the Caribbean and Gulf of Mexico.

5 October 1942 to June 1943 was marked by large wolf packs attacking convoys in the north-west Atlantic.
The mid-ocean gap - that part of the North Atlantic that was not covered by very long-range (VLR) land-based aircraft - became the focus of the U-boats in October 1942 and large wolf-packs spread out in patrol lines covering vast expanses of the ocean with up to 100 U-boats at sea. Concerted attacks disorganised convoy formations and their defence. Trade tonnage lost in November topped 700,000 gross tons. May 1943 saw a turning point, however, as more VLR aircraft became available, and escort aircraft carriers sailed in support of convoys. Also, the average number of escorts available to a convoy had risen to eight. Convoy ONS 5 (outward bound, Britain to USA) saw a decisive battle with 6 U-boats sunk and 7 damaged of the 58 ranged against it. After 17 May, no ships were sunk in the North Atlantic for some time.

6 July 1943 to May 1944 was marked by a temporary abandonment of the large wolf packs in the north Atlantic.

The Germans sought to find a soft spot in Allied defences and failed. July saw more U-boats sunk than merchant ships for the first time in the Battle of the Atlantic. They were forced to stay submerged and were forced to adopt a defensive posture. They lost mobility but had some successes with acoustic torpedoes, especially against the escorts. Despite concentrated efforts, the Germans were unable to counter the Allies' technological superiority and their application of radar, HF/DF and the application of aircraft in the anti-submarine war.

7 June 1944 to the end of the War was marked by operations in British home waters.

The D-Day invasion of Normandy saw an immediate requirement to redirect aggressive action in the English Channel but the heavy concentration of air and sea patrols nullified provided only limited successes. In August and September, the U-boats were forced to withdraw from the Bay of Biscay bases and had to be content with a coastal offensive in British waters which had only limited success. Production difficulties denied the Germans the use of the technically advanced but unproven Type XXI U-boat and the surrender in May 1945 occurred before these became operational.

(Source: principally Sternhell and Thorndike)

Typical North Atlantic stormy sea, but ones that probably neutralised the U-boats. HMCS *Sea Cliff* battles the conditions. The camouflage pattern – the simple contrasting panel low on the hull - suggests this photograph was taken mid 1945 when *Sea Cliff* was refitted for anticipated service in the Pacific. [forposerityssake.ca]

HMCS *Swansea* was party to the sinking of no less than four U-boats: U-448 with HMS *Pelican,* U-311 with HMCS *Matane,* U-247 with HMCS *St John*, U-845 with HMS *Forester*, HMCS *St. Laurent* and HMCS *Owen Sound.* [forposerityssake.ca]

CHAPTER 3 GENESIS

The Flower Class corvette formed the initial backbone to the Royal Navy's answer to the German U-boat problem, both coastal – for that was what they were primarily designed for – and trans-Atlantic, for which they were not designed or, indeed really suited. While being eminently seaworthy, having design origins in whale catchers, they were too small, too cramped, too volatile a platform in rough weather and lacked endurance – both in fuel terms and their too-easily fatigued crews. They were intended to operate close to home under the protection of air-cover in relatively calm, East Coast waters. They were a stop-gap measure - a proverbial finger-in-the-dyke to make up for the short-sighted Admiralty's between-the-wars lack of appreciation for the need to properly protect Britain's trade routes from the submarine threat that had become only too apparent in World War I. A large cruiser fleet was seen as a more than adequate protection against surface raiders. However, lessons learnt in World War I seem to have been quickly forgotten. Anti-submarine warfare was viewed as the less-than-desirable aspect of naval service and failed to attract the necessary brainpower to make use of what limited financial support was made available. Between the wars there was time-a-plenty and no money to spare; when war came there was suddenly money available but no time to spare. The Royal Navy was to rue the lack of attention to anti-submarine warfare and naval aviation.

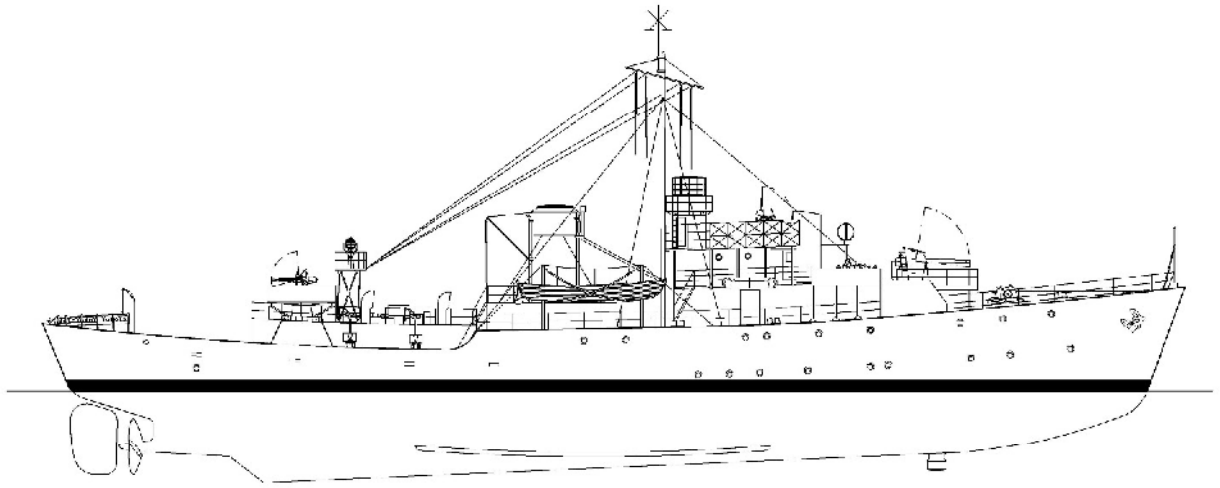
A large fleet of destroyers, many of them dating back to World War I, supplemented by a program designed to deliver at least one new-build flotilla each year, was not an answer to the problem. The ideal convoy escort is not a destroyer, and certainly not a fleet destroyer with its heavy gun and torpedo armament. What is needed is a long-ranged, seaworthy platform capable of a reasonable turn of speed, highly manoeuvrable with the emphasis on anti-submarine weapons and, of course, reasonably able to defend itself. Sloops of the *Black Swan* Class fitted that bill nicely but they were expensive and slow to build – not significantly less than a destroyer on both counts.

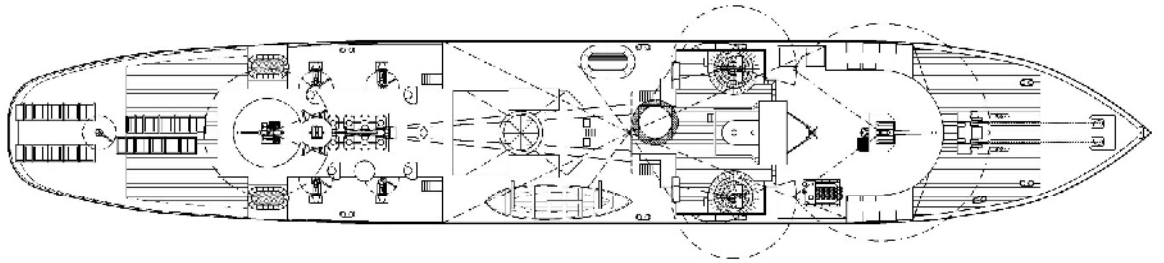
The venerable V & W Class destroyers dated from the closing days of World War I and just after. They were trend-setters in basic destroyer design that lasted, in principle, for the next twenty years. However, by the start of World War II they were no longer suitable

to perform the roles of fleet destroyers; although the Royal Australian Navy's "Scrap Iron Flotilla" – so named by Germany's Propaganda Minister, Joseph Goebbels – did just that, successfully, in the Mediterranean. Despite their obsolescence, they made excellent and timely conversions to anti-submarine destroyers and leaders of convoy escorts, despite the fact that they were designed for North Sea operations not the North Atlantic. Some were converted to Long-Range Escorts by the removal of forward boilers. A destroyer with a convoy was always useful to pursue a contact or harry stragglers having the speed necessary to re-join a convoy, something the Flower Class with their 16-at-best-knots was sorely pressed to do. This fact alone often limited attacks on submerged U-boats to be called off prematurely because of the time taken to catch up with the convoy, slow as its own progress might be. My drawing on page 15 is of a Modified Flower Class Corvette and page 16 are simplified drawing showings how the design progressed to that point.

Please note that because this document is a PDF the drawings which follow have to be inserted as JPEGs and, as a result, the line quality is less sophisticated than the originals.

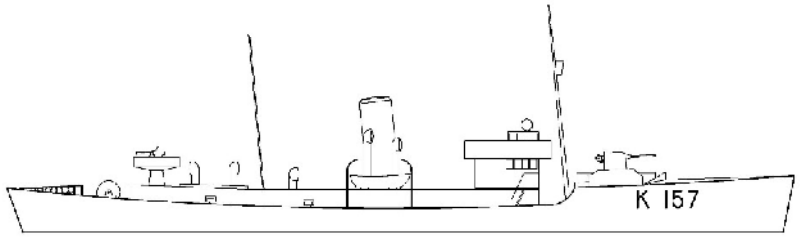
FLOWER CLASS CORVETTE
MODIFIED TYPE





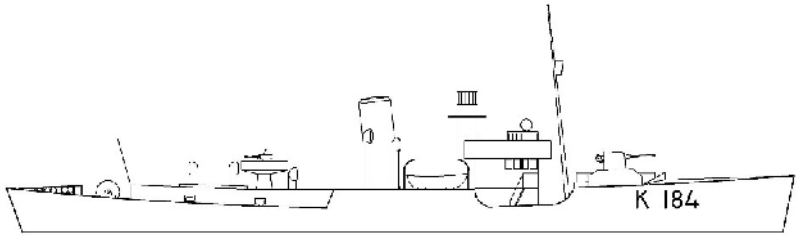
The Flower Class Corvettes bore the brunt of the Battle of the Atlantic even after the first of the River Class frigates came into service. Records speak for themselves with Flowers being credited as the single class of ships with the most U-Boats destroyed: 38. The total destroyed by all four classes of frigates (Rivers, Lochs, Captains and Colonys) with their far superior seakeaping, range and weapon fit was 67. This drawing is of the Improve or Modified Flower Class which was the last of the breed and was a far more sophisticated ship than the previous versions - albeit still slow and "able to roll on wet grass" according to their crews!

FLOWER CLASS CORVETTES (1)



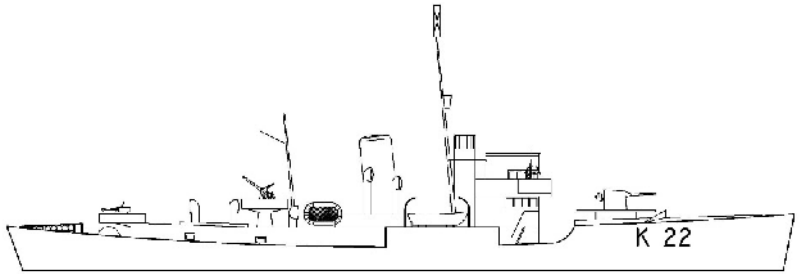
HMS DAUPHIN

The very earliest type, some did not even mount the 2 pounder aft.



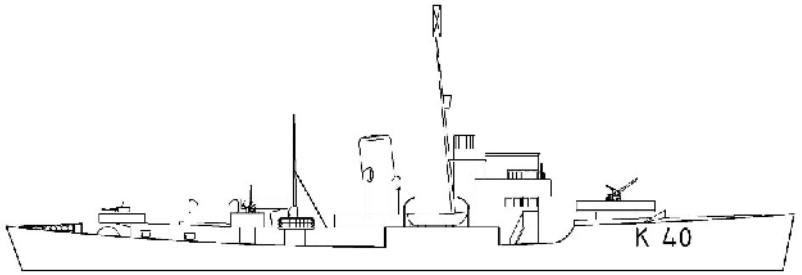
HMS ABELIA

The next modification was to remove the mainmast, build in part of the waist and add Type 271 radar.



HMS GLOXINIA

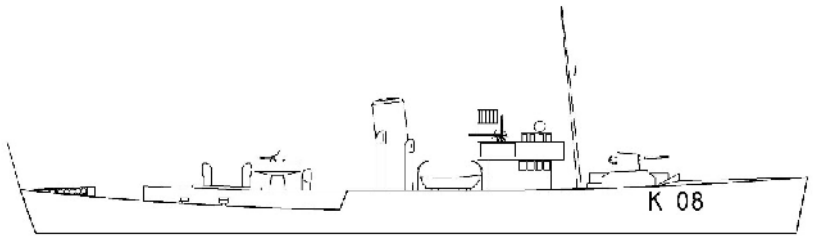
An unusual combination of the mast moved aft, an open bridge above the wheelhouse, the waist built in and a 12-pounder installed aft, the 2-pounder moved plus Type 286 radar added.



HMS PEONY

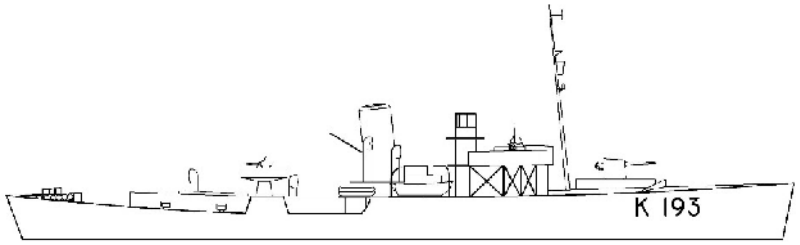
Two 20mm Oerlikons have been added and the 2 pounder moved aft.

FLOWER CLASS CORVETTES (2)



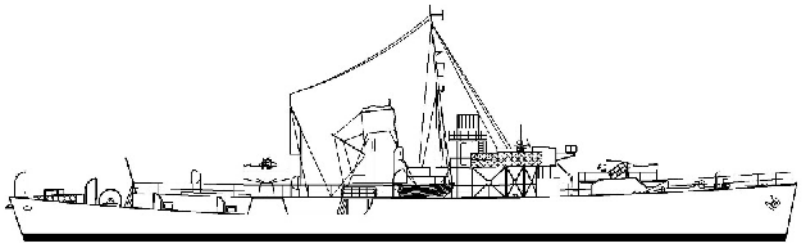
HMS SPIRAEA

Here the forecastle has been extended but the mast is still in front of the bridge which now has 20mm Oerlikons in the wings.

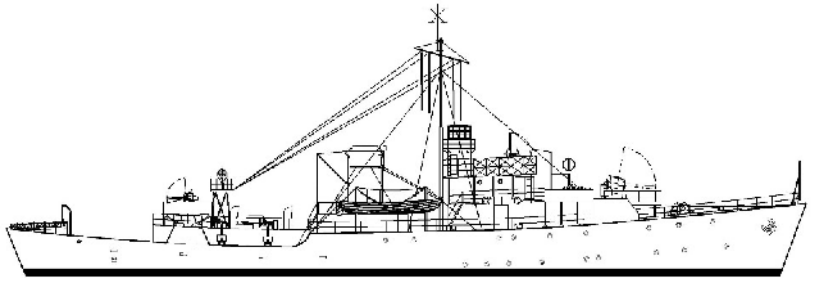


HMS BUTTERCUP

Extended forecastle plus a new type of bridge.



The penultimate version: long forecastle, mast behind the new type bridge, standard armament and radar fit.



The final version: longer hull, more freeboard, new 4-inch gun. Hedgehog ATW.

NOTE: It is probably fair to say that, with the exception of the final Improved versions, there were no two Flower Class corvettes that were absolutely identical at the same point in time having regard to the intervals between refits and the equipment available to them at the time. The eight illustrated on these two pages are just a snapshot of the many various types.

THE 27TH NOVEMBER 1940 CONFERENCE

It was prescient therefore that, with only some forty-one of the Flower Class in commission at the end of October 1940, that at some unknown date in November 1940, two basic designs were prepared for the Admiralty, presumably by the Director of Naval Construction (DNC), Sir Stanley Goodall. These were discussed on 27th November at a conference convened by the First Sea Lord. Both the naval historian, Normal Friedman [1] and David Brown [2] cover similar ground – some of which is contradictory and some of which is complementary. I have, therefore, cherry-picked from both.

Brown gives a "wish list" [3] which is also covered by Friedman but as a Staff Requirement – in effect, a performance specification by the Naval Staff – by the chairperson of that conference, Rear Admiral H. R. Moore, as follows:

> Good sea-keeping.
> A speed of at least 20 knots – 22 if possible – with good acceleration and astern powers. Friedman makes reference to *"the desirable escort speed was 22 knots in half-oil condition"*. [4]
> Endurance of 3,500-4,000 miles.
> Small turning circle (distance not specified).
> Simple machinery that was easy to maintain.
> One 4-inch HA/LA and two 2-pdr and two 20-mm Oerlikons. Brown adds: simple fire control but if two 4-inch fitted then director with Type 285 (radar fire control).
> It is interesting to note that Oerlikons were specified as the production rights to these had only been obtained in early 1940. British production did not commence until the end of 1940 and the first ships to be fitted with these were in March-April 1941. (See Appendix J)
> Four depth charge throwers each side and two depth charge tracks to provide a pattern of fourteen charges with 100 charges total.
> Stiffened stem for ramming.

Items mentioned by Brown but not by Friedman were:

> ASDIC, radar, W/T and R/T.
> Minesweeping gear for acoustic mines and wire minesweeping.
> Small crew.
> Cheap and easy to build using existing shipyards of a suitable size and familiar with mercantile practices.

Brown suggests this "wish list" was the result of the meeting which, amongst other things, rejected diesel propulsion as unreliable for continuous high speed, the space taken up by reciprocating machinery and its inability to provide acceleration was considered a disadvantage and the 12,000 SHP turbines thought necessary to deliver the necessary performance were subject to the well-known production difficulties. [5] Although a heavily industrialised country, Britain had limited ability to produce the type of diesels engines necessary anyway. High-speed diesels were not and never have been the country's forte.

However, Brown suggests that a design was *"begun in about November 1940 when it was referred to as a twin-screw corvette"*. [6] If that is so, the design pre-dated the Staff Requirement. The proverbial horse was put before the cart. Friedman is more explicit. He states two design proposals were put to that meeting – which surely must have been to meet a Staff Requirement issued previously - as follows:

THE PROPOSALS

Proposal A: or more properly Admiralty DNC 30/B 90 Nov 1940, is shown as a very basic, schematic drawing by A D Baker III. [7] Its essential details were: LBP 283 feet, Beam 36 feet, Draft (mean) 10'6", Displacement 1,600 tons.

This was a very austere ship. It was to be built to mercantile standards with two sets of the Flower Class' VTE reciprocating machinery but fed by water-tube boilers and not Scotch boilers – 5,500 IHP giving a speed estimated at 20 knots in half-oil condition. Its armament was basic having the same breach-loading 4-inch main gun as the Flower Class and only one more 2-pounder Mk VIII than the Flower Class's single. It should be noted, however, that at this time some Flower Class did not even receive the single 2-pounder, such was the demand for what was an obsolescent gun anyway. There were to be Lewis guns (Light machine guns dating from World War I) on the bridge, again like the early Flower Class. However, the main difference was an increase in the number of depth charges on board – 100 – and the number of throwers at four per side, although these are not shown on the DNC drawing.

Looking at the design, I note that the 2-pounders are staggered but, since there's no deck plan, it is difficult to determine just how this would have worked given the presence of the mainmast abeam them. A better arrangement would have been to mount the mainmast further forward and arrange the 2-pounders *en echelon* or, better, mount both on the centreline and superimpose one above the other for better fields of fire. It is of interest that the foredeck was deliberately left bare of any form of weaponry with the 4-inch BL Mk IX

mounted one deck higher, nominally the flag deck, perhaps so it could be worked in heavy seas. The concept of a weapon mounted on the foredeck that could throw an anti-submarine missile ahead of the ship – most often thought of as a depth charge or depth charge-like missile – had its origin some years before. These should not be confused with the late World War I naval howitzers designed as anti-submarine weapons but firing conventional shells exploding on contact rather than charges exploded by hydrostatic pressure. In this latter category, the crudely called "Bell-mouthed Bastard" had been designed, unsuccessfully, to fire quite a large projectile from a mounting sunk into, presumably, the foredeck. Another, name unknown, used rockets. [8] A Fairlie Mortar with multi barrels in a fore-and-aft configuration had also proved unsuccessful as had a similar, five-barrelled, athwartship arrangement by the ever-inventive Thornycrofts called the "Five Wide Virgins". It was clumsy to reload and was redesigned with ten barrels as "Parsnip," but this too failed to gain acceptance. It would seem that recognition that the need for such an ahead-throwing weapon was going to be met in the near future was probably a reason for keeping the foredeck free. The Hedgehog eventually won the race. It was a spigot-mortar owing its beginnings to Lt. Colonel Stewart Blacker for use as an anti-tank weapon – the "Blacker Bombard". [9] Prior to the War, Blacker had suggested the use of such a mortar to the Admiralty for attacking submarines but was rejected. The Department of Miscellaneous Weapons Development – also known as the "Wheezers and Dodgers" – took up the concept on the basis of firing not one but a ring of twenty-four bombs. After many trials and tribulations, a successful demonstration on land before Prime Minister Winston Churchill saw it tested at sea on HMS *Westcott* in May 1941 and go into production nine months after the first drawings had been prepared. [10]

I have taken the liberty of redrawing Proposal A in more detail to show what it might have looked had DNC tricked it up a bit more for presentation purposes. This also allows a comparison with the actual River Class as eventually built. There was no deck plan available so I have provided my estimate based on the dimensions given, the final shape of the River Class bow and the stern shape based on the fact that the profile indicates a cruiser type stern which went hand-in-hand with the elliptical plan shape common at the time.

Proposal B is not detailed. However, what is known is that it was a much more warship-like proposal using a *Black Swan* Class power plant – that is, geared turbines of 4,300 SHP for a similar speed but at 1,030 tons displacement. Considering that the displacement is less than two-thirds that of Proposal A, it must have been a significantly smaller ship even allowing for the fact that the turbines occupy less space and weigh less than the reciprocating machinery of Proposal A. Since the manufacturing of turbines and their associated reduction gearing was a major bottleneck – and would remain so for the duration of the War – and these ships were going to be crewed by reservists more familiar with reciprocating machinery, Proposal B was probably doomed from the outset. Even if there had not been a problem with producing turbines – a lag time of eighteen months was possible - and with crew operating and maintaining them, finding sufficient shipyards with the necessary abilities, facilities and qualifications to build ships to warship specifications versus mercantile specifications would have seriously reduced the volume of ships urgently needed.

What is of interest is that the term "fast corvette" apparently was used at this conference. The term "twin screw corvette" was also used. There are many references to the Royal Canadian Navy's Rear Admiral P. W. Nelles (who was not present at this conference) as being the person coining not only the term "Corvette" as applicable to the Flower Class, but also the classification Frigate for the River Class. The Canadian War Museum's Fact Sheet #21: Canadian River Class Frigates, states:

> "*The class name 'Frigate' was proposed to My Lords of the Admiralty by Vice-Admiral Percy Nelles when he was Canadian Chief of the Naval Staff"* (1934-1944).

Lavery is more explicit. [11] He says the RCN began using the term Frigate in March 1942 before any were in service and that this incurred the displeasure of the Admiralty, so much so that in April a curt reprimand from the First Sea Lord to the Canadian naval headquarters said*, inter alia*;

> *"It is, therefore, considered insufficient justification for the use of the term frigate and it is therefore, intended that all ship shall be designated corvettes…"*

However, Friedman states that the term Frigate was not adopted until February 1943 – six months after the first River was commissioned. [12] This assertion is borne out by captions of photographs held by the Imperial War Museum which are, typically:

> ONE OF THE NAVY'S NEW FRIGATES - HMS TEST. 4 FEBRUARY 1943. THIS IS ONE OF THE NEW "FRIGATES" - A FASTER, HEAVIER TYPE OF CORVETTE, WITH WHICH THE ROYAL NAVY IS COMBATING THE U-BOAT MENACE. FRIGATES ARE OFFICIALLY CLASSED AS 'RIVER CLASS' CORVETTES.

The same captions are used with the name of the ship depicted simply changed to suit. Note the confusion presented by the captions' last sentence. The Admiralty clarified the nomenclature on 23 February 1943 in a *volte-face* officially adopting the classification of Frigate and this was made official by the First Lord of the Admiralty in the House of Commons on 3 March. [13]

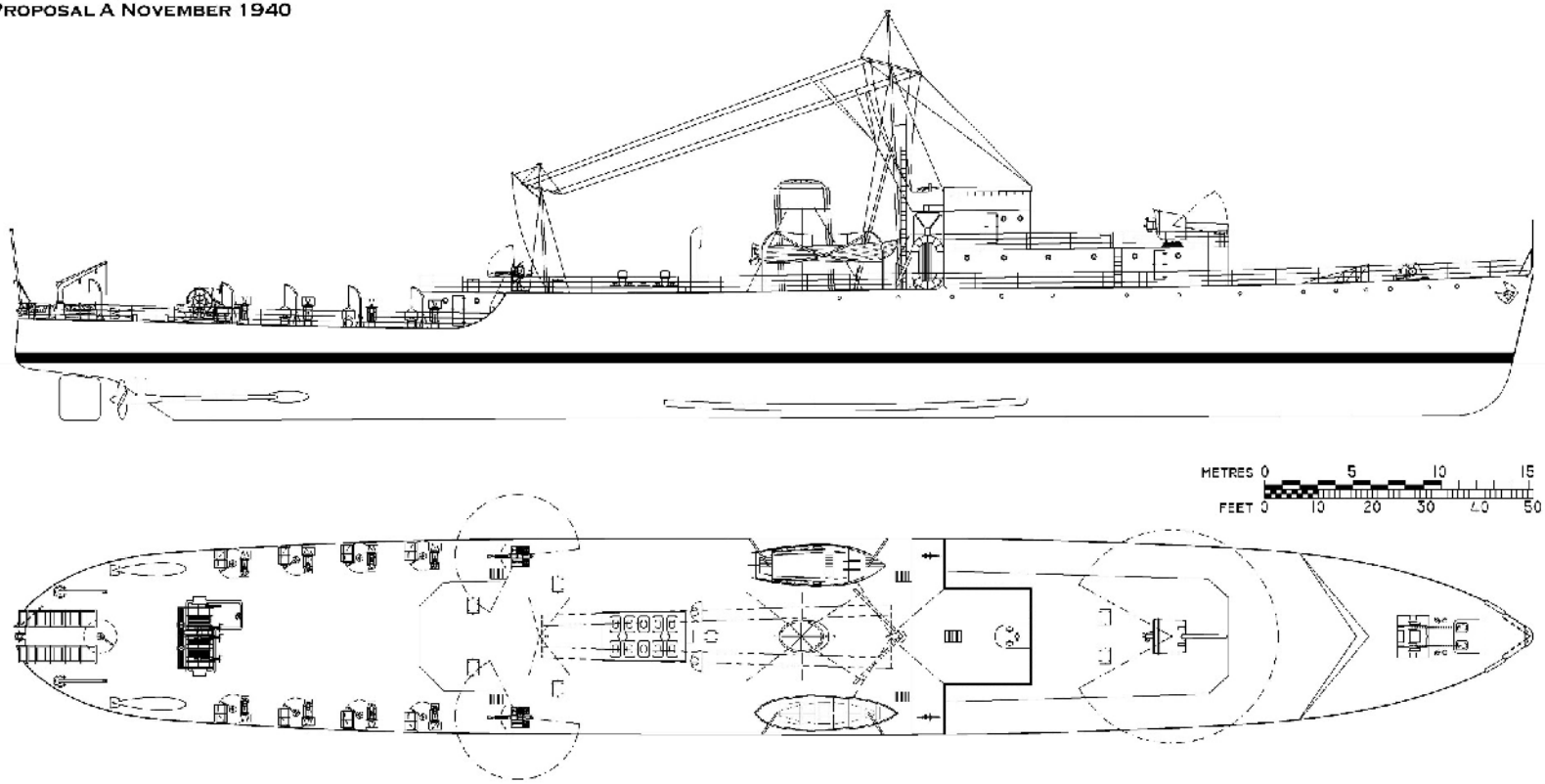
It is interesting to contemplate just how that discussion may have proceeded in view of the fact that the designation of frigate in the days of sailing ships were the equivalent of the current cruisers and were only one down from ships-of-the-line, the largest and most powerful

warships of that period. World War II's frigates lacked neither the speed nor the armament to be even vaguely compared with the sailing warships bearing the same title

Other concepts were discussed at the conference as possible solutions.

ADMIRALTY DNC 30/B 9 0

PROPOSAL A NOVEMBER 1940



The progenitor of the River Class frigates - a recreation of the very basic sketch drawing that was approved by the Admiralty in November 1940 but with a deck plan and extra detail added. Note the paucity of the armament which was similar to the contemporary Flower Class corvettes that the frigates (or twin-screw corvettes as they were called) were expected to replace as true fit-for-purpose ocean-going escorts. The two 2-pounders could have been mounted en echelon or, preferably, superimposed for better arcs of fire. Note the generous quarterdeck providing space for eight depth charge throwers and two depth charge tracks plus contact minesweeping equipment. There was ample room for LL sweep equipment. The similarly spacious foredeck was prescient in view of future developments in anti-submarine weapons by way of ahead-throwing mortars.

ALTERNATIVES

In September, the first of the fifty Town Class destroyers had been transferred from the USN to the RN at Halifax, Canada and few had to see any real or useful action being in dockyard hands undergoing maintenance and modifications to make them suitable. Notwithstanding their less than impressive debut in Royal Navy service, at the conference DNC suggested obtaining more Town Class and having them converted in the United States with forward boilers removed (like the V & W Class although he apparently did not state that) giving 13,000 SHP and 22 knots continual and 25 knots maximum with an endurance of 3,800 nautical miles at 15 knots. [14] This was in fact done to three such Towns in 1941 (*Bradford, Clare and Stanley)* but each conversion took an incredible and inefficient eight-months. The USN made similar, if less drastic conversions to extend range, but managed to undertake these in as little as four weeks. [15] Even so, the Towns suffered from extremely large turning circles due mainly to the fact that they did not have propellers that turned in opposite directions and such manoeuvrability was a critical requirement for an effective anti-submarine escort if it was going to be new construction rather than an adaptation of an existing, if outdated warship. [16]

THE DECISION

The logical conclusion was that Proposal A was to be taken to the next stage of development and on 28 November – the very day after the conference - orders were issued accordingly to develop Proposal/Design A.

The Board of the Admiralty approved the Legend (a list of the ship's specifications, weights of the armour protection – if any – ordnance and machinery) and drawings on 7 March 1941 and Controller approved the Staff Requirement on 1 June 1941 at which time the fast corvette became the River Class.

A Modified Flower Class corvette, the ultimate version of the make-do warship vessel that was never meant to be anything more than a coastal convoy escort but bore the brunt of trans-Atlantic convoy work even after the first frigates appeared. [southerncrossmodels.com.au]

1. Norman Friedman, *British Destroyers & Frigates, The Second World War &* After, p.p.139-141
2. David K Brown, *Atlantic Escorts, Ships, Weapons and Tactics in World War II*, p.p. 77-9
3. Ibid, p. 78
4. Friedman, p.139
5. Brown, p. 78
6. Ibid, p.79
7. Friedman, p. 140
8. Gerald Pawle, *The Secret War 1939-45,* p.128
9. Ibid, p. 125
10. Ibid, p. 138
11. Brian Lavery, *River-class Frigates and the Battle of the Atlantic: A Technical and Social History*, p. 63

12. Friedman, p. 138
13. Lavery, p. 64
14. Friedman, p. 143
15. John Henshaw, *Town Class Destroyers: A Critical Assessment*, p. 84
16. Ibid, p. 31

CHAPTER 4 THE RIVER CLASS

The 1942 edition of Jane's Fighting Ships has what I believe to be the first mention of the River Class in this important publication. In what I think must be the new heading of "Frigates," following on from the category of "Sloops", the following note appears under a photograph of HMS *Rother* and twenty-six frigates' names, *"Above vessels have been mentioned in official communiques, in Warship Weekly announcements and in the Press. No particulars published".* (my emphasis) Then follows a photograph of HMS *Ness*. [1]

I mention this because Jane's was issued in June 1943 yet the first River Class frigate, HMS *Rother* was commissioned fourteen months earlier. So, why the need for such secrecy?

HMS *Rother* was completed with two single QF 2-pounder MK VIIIs at the break of the forecastle but was completed without Hedgehog. [photoship.co.uk]

DESIGN

The design used the same basic dimensions as Proposal A and was 301'4" LOA with the draft 4'0" more at the stern to give the propellers better grip. Also, deeper draft reduced issues with the ASDIC losing efficiency in rough conditions. Notwithstanding the fact that reciprocating engines take up much more space than turbines and are slow to accelerate, this form of propulsion was retained. The deeper draft also helped their larger, slower turning propellers. The hull had pronounced sheer, good freeboard forward which was continued well aft and flare to the bows for dryness. Extending the forecastle was a lesson then being incorporated in the much smaller Flower Class. Unlike the Flower Class, the bilges were distinctly firm and extended bilge keels were to assist in reducing rolling – a factor that limited crew effectiveness in the Flower Class which were said to have the ability to *"roll on wet grass".* Brown states that an average of twenty-eight days' capability was lost per year in Flowers due to bad weather and this was significantly reduced to fifteen days in the Rivers. [2] Good manoeuvrability would be assisted by a single and large balanced rudder aft of a cut-away keel. Quite why twin rudders – one in the slipstream of each propeller – was not considered has never been explained. This would have resulted in even better manoeuvrability and a degree of redundancy. Accommodation followed the Hunt Class destroyer design with officers accommodated forward, close to the bridge and generally the more spacious hull offered improvements on similar-sized warships to date. So, while it might have been late in coming, the River Class was, in many ways while borne of desperation and lessons learnt, perhaps a step further than might have been taken had the Admiralty been more diligent in pursuing the design of what might be thought of as emergency-build dedicated anti-submarine vessels between the wars.

Typically, instead of specialising, of making a ship, or aircraft, truly fit-for-purpose so that it does that job very well, various other roles are tacked on making the ship, or aircraft, potentially live up to the old saying, *"Jack of all trades and master of none".* There are many instances of this when it comes to finalising the designs of warships for the Royal Navy and of aircraft for the Fleet Air Arm. The FAA's Fairey Barracuda is just one example. The first ships were designed with full minesweeping equipment, thus limiting their true anti-submarine ability. While the quarterdecks were long, wide and spacious – if having a tendency to be low and wet – the presence of a large minesweeping winch, davits, otter boards, Oropesa floats, LL sweeps, the necessary generator to power the sweep and other paraphernalia, must have had a limiting factor on the number of depth charges carried (50) and the apparatus for dispensing them, let alone the efficiency in doing so. My drawing of HMS *Spey* shows the large minesweeping winch and a reel for the LL sweep (not visible

in the plan view because it is obscured by the blast shield above) plus no less than eight depth charge throwers – four of which are angled outwards at about 45-degrees – and two depth charge tracks, each track holding what would appear to be twelve depth charges. These tracks are slightly further apart than normal to allow space, presumably for working the complicated sweeping apparatus deployed between/over rollers over the stern. What looks workable on paper may not have been quite so ergonomic in reality, particularly with a sea running and depth charges to reload. It would have been a simple matter to have provided the quarterdeck with bulwarks to improve habitability in a heavy sea but this does not appear to have been considered and, indeed, never appears to have become the subject of post-war modernisations. This may be due to the fact that there was less reliance on depth charges and more attention paid to ahead-throwing weapons.

The minesweeping ability was deleted after twenty-four ships had been so fitted according to Friedman, [3] and only after twenty ships according to Brown. [4] I am of the opinion that the real number was actually twenty-three being the number of River Class in what might be termed the first batch and was referred to as being Group I, Group II being the ships built in Britain and Canada. (See Appendix B) Depth charge capacity was reduced to an inefficient fifty. Friedman says the after 4-inch gun was deleted and range was reduced to 2,000 miles at 18 knots. A drawing of HMS *Spey* held by Canadian Forces Base Esquimalt Naval & Military Museum clearly shows both 4-inch guns fitted. Also, I have seen many photographs of Rivers with the prominent minesweeping winch on the quarterdeck and a full armament. Also, if the aft 4-inch gun was removed, since the aft magazine was designed to be oil tight, one would have thought that the loss of the gun plus the extra tankage (80 tons) would have increased rather than decreased endurance – apparently to 4,750 miles at 15 knots. Five ships formed, in theory at least, the 10th Minesweeping Flotilla. I say in theory because the one and only operation as such was, apparently, part of Operation Torch – the invasion of French North Africa in November 1942. I have been unable to substantiate this. The Eastern Naval Task Force had seven minesweepers in its complement which split into the Algiers Inshore Landing Groups of a Western Landing Group with none, a Centre Landing Group with three and an Eastern Landing Group with four. The Centre Naval Force (Oran) had eight minesweepers all of which were deployed to its Eastern Landing Group. [5] It is impossible to determine from this which, if any, were Rivers because other sources suggest that the 10th seems to have been an Algerine Class-based flotilla.

Various sources attribute the design of the River Class, but more probably the responsibility for turning the design parameters into a set of working drawings, to William Reed of Smith's Dock Company of South Bank-On-Tees. It's a big jump from a set of sketch drawings to the full set of working drawings, shop drawings, tables of offsets and lofting plans, plating schedules and the like necessary to even begin the construction. Smith's was a shipyard with experience in building the *Black Swan* Class – and designed the Flower Class – although quite why that was of relevance escapes me because, apart from overall size being similar, the method of construction and installed equipment was considerably different.

According to G. N Tucker's 1952 book, *The Naval Service of Canada; Its Official History Vol II Activities On-Shore During WW2,* Reed actually conceived the River Class, just as he had done for the Flower Class:

> *"Mr. Reed of Smith's Dock Co., who was again consulted, proposed a twin-screw vessel with two corvette engines and two water-tube boilers. He suggested its length should be 320 ft. so that it would ride more smoothly in the long Atlantic waves. His recommendations were approved, except that the length was reduced to 301 ft. over-all, to allow for the limited size of the building slips in certain yards. The first twin-screw corvettes, soon afterwards renamed frigates, were ordered in the United Kingdom in February 1941*". [6]

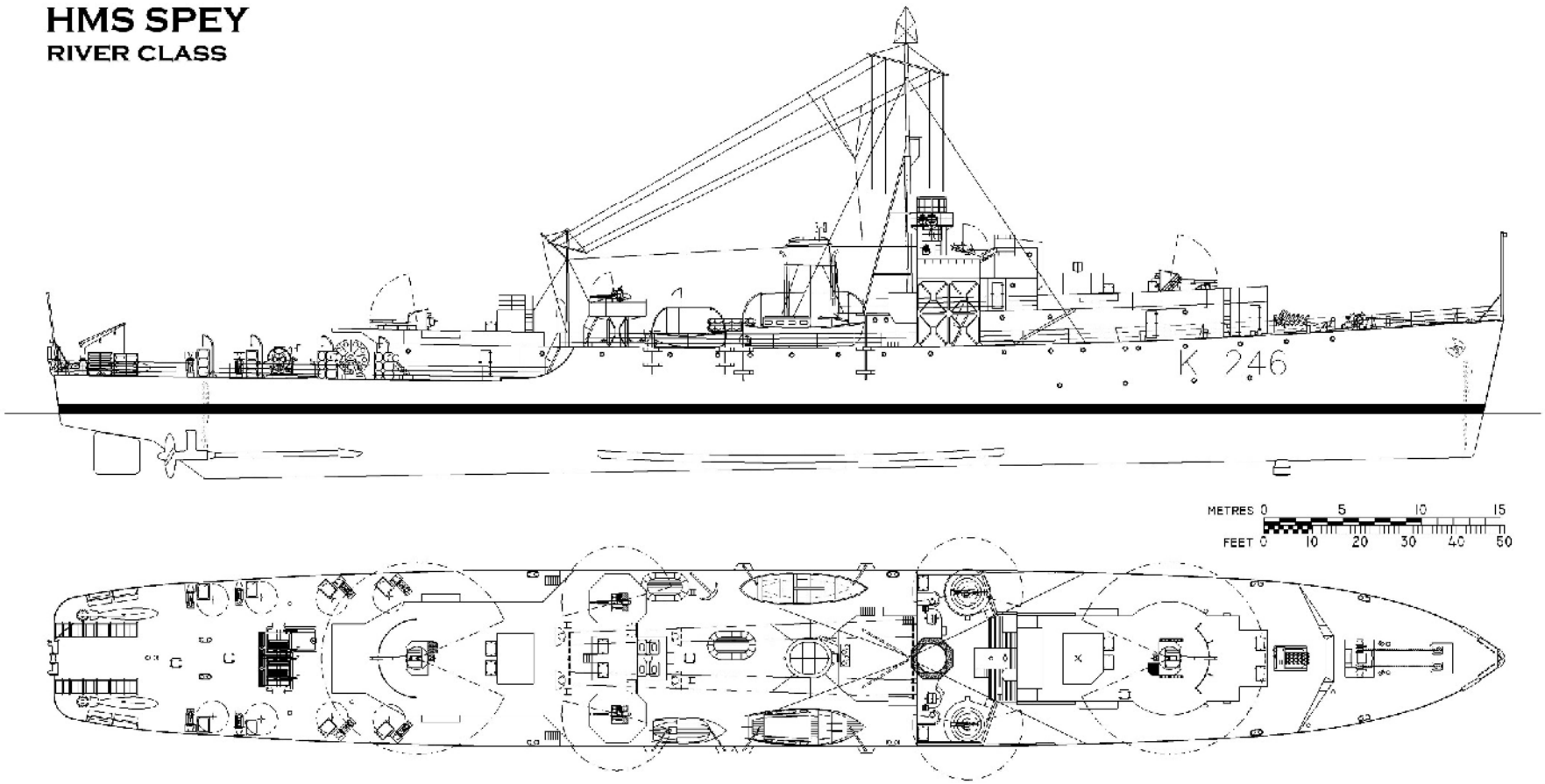
Lavery states that:

> *Charles Hills of Bristol used their mould loft to create all the templates from the drawings prepared by the Naval Construction Department; Smith's Dock prepared the documentation for the framing, Fleming & Ferguson Ltd., Paisley prepared the drawings for the engine mountings, boilers and auxiliaries; Henry Robb Ltd., Leith designed the bridge and gun supports; Robbs and Hill divided up between them below-deck layouts. John Brown & Company, Clydebank and William Denny and Brothers, Dumbarton – neither of them noted for small ships - were brought in later to assist with the documentation.* [7]

So, the River Class had, by any measure, a somewhat unusual beginning.

HMCS *Penetang*, one of the Canadian modified River Class battling typical North Atlantic conditions. The twin QF 4-inch Mk XVI mount forward was a major change but a QF-12 pounder 12 cwt was retained aft. The bridge-mounted radar is the Type 272 with the all-perspex drum covering the antenna. [shipsnostalgia.com]

HMS SPEY
RIVER CLASS



The first twenty-three of the River Class frigates were built with a comprehensive minesweeping fit out to deal with conventional contact mines and influence type mines. Their spacious quarterdecks - if prone to be wet in heavy seas - easily accommodated eight depth charge throwers and two depth charge racks. However, their main anti-submarine weapon was the new Hedgehog - a spigot mortar mounted on the foredeck. Unfortunately, this excellent weapon took a long time to be accepted having been brought too quickly into service without sufficient training. The drawing shows two single QF 4-inch Mk XIX - the low velocity 'Woolworth Gun' - plus two single 2 -pounder Mk VIIIs which were only fitted to a few early Rivers. The more usual fit was single 20mm Oerlikons, later 20mm twin power-operated Mk Vs and, later on, 40mm Bofors in some cases. Type 271 radar is above the bridge and Type FH4 HF/DH is at the masthead.

FIRST ORDERS

Irrespective as to how and when the documentation was put together, it led to the first eleven orders being placed on 10 or 11 Feb 1941 – depending on which source you believe.

Urgency demanded that corners be cut and what would be regarded as normal procedures – in peacetime anyway – be set aside. The orders were placed by telegram followed by a letter three days later stating: *'.....work should proceed without prejudice to price and on the distinct understanding that you agree to satisfy the Admiralty as to the reasonableness of the price to be paid…"* [8] Urgency and trust were the order of the day. A man's word was his bond. Contrast that with today's litigious commercial world. If those frigates were being built under today's conditions, there would be a twelve-month hiatus – at best – while negotiations took place and documentation was picked over with a fine-tooth comb by all parties.

The order date is interesting if one compares it with Friedman's dates in the earlier paragraphs. The Legend was approved almost a month after the first orders were placed and the Staff Requirements were approved more than three months after the first orders were placed. Surely an unusual sequence. The first ship's keel was laid down – HMS *Exe* (K 92) at the yard of Fleming & Ferguson Limited at Paisley on the River Clyde on 16 May – two weeks before the Staff Requirements were approved, even more unusual one would think. She was launched on 19 March, 1942 and commissioned on 6 August 1942. While the first to be ordered and laid down she was not the first commissioned, that honour going to *HMS Rother* (K 224), built by Smith's, and commissioned on 3 April 1942 yet having commenced four months later than *Exe*. Appendix B provides all details of the River Class.

CONSTRUCTION

Construction practice was simplified although the Black Swan hull structure was used as a basis with *"additional material to reduce stresses and thus to allow for construction by non-naval builders"*. [9] On the face of it, this sounds like a contradiction and that a River Class was a naval hull with something added, not taken away, but Friedman goes on to say, in summary, these were "*non-MilSpec* (Military Specification) *ships".* Brown states that *"the hull structure was relatively light, though complying with Classification Societies Rules"*. [10] That comment ties in more with the overall concept of a quick and cheap-to-produce warship. Preston says that *"the design was kept as simple as possible and mercantile practice was adopted to allow the ships to be built at yards which did not normally undertake warship work."* [11] That description applied to the Flower Class too, the only difference being that some yards that normally built Flowers could not build Rivers because their slipways were simply not big enough.

PROPULSION

The four-cylinder, VTE engines each of 5,500 IHP were double-ended – that is, the drive could be taken off either end allowing any engine to be used as a port or starboard engine, thus simplifying production and spare parts. Six Rivers were turbine-engined (*Cam, Chelmer, Ettrick, Halladale, Helmsdale* and *Tweed*) of 6,500 SHP providing fractionally more speed, 20.25 knots, and only lightly better range – 4,920 miles at 14 knots compared with 4,630 miles at 14 knots [12] – hardly sufficient reasons considering the problems with the supply of these relatively complex items. The extra range was probably a function of extra tankage since the turbines took up less space and weighed less than the bulky reciprocating machinery. Either that or the turbines were simply more efficient albeit driving smaller propellers at faster revolutions – 300 RPM as compared with 185 RPM. Reciprocating engines were more efficient at the sort of convoy speeds experienced whereas the opposite was true of the turbines being more efficient at the top end of the speed range.

I have not been able to find an explanation as to why the Admiralty bothered to change the mould for just six vessels – particularly given the production bottleneck with turbines and reduction gearing. They had a proven product and a proven production line – that was probably not delivering as fast as they would have liked – so what great advantage was expected *vis a vis* the complications of a partial redesign, redocumentation process – fifty new drawings – plus moving bulkheads and the like?

ARMAMENT

Initial designed armament was just the one 4-inch in "B" gun position – probably the same 4-inch BL Mk IX in the original proposal of November 1940 because these were still available from reserve stock. By the time the first Rivers were being delivered from British yards, two single QF 4-inch Mk XIXs were specified, the second one in "X" position. These were an HA/LA gun with an elevation range of -10 degrees to + 60 degrees and a rate of fire of 15 rpm. While it was primarily intended as an anti-submarine weapon its elevation range gave it a theoretical anti-aircraft ability but, more importantly, an ability to fire star-shell for night engagements – the time most favoured by U-boats for attacking convoys. Its low velocity of 1,300 feet per second (396 metres per second), and perhaps other factors, saw it commonly derided as the 'Woolworth Gun'.

"A feeble weapon of misguided conception…which was mistakenly expected to make a bang loud enough to sustain morale of the merchant seaman whilst at a ridiculously short range, produce a splash big enough to make the submarine dive". (Commander H. Stokes-Rees, RN, 1948)

> *"Many of the 12- pounder armed Bathursts replaced these weapons with a QF 4 inch Mark XIX on a Mark XXIII dual purpose mounting. This was the famous Woolworth gun, low velocity but dual purpose".* (A.N Other, Naval Historical Society of Australia, 1980)

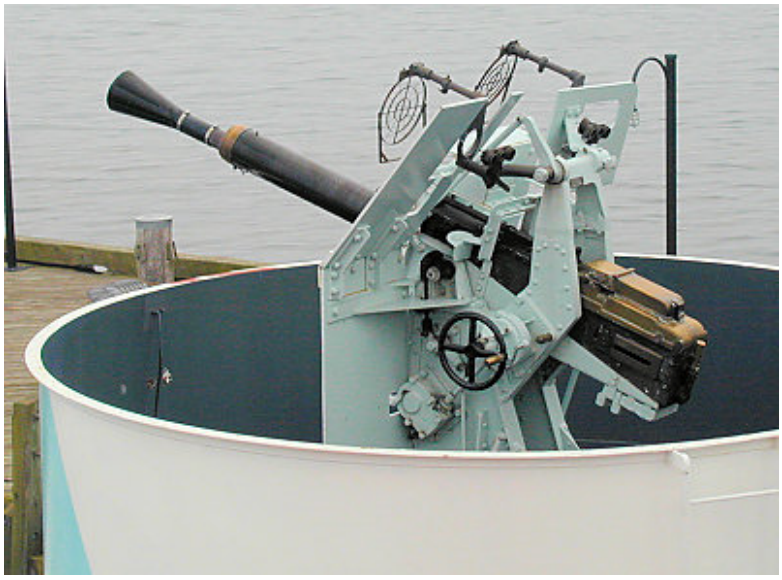
The QF 4-inch Mk XIX that equipped most River Class corvettes. They were a low velocity weapon not suited to anti-aircraft fire as the elevation of the one on HMAS *Cowra*, a Bathurst Class corvette, would suggest. The shield is the later version, earlier ones being somewhat more rudimentary. [Australian War Memorial 109986]

The far more capable single-barrelled QF 4-inch Mk XVI on a MK XIX mount but with a shield essentially a cut down version of the more common twin mount. This is on HMAS *Barwon,* an Australian-built River Class frigate. [State Library of Victoria: H91.250/156]

The versatile QF 12-pounder 12 cwt gun in action in anti-aircraft mode. Note that this is obviously a training exercise: the dog on the right and the shell minus projectile on the left. [commons.wikipedia.org]

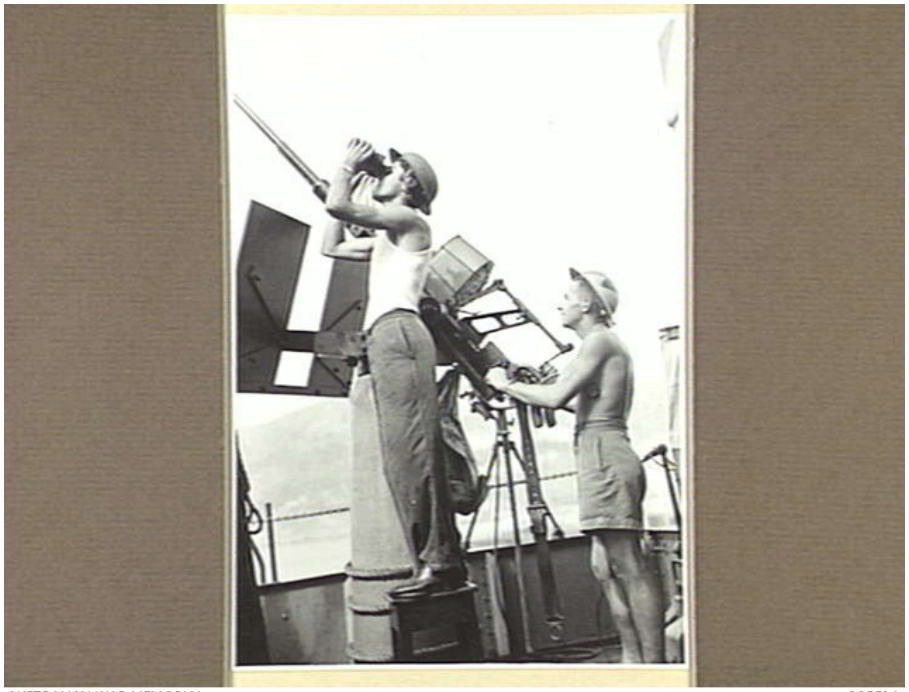
Canadian-built Rivers had a QF 12-pdr 12 cwt (probably the HA/LA IX or HA VIII model) in place of the aft 4-inch mount. Whether this was intentional as a possibly better anti-aircraft weapon or due to a shortage is not known. The practice of aircraft preferring to attack from astern where they could line up on the wake of the ship and better judge their approach speed was well established.

Close-range weapons were four 20mm Oerlikons as initially specified – a pair in the bridge wings and a pair in bandstands near the break of the forecastle. However, the first deliveries had single 2-pounder Mk VIIIs where single 20mm Oerlikons would normally have been fitted. At least one RN River was so fitted (HMS *Rother*). While the Oerlikon was a handier weapon, it is interesting to note that the favoured "bow-chaser" on British East Coast convoy escorts was not the 20mm Oerlikon when these had become more plentiful but the 2-pounder Mk VIIIs – probably ones removed from ships that had them replaced by twin Oerlikons. Also, coastal forces stuck with the 2-pounder throughout the war, especially the power-operated Mk XV-XVI models. One would have thought that despite their relative low velocity compared with the Oerlikons, the heavier, 2-pound, exploding projectile would have been a preferred anti-submarine weapon albeit less useful as an anti-aircraft weapon. On the other hand, the Oerlikon was easy to operate with little training whereas the 2-pounder required trained crews.



The QF 2-pounder Mk VIII – the single-barrelled version of the quad and eight-barrelled types. It was a low-velocity weapon of limited range but soldiered on until replaced with the lighter, more manoeuvrable 20mm Oerlikon and, later, the 40mm Bofors. [hazegray.org]

The 20mm Oerlikon with the hydraulically-adjustable Marks 1, 1A and II (US Marks 2 & 4) mounts that required the extra man and a certain amount of teamwork. Note the wheel on the left-hand side to raise the gun and the sailor manning it is co-ordinating with the gunner to achieve the correct elevation. The third seaman is ready to change the 60-round magazine.– in this case on an RAN Fairmile off Bougainville, 1945. [Australian War Memorial 095088]



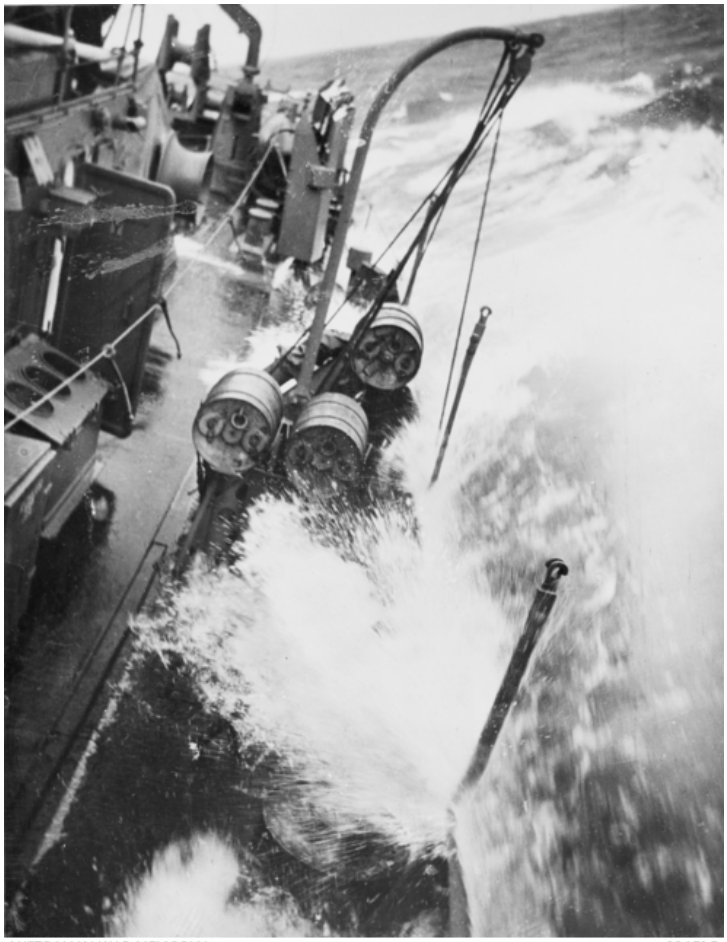
The 20mm Oerlikon with the simple pedestal Marks IIA, IIIA, V and VIIA (US Mark 5 & 9) mounting. The RN had a preference for this simpler model over the adjustable-height version and was more usually found with a ringed, stepped platform for the gunner to vary elevation. This mounting is on the RAN's corvette, HMAS *Bendigo* off New Guinea in 1942 where its anti-aircraft performance was important and the height of the pedestal would have made surface action difficult. [Australian War Memorial 026614]

But the Rivers were, essentially, mobile floating depth charge platforms. In this regard their eight Mk IV depth charge throwers (with 6 charges by each plus one on the thrower) and two large depth charge rails each holding fifteen charges (one rail with normal depth charges, the other with special heavy depth charges) to deliver a pattern of fourteen charges (4 per side plus 3 per rail over the stern) were in excess of any other anti-submarine escort in the Royal Navy at the time. That's 86 charges available before a complete reload. Initially, one hundred depth charges were carried in total but this was increased to 150. There was a small magazine but long rails were fitted to port and starboard abeam the aft 4-inch mount. These spares would have been difficult to manoeuvre at the best of times but especially so with a sea running. The fourteen-charge pattern was discredited after tests in November 1942 which indicated that charges too close together tended to set off other charges prematurely. Frigates completed soon after that date only mounted four depth charge throwers. But, more importantly than the depth charges – although it took some time to be adopted as a serious anti-submarine weapon – the Hedgehog anti-submarine mortar was fitted to the foredeck in what would have been "A" gun position. There were five reloads for the Hedgehog. Experience proved that Hedgehog would have been better fitted in "B" position where it would have been away from the exposed conditions of the foredeck and the 4-inch mount could have been placed in the "A" position as was done with the Loch Class. This relocation was tried in only one ship, HMS *Monnow*. However, the Hedgehog was rushed into service and its potential was not fully realised until a proper training protocol had been developed.

My drawing of HMCS *Cape Breton* shows one of the first group of ships equipped with full minesweeping equipment and armed with the QF 2-pounder Mk VIII before 20mm Oerlikons were fully available. All minesweeping equipment was landed by April 1944.

The stern of the River Class frigate HMS *Parret* at Port Elizabeth, South Africa. Note the slotted smoke generators, the extra 20mm Oerlikons on the quarterdeck and the ready-use racks for depth charges beside the four depth charge throwers. [navsource.org]

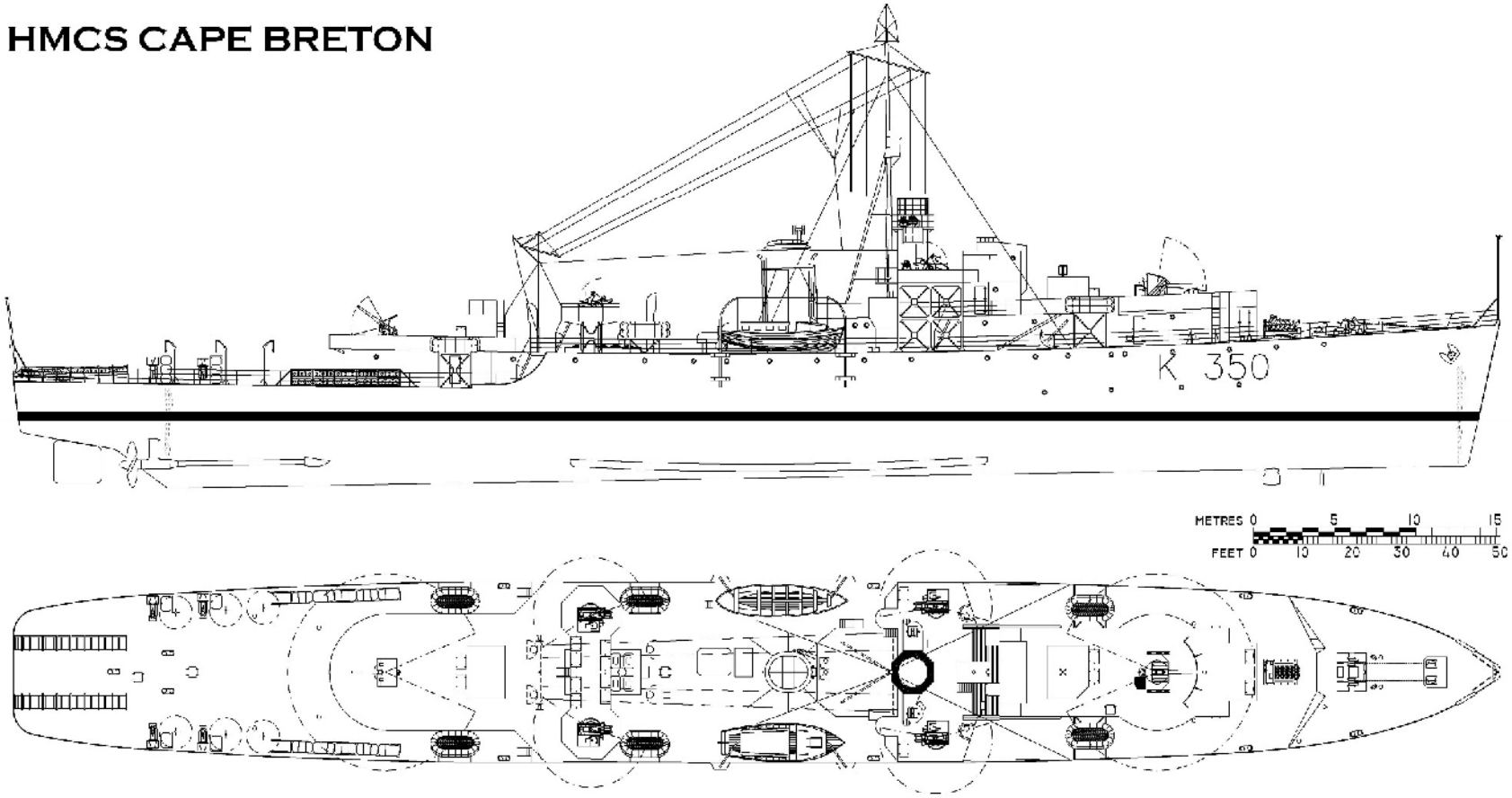
Depth charger being loaded from its storage rack on to a Mark III depth charge thrower on the corvette HMAS *Geelong*. [Australian War Memorial 075719]



Man-handling a depth charge from its storage rack on to its thrower required teamwork even in calm seas. Imagine how difficult it would have been in these circumstances: the corvette HMAS *Broome* in heavy seas. [Australian War Memorial 304516]

The Hedgehog spigot mortar. Note how the twenty-four bombs are angled forwards and outwards to deliver an oval-shaped pattern ahead of the attacking ship. [wikivisually.com]

HMCS CAPE BRETON



The Canadian-built River Class differed from their British contemporaries mainly in their armament fit. While the same QF 4-inch Mk XIX was retained forward, a QF 12-pounder 12 cwt HA/LA was installed aft reflecting the former's lack of anti-aircraft ability. Also, four twin power-operated 20mm Oerlikons, Mk V, were fitted instead of single manually-operated ones. Since the fourteen depth charge pattern attack had been discredited, the number of depth charge throwers was reduced to four to provide a ten charge pattern and extra on-deck depth charge stowage was provided. The Type 147B "Sword" transducer is fitted forward of the ASDIC dome.

ELECTRONICS

The electronic fit, by the time the first River – HMS *Exe* – was ready, was Type 271 surface-warning radar and may have been Type 128 ASDIC. Certainly Type 144 ASDIC became standard and eventually Type 147B was fitted. However, there was no air-warning radar or HF/DF at this stage. Because the Type 271 radar had to keep the co-axial cabling between the antenna and the transmitter as short as possible and since the antenna had to be turned by hand via a crank (40 turns per 360-degrees), the radar office was situated directly under the distinctive teak-framed and perspex-lined lantern that protected the antenna. While it was desirable to have the antenna as high as possible, the only place the antenna and office could be located was at the back of the bridge which did have one advantage in that it was easily accessible,

The ASDIC office was a cramped space in the front of the bridge to starboard. Like the radar, this had the advantage of accessibility for on-the-spot assessment by the officer-of-the watch.

SHIPS' BOATS

The outfit was typical for a ship of this size: the usual 27-foor Montagu Whaler, to port, and a 25-foot motor cutter, to starboard, with a 16-foot dinghy also to starboard. Quite what use the last-mentioned was is questionable and, in fact, was deleted from Australian and Canadian Rivers. Unusually, and somewhat archaically, simple radial davits were used although later Canadian Rivers adopted the more modern and efficient quadrantal davits.

A 27-foot Montagu from the Tribal Class destroyer HMAS *Warramunga* pulling away from the ship's side, Korea 1952. Note the coxswain is using a direct tiller to the rudder head and not a tiller mounted forward of the mizzen mast, the support for which is clearly visible. [Australian War Memorial]

SEA TRIALS

The sea trials of HMS *Exe* just failed to deliver the hoped-for 20 knots, falling short by .25 of a knot. Compared with destroyers, the long foredeck kept the ship dry, gave reserve buoyancy and stability when heeled in turns and the shielded fore and aft access it provided improved habitability generally. The low quarterdeck, not unexpectedly was wet. Unusually, the addition of bulwarks aft – like the Flower Class – seemed to have never been considered as a partial countering measure. Similarly, a more substantial breakwater to protect the exposed Hedgehog. Perhaps it was considered that if conditions were so bad that the Hedgehog's operation was compromised by bad weather, the likelihood of an anti-submarine action was remote anyway. Interestingly, the RCN heavily modified twenty-one River Class as the Prestonian Class in 1953-58 with the foredeck extended to the stern, enclosing two Squid anti-submarine mortars.

Turning circles were reasonable at 330 yards diameter at 12 knots (ASDIC speed) – more than twice that of the handier, but slower, Flowers but considerably less half that of the ponderous Town Class destroyers which the Rivers would ultimately replace.

FURTHER ORDERS

Further orders followed in small batches, presumably as various yards became available: one on 15 March, four on 8 May, two on 19 May, two on 1 June, four on 20 June, three on 3 July, one on 30 September, one on 8 November, three on 13 December, one on 19 December making a total of thirty-three in 1941. Given the urgency, this seems a very drawn out and prolonged process made more-so by a further twenty-two ordered in twelve batches between January and October 1942 giving a total of fifty-five River Class according to Friedman. [13] However, Lenton and Colledge list fifty-seven. [14] The difference would seem to be that Friedman's list omits HMS *Annan* (K 417), laid down 10 Jun 1943, and HMS *Monnow* (K 441), laid down 28 September 1943. Lenton and Colledge only give launch dates data.

UPGRADES

At various times that I have been unable to determine precisely, some changes were made, as follows:

After the first twenty-four ships, fuel capacity was increased from 440 tons to 650 tons resulting in greater endurance of 7,500 miles [15]
As and when the flow of armaments improved, so too did the Rivers benefit, especially those destined for the Mediterranean or Russian convoys where air-attacks were more likely than the trans-Atlantic routes. Twin 20-mm Oerlikons replaced, or were installed in place of, single mounts. Extra single mounts were added. Some Rivers never received twin mounts having as many as ten single mounts. Rivers destined for the British Pacific Fleet received single 40mm Bofors in place of twin Oerlikons at the break of the foredeck. In what may seem a retrograde move, quite ancient 6-pounder guns – the same type fitted to World War I Tanks – were fitted to at least four Rivers abeam the Hedgehog mount to engage surfaced submarines. The same measure had been used on some Flower Class in place of the bridge-mounted Oerlikons. There are no records of any of these having been used successfully. Perhaps if they had been of the automatic-loading Molins type used on MGBs and in the Tse-Tse version of the anti-shipping De Havilland Mosquito it might have been a different story for these were an effective weapon.
HF/DF was fitted to the foremast.
Facilities were installed aft for 22 barrage balloons but I was unable to find a photograph of a River flying one.
Type 277 radar was fitted to a short lattice mast in 1944.

BUILDING TIMES

Sixty-seven British-built River Class ships (Group I of 23 + Group II of 44) took a total of 17,882 days to build, or an average of 267 days or 38 weeks– or just under nine months. (Refer Appendix B) The quickest, HMS *Ribble* by W. Simons & Co. Renfrew at 178 days would be remarkable if it were not for the fact that there may be a confusion as to the commissioning date as being the date she was officially transferred to the Royal Netherlands Navy which may have pre-dated commissioning. Two months is a particularly short time between launching (23 April 1943) and commissioning (25 June 1943) when the average was just under five months. I think it needs to be dismissed for that reason. Also, Simons only built two and the second one took the more believable 416 days to build. Similarly, the next shortest building time, HMS *Annan* by Hall, Russell & Company of Aberdeen at 217 days cannot be right because the time between launching (29 December 1943) and commissioning (13 January 1944) when she was transferred to the RCN, of only fifteen days is impossibly short. Therefore, I am inclined to accept that the most realistic and genuine shortest time was, in fact, the 238 days taken by Charles Hill & Sons of Bristol to build HMS *Taff*.

The longest building time is, however, beyond dispute being HMS *Ballinderry* at 665 days by Blyth Shipbuilding & Drydock, Blyth. This shipyard had a particularly poor record. Its five orders averaged 620 days.

NUMBERS BUILT

Curiously, the number of River Class frigates built seems to vary depending on one's source.

The highest total frequently circulated is 151 and I accepted this until I did some cross-checking.

Brown calculates only 128 [16] While his number built in Britain is correct at 57, he only attributes 49 to being built in Canada (2 US, 8 RN and 39 RCN) and for as many as 22 in Australia. Both figures are wrong. I believe that the real numbers were 70 and 8 respectively.

Lavery states 133 were built. [17] However, this ignores the two built for the USN and the RAN's four Modified River Class frigates which were, in effect, Bay Class (See Chapter 6). Adjusted, this brings the total to 139.

Lenton & Colledge list 139. [18] While this is a comprehensive list, it is a bit confusing in that HMS *Glenarm* (K 258 built by Robb) does not appear at all.

The simple numbers are as follows:

British-Built ships	Group1	23
Group 2		34
Canadian-built ships	Group 2	70 (these included 2 for the USN and 8 for the RN under Lend Lease)
Australian-built ships		12 (these include 4 Improved River Class with Bay Class armament)
Total		139 (See Appendix B)

I believe the confusion that has created the commonly distributed total of 151 relates to double-counting ships that were transferred to other navies, such as those of France (6), India (3) South Africa (2) and the Netherlands (1). These total 12 and when subtracted from 151 equal the 139, above.

ESCORT GROUPS, SUPPORT GROUPS AND LATER

By the time the Rivers began to appear in number, Escort Groups were a mix of destroyers, corvettes and the new frigates. The faster ships were able to detach and chase away the U-boats, the slow corvettes maintained the defensive screen and the frigates with their most up-to-date sensors provided the early-warning, had a doctor on board and were the best sea-keepers in the worst of the weather. Also, they had a speed and armament advantage over the corvettes to deal with threats in and around the convoys. They made logical escort group leaders because the larger destroyers were often away from the convoy, chasing up stragglers or pursuing contacts.

River Class frigates made up a substantial part of the 1st Support Group formed in April 1943. Support Groups were not attached to specific convoys but loitered in areas such as the Air Gap where they could be called on to give additional support to convoys either under attack or expected to be under attack.

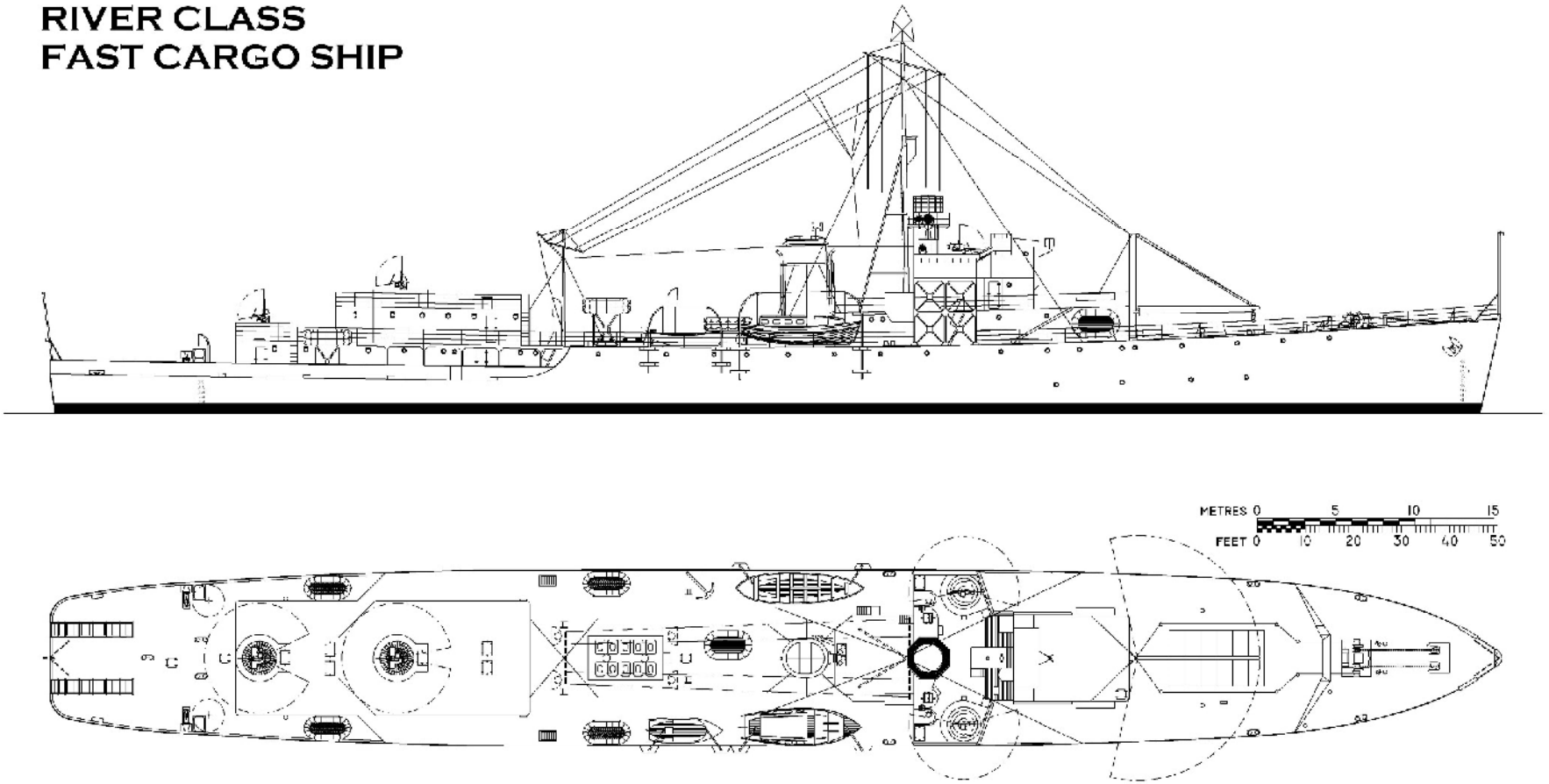
By November 1944 the Rivers had been superseded by the superior Loch Class as the Atlantic's premier anti-submarine vessel and only five RN ships, all of them escort group leaders, were serving in home waters. The Indian Ocean had claimed the rest for this is where the current demand lay. The war in the Pacific, however, was a fast, aircraft carrier-led task-force type and the River Class was not capable of keeping up. However, there were still plenty of convoys transiting the Persian Gulf and the Indian Ocean and many were based as the Aden Escort Force.

OTHER USES

In July 1943 – probably as a result of experiences with the siege of Malta (11 June 1940-20 Nov 1942) – the possibility of converting some River Class to carry **200-tons of cargo and 52 passengers** was entertained. [19] Armament was to be restricted to a mere four 20mm Oerlikons, which would seem to be an inadequate defence considering the likely theatres of operations. Even merchant ships in convoys had better weapon fits than that in mid-1943. Presumably the cargo space would be forward of the bridge where most of the crew accommodation would have been placed and, coupled with the need to find space for the passengers, the ships' crews would have been reduced to a level insufficient to man more weapons than those envisaged. Or, perhaps the commodious but wet quarterdeck was used for the cargo having been stripped of all anti-submarine weaponry. I consider this unlikely having regard to cargo being so exposed to the elements.

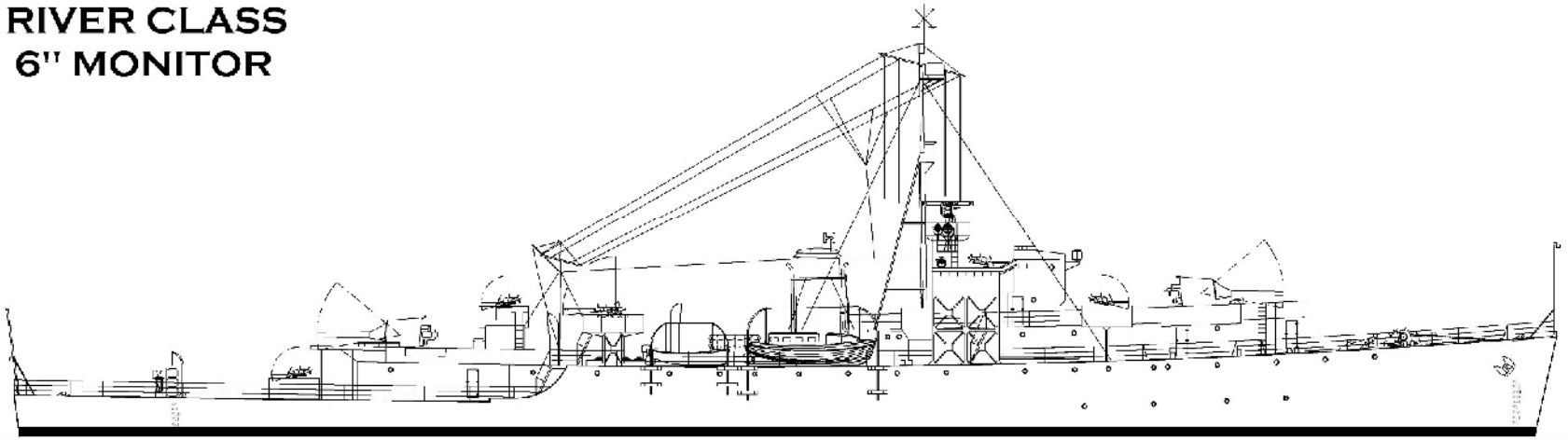
My interpretation shows how such a conversion might have looked.

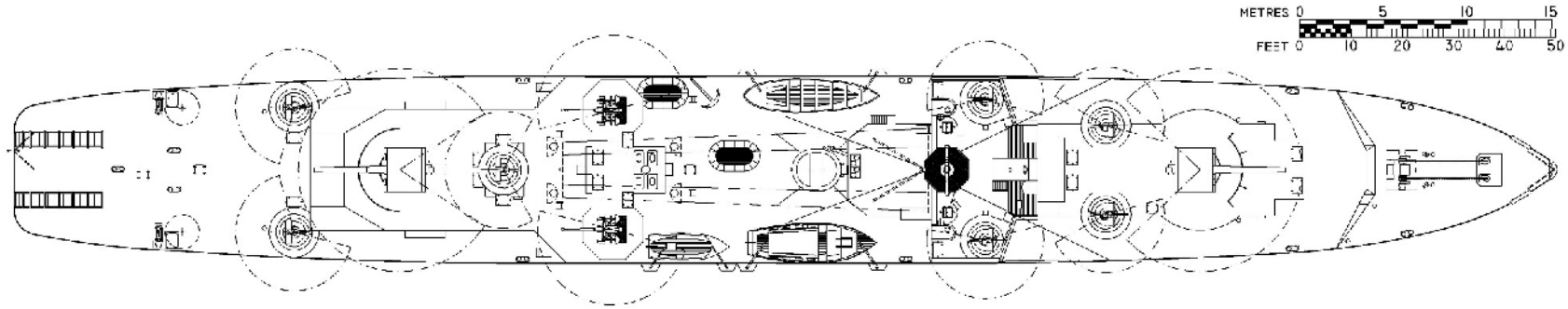
RIVER CLASS
FAST CARGO SHIP



This drawing depicts a River Class frigate as it might have appeared had a July 1943 proposal proceeded to convert some to fast transports carrying 200 tons and 52 passengers. No drawings are known to exist so this is purely conjectural. It would have been logical to locate the small hold forward where the weight would have been compensated by the removal of the forward 4-inch gun, the Hedgehog and their associated magazines. The extra passenger accommodation plus crew displaced by the hold has been added aft in a similar fashion to the depot ship conversions of the two Loch Class frigates. Since there were only four 20mm Oerlikons fitted, it seemed logical to retain those fitted on the bridge wings and add two aft, superimposed on the centreline for the best arcs of fire. Note the bulwarks fitted aft.

RIVER CLASS
6" MONITOR

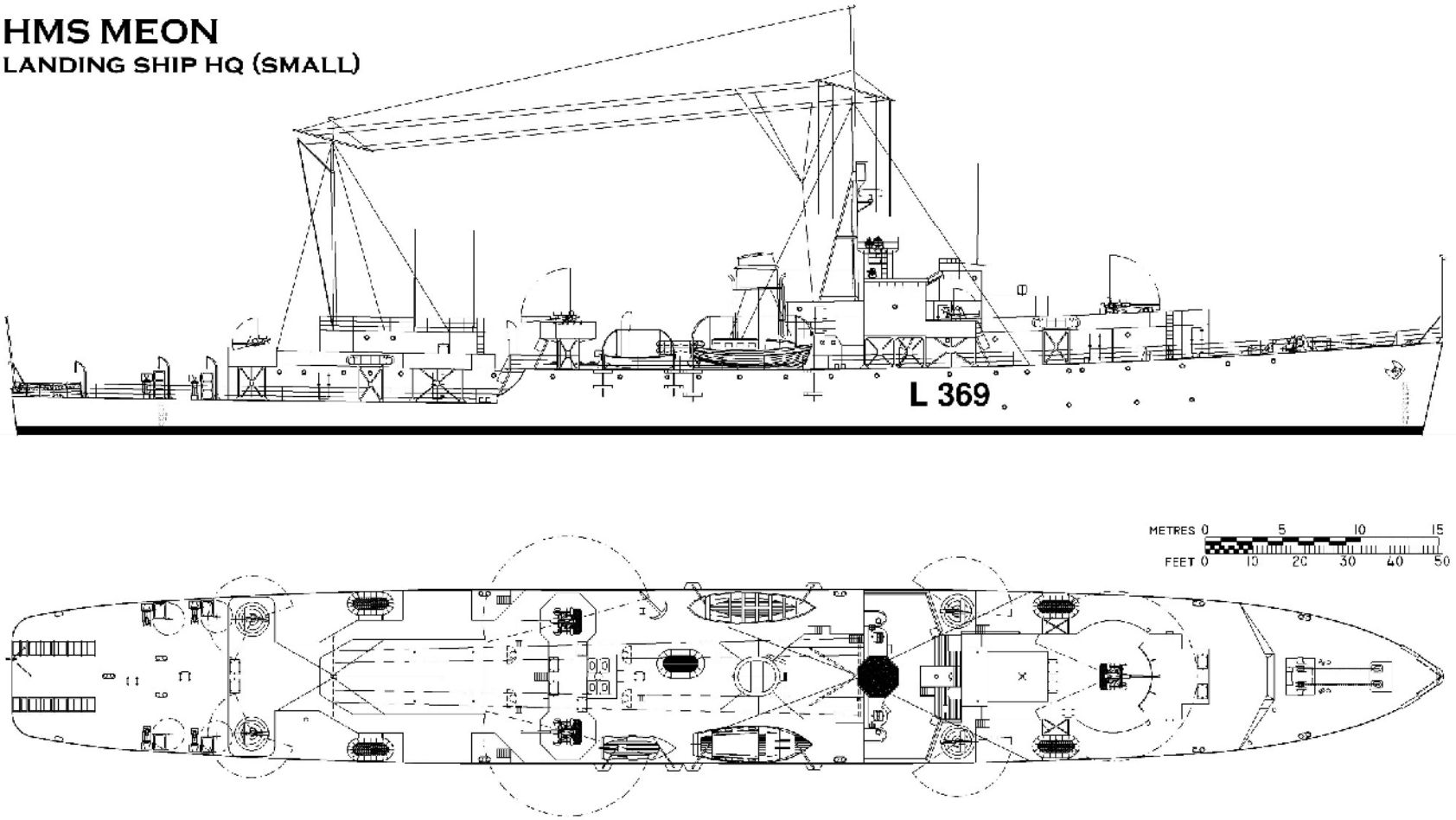




One of the aborted projects was to use the River Class frigates as 6-inch gun monitors for amphibious assaults. They were not the only small ships considered. The obsolete Town Class and the newer Hunt Class escort destroyers were also considered but all were abandoned in favour of converted landing craft. This drawing is conjecture but based on what is known about the Town Class. It shows how a River might have accommodated two of the BL 6-inch Mk XII guns (secondary armament from scrapped warships) with gunfire control from a 9-foot rangefinder. Short range weaponry was essentially an anti-E-boat measure and has been increased to two 40mm Bofors and seven 20mm Oerlikons, not all of which could have been manned when the main guns were firing. There is a token ASW presence as a precaution against midget submarines which operated in shallow waters off invasion beaches. The radar fit is Type 291 at the masthead and US Type SL below it.

HMS MEON

LANDING SHIP HQ (SMALL)



HMS Meon was one of four River Class frigates converted to Landing Ship Headquarters (Small) in 1945, too late to see service during World War II. The drawing is reconstructed from the few photographs available and show her still equipped with anti-submarine weaponry aft which was later removed. Her only guns are three 40mm Bofors and four 20mm Oerlikons. One reference work states that these ships carried at least one Landing Craft Vehicle & Personnel (LCVP) but I was unable to find a photograph to substantiate this.

Another possible use was as **small monitors**, presumably with the invasion of Europe in mind. The obsolete Town Class were also considered with BL 6-inch Mk XII guns taken from decommissioned cruisers. Using what was proposed for the Town Class destroyers as a basis, I have drawn a River Class with the same sort of equipment. The lack of AFCC Mk I fire control computers would have meant a simple rangefinder – in this case the 9-foot – would have had to suffice. Working close inshore would have presented a potential threat from midget submarines and E-boats so a close-range outfit of 20mm Oerlikons and 40mm Bofors has been provided plus depth charge throwers and depth charge rails. [20]

The projected invasion of Europe also posed a requirement for **floating headquarters** for amphibious assault groups until bases were established onshore. Staff Requirements TSD 3070/44 of 25 Jan 1944 provided for River and Captain Class frigates to be converted to Landing Ship Headquarters Small - LSH(S). Quite how an extra 12 officers and 60 enlisted men plus the extra communication spaces fitted in is a mystery since I was unable to find any drawings showing the conversions. A mainmast was added to support the additional aerials. One landing craft was apparently fitted according to some sources – presumably a British LCP (Landing Craft Personnel) type of around 6.5 tons because the Higgins type of LCVP (Landing Craft Vehicle & Personnel) was even heavier at 8 tons – but I have been unable to substantiate this. I doubt it was possible anyway, let alone practical. Armament was reduced to close-range 20mm Oerlikons – 5-twin and 6 singles. *Nith* and *Waveney* were converted in early 1944 and *Meon* and *Ettrick* were converted in 1945 after being returned from the RCN but *Ettrick* was laid up and never re-commissioned. [21]

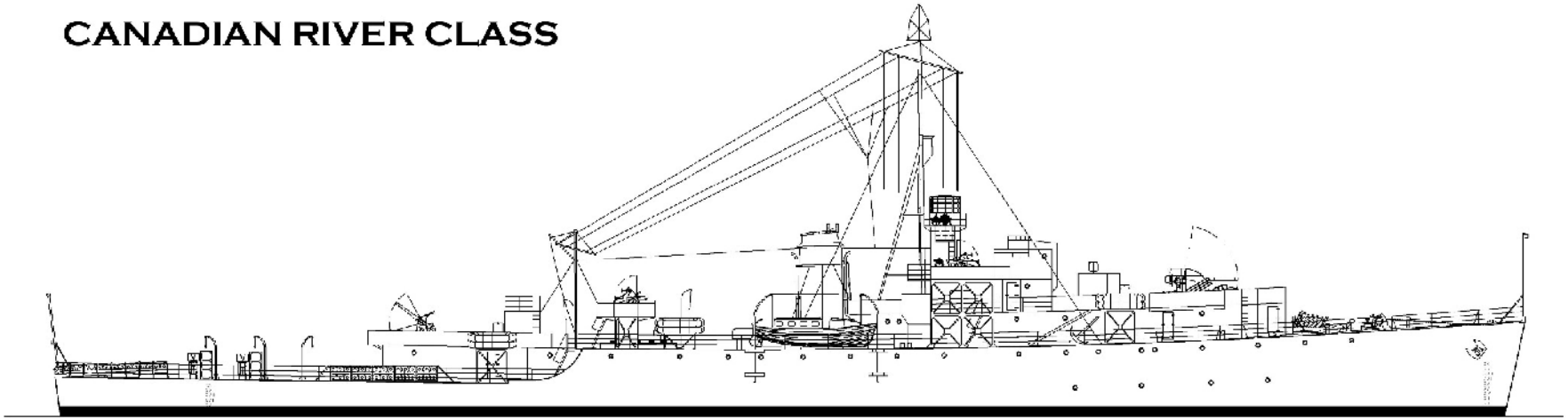
My drawing is of HMS *Meon* because it is the only one for which any reasonable photographs exist.

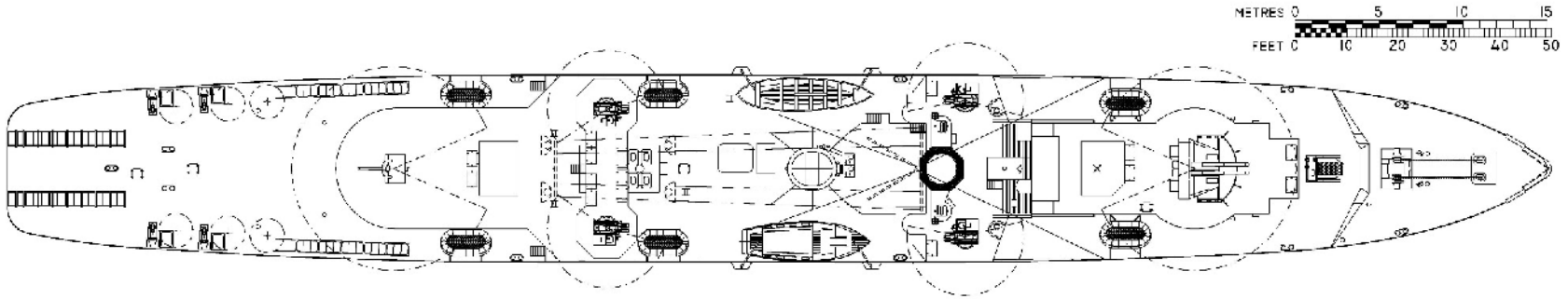
CANADIAN RIVERS

The Canadian shipyards built seventy River Class frigates – ten for the Royal Navy, two of which were retained by the United States Navy since all of them were part of the Lend Lease Agreement anyway. The remaining sixty served in the Royal Canadian Navy. They differed from the RN ships in their armament fit. As previously stated, the standard fit was the single QF 4-inch Mk XIX forward and a QF 12-pounder 12 CWT aft. All bar HMCS *Valleyfield* had the single 4-inch replaced with the infinitely superior QF 4-inch Mk XVI thereby making them a superior gun-ship to the RN Rivers. The Mk XIX was a low velocity weapon, derisively called the "Woolworth Gun". (See earlier reference under Armament). Canada produced 1,006 of the 2,023 QF Mk XIX guns, many of them being fitted to the Fort, Park, Victory and Canadian type merchant ships built in Canada which were derivatives of the 60 Ocean Class ships ordered by the British from Kaiser in 1940.

The Canadian Rivers also excelled in their anti-submarine detection equipment being fitted with the Type 147 Sword ASDIC which produced a vertical fan-shaped beam that could be depressed to an angle of 45 degrees and detect a submarine as deep as 800 feet. My drawing reflects a typical RCN frigate but there were always variations to fit outs depending on the period between refits and the availability of equipment.

CANADIAN RIVER CLASS





The Canadian-built River Class were up-gunned and had the single QF 4-inch Mk XIX replaced with a twin QF 4-inch Mk XVI.

AUSTRALIAN RIVERS

The Royal Australian Navy ordered six on 16 August 1941, added more, cancelled some and eventually completed eight as River class and four as Modified River Class but which were, in effect, Bay Class ships built on River Class hulls. (See Chapter 6) They all took an inordinately long time to build – an average of 721 days – with a best of 207 days which would beat the best of the British yards, above. This was from a small shipyard in Queensland country Maryborough with a maximum workforce of 1,200. The worst building time was an incredible 1,356 days (3.71 years!) for which there is simply no comparison! Admittedly the War had ended while the ship – HMAS *Culgoa* – was being completed at the HMA Naval Dockyard, Williamstown, Victoria (which had a poor record for building the smaller Bathurst Class corvettes) and she was placed into Reserve upon completion, so there was obviously no hurry to get her into action. Irrespective, long building times in Australia were the norm and partly due to the shortage of skilled labour which, in turn, led to union militancy (demarcation disputes, go-slows, sit-downs, stop-works, strikes), shortages of materials generally, the wide-spread nature of various suppliers – steel coming from different plants, propellers cast in Western Australia, guns made in Victoria, engines made in Queensland – all having to be transported great distances by rail and often transhipped because of up to three different rail gauges between states (Queensland 3'6", NSW 4'8 ½ ", Victoria 5'3", South Australia 5'3", 4'8'½" and 3'6" and Western Australia 4'8 ½"and 3'6"). The building of the Modified Chatham-class light cruiser, HMAS *Adelaide* – derided as HMAS *Long Delayed* – at HMA Naval Dockyard, Cockatoo Island, Sydney Cockatoo took an incredible 2,450 days (6.7 years) from laying down to commissioning. She was obsolete by the time she was commissioned on 5 August 1922.

Only six of the twelve Rivers saw action in World War 2. In order of commissioning: *Gascoyne*, 18 Nov 1943 (5 Battle Honours), *Barcoo*, 17 January 1944 (3 Battle Honours), *Burdekin*, 27 June 1944 (2 Battle Honours), *Hawkesbury*, 5 July 1944 (3 Battle Honours), *Lachlan*, 14 February 1945 (2 Battle Honours) and *Diamantina*, 27 April 1945 (1 Battle Honour). HMAS *Gascoyne* was present at the Japanese surrender in Tokyo Bay on 2 Sep 1945.

On first appearance one would swear that the British and Australian Rivers were the same. It would be logical that a shipment of plans and specifications would be sent out to Australia, perhaps with some personnel to help in setting up production and that the Australian-built Rivers would be duplicates of whatever happened to be the most up-to-date version of the British River Class at that particular time. Of course, they may well have been the same. It was only when I came to re-draw the Improved River Class from the Australian Department of Defence (AdoD) drawing #A 015510 that I found that there are minor differences, but these might only apply to the Improved River Class – the ships that came before them, for which I have not been able to find such detailed drawings, may well have been straight copies off the British plans insofar as the basics were concerned.

The most noticeable in the AdoD drawing are:

> the foredeck is continued aft about 7 frames (15'9") to about frame 88.
> the bridge wings have been omitted in favour of extending the flag deck where the 20mm Oerlikons are twin power-operated Mk Vs instead of the manual singles that would have been on the bridge wings.
> the 16-foot dinghy was never fitted.
> the 25-motorboat is slightly further aft.
> there's a 20-inch searchlight (possibly a 24-inch) on a mounting just like the ones that were standard on the V & W destroyers just abaft the funnel but offset to port.

The Australian River Class was better armed than their British and Canadian equivalents in that they received, uniquely I believe, the single-barrelled version of the QF 4-inch Mk XVI in a Mk XX mounting and shield that looked exactly like a cut down version of the twin-barrelled mounting – the Mk XIX (not to be confused with the Mk XIX gun). Whether this was a peculiarly Australian-derived mounting, or at least shielding for the mounting, I am yet to discover but I have not seen any evidence of it on ships other than those built in Australia. Since the 40mm Boffin mounting – that is, the 40mm Bofors gun mounted on the 20mm Oerlikon Mk V power-operated mounting – was a purely Australian invention and manufacture, it seems quite logical that adapting the QF 4-inch Mk XVI to a single mounting within a shield that was cut down from the twin mount would be well within the Australian munitions industry's capacity. Being so isolated, Australia became, of necessity quite innovative and self-reliant. For example, the CAC Wirraway was (in theory at least) a fighter developed from the North American NA-16 training aircraft by the Commonwealth Aircraft Corporation as was the Wirraway-derived CAC Boomerang fighter – both desperation measure in the absence of overseas support. The AC 1 Sentinel cruiser tank was powered by three V8 Cadillac engines and its hull and its turret were the largest single one-piece castings of any tank. See also the next section concerning radar, below.

Additional 20mm mountings were added as and when they became available and singles were converted to twins. Single 40mm Bofors – the preferred anti-aircraft weapon – were added, generally on the centreline, in front of the bridge and on the quarterdeck.

HMAS *Gascoyne* was one of eight built in Australia. Note the 4-inch guns were a single version of the Mk XVI twin. The camouflage pattern predates the USNs overall dark blue which became standard. The masthead radar antenna is the Australian-designed and built A286, not the American SC as often attributed. [navy.gov.au]

AUSTRALIAN RADAR

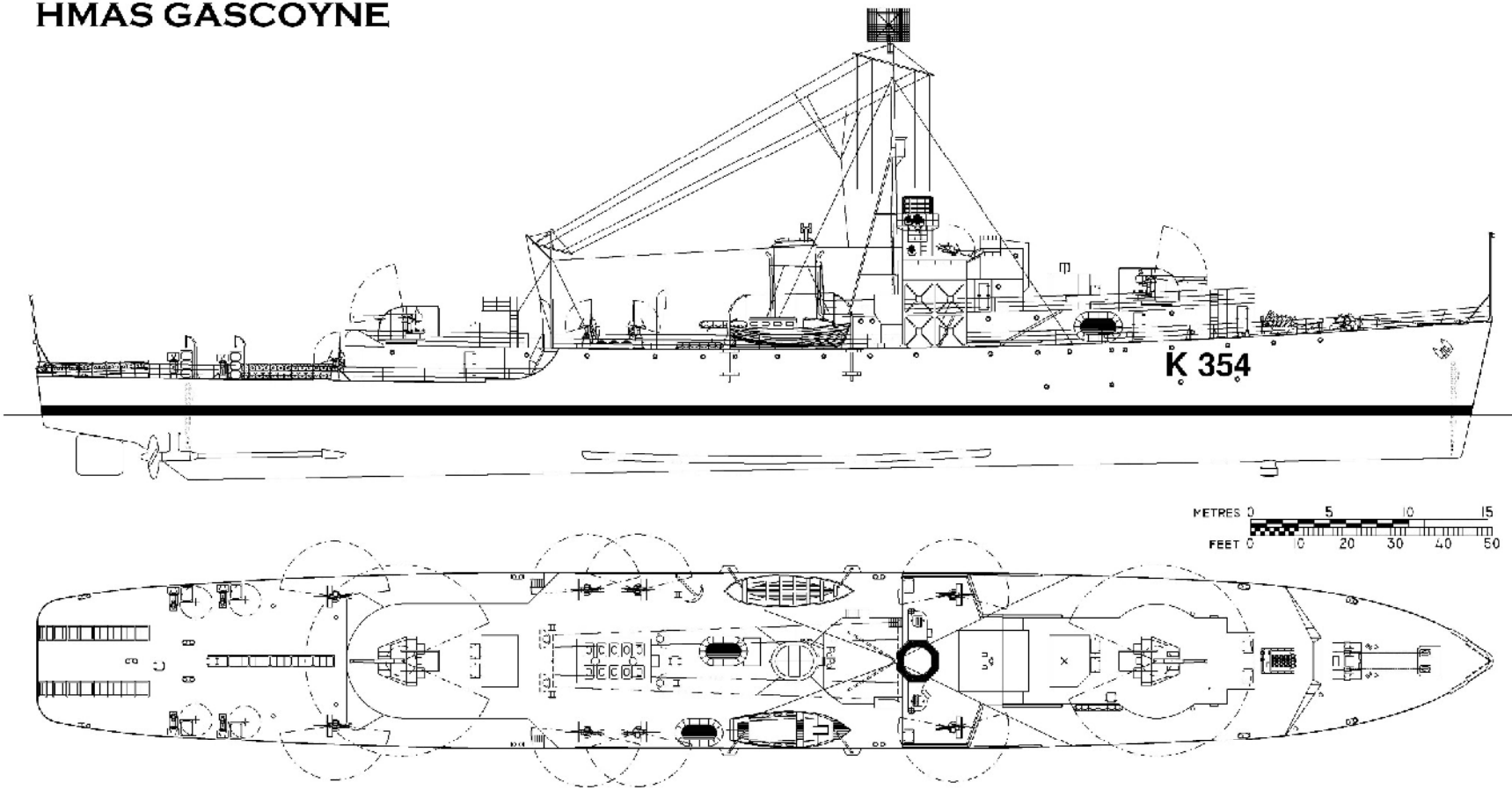
Many historians look at photographs and immediately identify the masthead antenna on Australian River Class frigates (and their Bathurst Class corvette contemporaries) as an American SC air-search. Indeed, the Australian War Memorial and the Royal Australian Navy's website's photographic records' captions tend to bear this out. In my opinion they are most probably wrong – at least insofar as those photographs that pertain to the early photographs of the Australian River Class frigates.

Australia – like Canada – developed her own radar systems, out of necessity not curiosity. The Council for Scientific and Industrial Research (CSIR) established a Radiophysics Division at the University of Sydney in 1940. The basic technology of using radio waves to detect aircraft was bought to Australia in 1939 and the equipment formed the basis for building systems for Australia's armed forces. Significant redesigns took place to suit Australian conditions. A Shore Defence (ShD) radar was built and tested at Dover Heights (near Bondi, Sydney) in 1940 to detect shipping. It was innovative in that it used only one antenna on a tower, rapidly switching between transmitting and receiving radio pulses. It picked up a ship at Port Stephens, 90 miles away. A radically modified version was used as the basis of an air-warning (AW) radar, operating on a 1.50 metre wavelength also at Dover heights that detected an aircraft at 65 miles distance. A truly innovative advancement of this was the LW/AW (Light Weight/Air Warning) radar designed in September 1942. This was an air-transportable system of 2-3 tons that could be re-assembled in four hours. The equivalent American system weighed up to 40 tons. The antenna for the LW/AW and its supporting structure was designed by the chief electrical engineer of the New South Wales Government Railways (NSWGR), J.G.Q. Worledge, and produced in less than a month. This became known as the Worledge Array/Aerial/Antenna. The installation at Dover Heights detected aircraft at 5,000 feet altitude at 88 miles and at 25,000 feet altitude at 65 miles. Aircraft flying at 500 feet were detected at 10 miles. Fifty-six units were used by the Australian forces, 60 by the US Army in the Pacific and a further 12 in Burma by the British.

Not surprisingly, the RAN wanted a seaborne version of the LW/AW radar. Being sensitive to increasing top-weight high on the top of a ship's mast, the antenna had to be lighter and smaller. This deficiency was made up by increasing power to 160 Kilowatts and this achieved a range of 60 miles. It was first installed and tested at sea in HMAS *Kybra* early in 1943. It was called the A286Q. The first locally-built River Class to commission was HMAS *Gascoyne* in November 1943. The A286 as it became known was in full production by then.

I think it fair to say, therefore, that the A286 was an almost totally Australian-derived air-warning radar. It may have shared some commonality with the British Type 286 insofar as the basic electrical componentry/circuitry was concerned but was made unique by the adaptation of the NSWGR-derived Worledge Antenna and the resultant improved performance.
It was this antenna that I believe appears on the Australian River Class Frigates and the drawing of HMAS *Gascoyne* shows a RAN frigate so equipped.

HMAS GASCOYNE



The Australian River Class frigates were better armed than their British and Canadian equivalents in that they had the single-barrelled version of the QF 4-inch Mk XVI fore and aft in place of the low-velocity Mk XIX - the derided 'Woolworth Gun'. Although they took an inordinately long time to build and saw little action as a result, the RAN ships operated in a potentially aircraft-rich environment and the Mk XIX was particularly inadequate in this respect. Otherwise. their secondary armament, while differently disposed, was similar. Their radar fit was a mixture of the locally conceived Type A286 air-search at the masthead and British Type 272 on the bridge.

USS ASHEVILLE (PF1) & USS NATCHEZ (PF2)

In a reverse Lend Lease scenario, two of the seventy River Class frigates built in Canada were transferred to the USN in July 1942 while still under construction and were commissioned in December 1942. This rather unusual event, the reverse of what had been happening under Lend Lease where the flow of materiel had been west to east, was the result of the German Navy's Operation *Paukenschlag* (or Operation Drumbeat) and the follow-on Operation *Neuland*, often referred to by the Germans as the *"Second Happy Time*" – the first having been that period between June 1940 and February 1941 after they gained access to the French ports and were able to range wide and free into the Atlantic. It was also called the *American Shooting Season*, such were the easy successes. Drumbeat brought waves of U-Boats to the American East coast, then the Caribbean and the Gulf of Mexico finding the USN desperately short of suitable escort vessels and American defence measure hopelessly inadequate.

Drumbeat started in January 1942. In March, Britain transferred ten Flower Class corvettes and twenty-four anti-submarine trawlers to the USN and stationed a Coastal Command squadron on Rhode Island to help protect New York in July. These were all measures Britain could ill-afford to part with, as were the two River Class frigates. But, one needs to consider that it did not matter how or where the torpedoed merchant ships were lost – they were still losses.

Asheville (ex-HMS *Adur*) and *Natchez* (ex- HMCS *Annan*) were apparently finally fitted out in Boston. It is unclear to what degree this fit-out may have re-done or altered the Canadian work (by Canadian Vickers Ltd., Montreal) but photographs quite clearly show the Type 271 radar in its usual position above and behind the bridge and the RN's 25-foot motor-boat to starboard – no 27-foot Montagu whaler however. I don't think rowing boats figured in the USN's way of doing things. Quite what the American sailors would have made of the British galley with their oil-fired Admiralty 25H type ranges, steamers, dough-mixing troughs and the like when they were used to chilled water dispensers, dishwashers and ice-cream makers one can only imagine. Did the USN throw out hammocks and install three-tiered bunks? Records simply do not reveal this. But, what we do know is that, for whatever reason, these two ships do not seem to have been utilised to anywhere near the extent they would have been had they not been transferred. *Asheville* was relegated to a test ship in May 1944 for anti-submarine and radar equipment – Squid at one stage. Both were soon struck off the Navy Register List: *Natchez* in 1945 and was transferred to the Dominican Navy in 1948 and *Asheville* in 1946 going to the Argentinian navy that same year.

The United States Navy's Patrol Frigate *Asheville*, transferred from the Royal Navy in a reverse Lend Lease in December 1942.
In effect a River Class frigate with American armament. Note that there are no 20mm Oerlikons fitted amidships like the Tacoma Class. [navsource.org]

The armament fit foreshadowed that for the Tacoma Class which was on the drawing board at the office of US naval architects Gibbs & Cox – that is, three 3"/50 cal (two forward and one aft), two twin 40mm Bofors with Mk 51 fire control (to port and starboard at the break of the forecastle) and, in theory, up to nine 20mm Oerlikons (two before and below the bridge wings, two on the bridge wings, two 'midships and three on the quarterdeck (fantail). Photographs do not support nine Oerlikons as visible and my drawing is as per photographs. The Hedgehog, forward, was backed up by eight depth charge throwers – projectors in USN parlance – and two depth charge rails (racks in USN parlance) were installed as per the early River Class. Presumably these were of American pattern.

WINS & LOSSES

Seven U-Boats were sunk by River Class frigates acting on their own.

Fifteen U-Boats were sunk by River Class frigates acting in concert with one or more other ships or aircraft.

Ten River Class frigates were lost, nine to torpedoes, one to her own depth charges exploding ammunition in a sunken wreck. Of these losses, only four were sunk outright, the other six being towed to port.

(Refer Chapter 10)

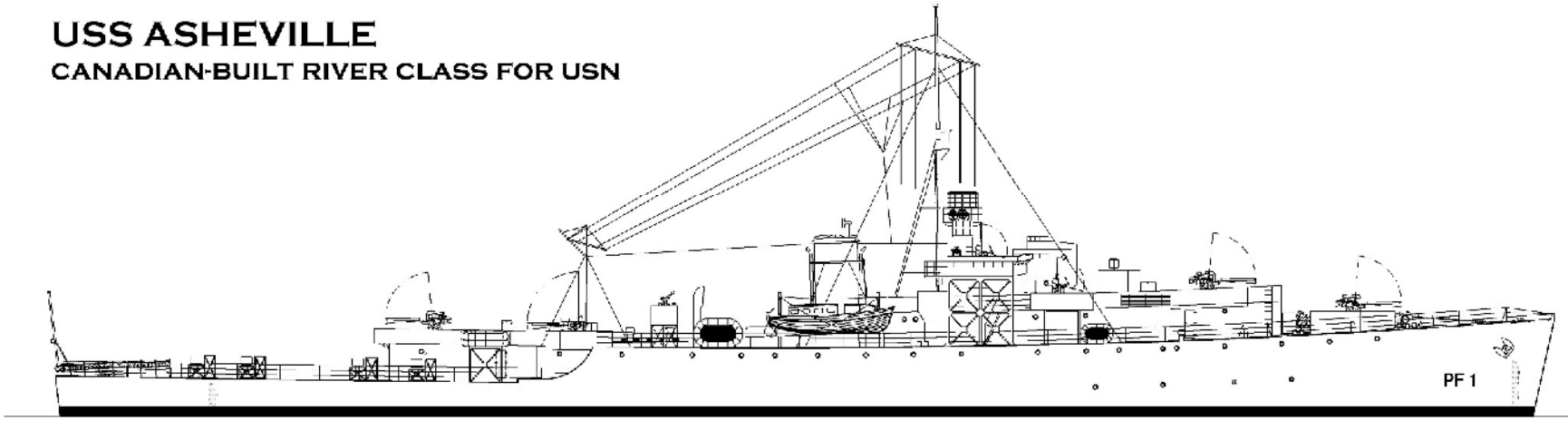
River Class Data: (as designed)

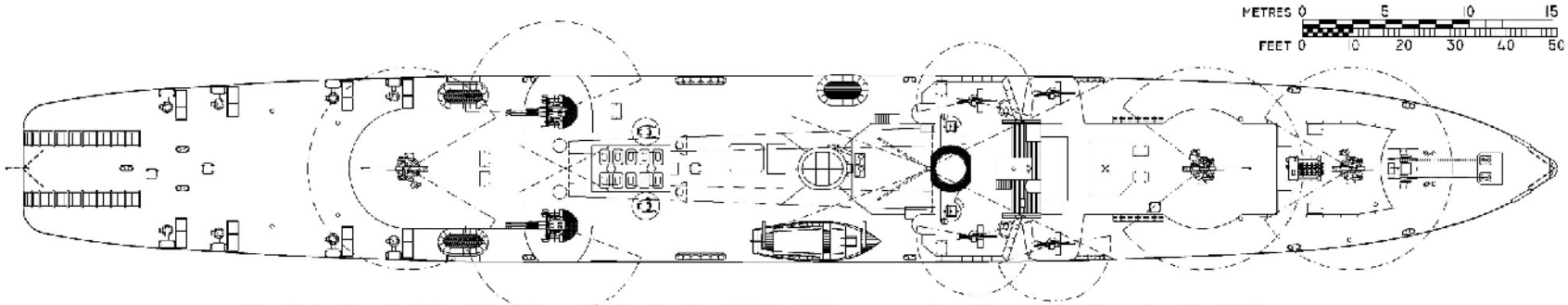
LOA	301'3"
Beam	36'6"
Draft	9'0" standard, 13'0" deep
IHP	2 x 5,500 to VTE engines
SHP	2 x 6,500 for Turbine engines
Displacement	1,370 tons (standard), 1,855 tons (deep)
Speed	19.5 knots clean
Range	4,630 @ 14 knots VTE, 4,920 @ 14 knots Turbine
Guns	2 x 4" (2 x 1), 2 x 2-pdr (2 x 1), 2 x 20mm (2 x 1)
DCT	8
ATW	Hedgehog
Crew	114

An evocative photograph of HMS *Swale*, apparently taken in the Mediterranean in 1944. She sank U-657 & U-302 in May 1943 and April 1944 respectively. [wikivisually.com

USS ASHEVILLE

CANADIAN-BUILT RIVER CLASS FOR USN





The Canadians-built two River Class frigates for the USN in 1942 a reverse Lend Lease at a time when the USN was desperately short of escort vessels on the east coast of America as a result of the German Operation Drumbeat. While outwardly similar, the armament (fitted in Boston) was to form the prototype for the Colony Class (RN) and the Tacoma Class (USN and USCG) - that is, three 3"/50 cal and two twin 40mm Bofors, each Bofors with a Mk 51 director. Various sources maintain that the two ships had nine 20mm Oerlikons but photographs only show four. Contrary to RN doctrine, eight depth charge throwers were fitted, the fourteen-charge pattern offered having been discredited as unnecessarily wasteful. Only the Type 271 radar appears to have been fitted. Note the absence of the usual Montagu whaler.

1. *Janes Fighting Ships 1942*, p. 67
2. David K. Brown, *Atlantic Escorts, Ships, Weapons and Tactics in World War II*, p. 131
3. Norman Friedman, *British Destroyers & Frigates, The Second World War & After*, p. 144
4. Brown, p. 79
5. S.W. Roskill, *The War At Sea, 1939-1945, Volume 2, The period of Balance, Appendix H*
6. G. N Tucker, *The Naval Service of Canada; Its Official History Vol II Activities On-Shore During WW2*, p 65
7. Brian Lavery, *River-class Frigates and the Battle of the Atlantic: A Technical and Social History,* p.p. 25-6
8. Ibid, p. 33
9. Friedman, p. 140
10. Brown, p. 79
11. Antony Preston, (Consultant Editor), *Fighting Ships of the World, An Illustrated Encyclopedia of Modern Sea Power*, p. 282
12. Brown, p. 143
13. Friedman, p.p. 333-4
14. H.T. Lenton & J.J. Colledge, *Warships of World War II,* p.p. 225-227
15. Brown, p. 79
16. Ibid, p.80
17. Lavery, p. 208
18. Lenton & Colledge, p. 225-227
19. Friedman, p.155
20. John Henshaw, *Town Class Destroyers: A Critical Assessment,* p.p. 74-7
21. Friedman, p. 156

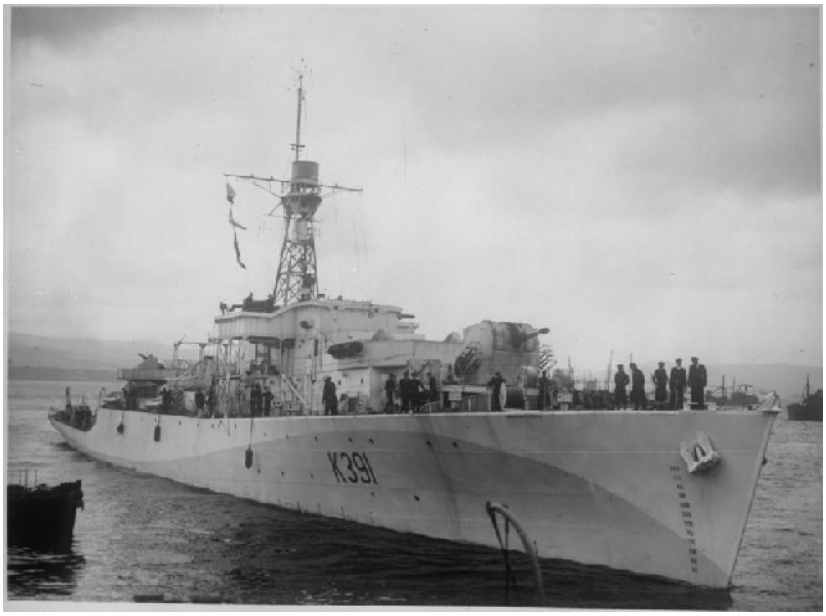
CHAPTER 5 THE LOCH CLASS

RAISON D'ÊTRE

The Loch Class evolved from the River Class as a result of Staff Requirement TSP 1657/42 of January 1942. Two- hundred more escort ships were predicted as being required by the end of 1944 made up – at that time anyway – of 120-145 twin-screw and 70-70 single screw, the latter being of the Castle Class then on the drawing boards to replace the Flower Class. The numbers changed, later, to 133 Lochs twin-screw and 69 Castles. [1]

The Loch Class were essentially the River Class modified for pre-fabrication. To achieve this, a new longitudinal hull structure was developed. Shipbuilders, Henry Robb Limited of Leith, were heavily involved to assist in the practicalities of simplifying the construction methodology. This was done by the elimination, where possible, of curved structures such as the hollow in the flare of the bows and the very slight tumblehome (where the sides, mainly amidships, slope slightly inwards from the maximum beam to the deck). Instead of a curved deck camber – to allow water to run off – deck camber was achieved by a flat upward slope from the deck edge to a flat deck then back down to the opposite deck edge, as was being done on the Liberty ships. Appearance-wise, the main change itself is in the sheer; instead of the gentle curve downwards from the bow to the waist of the River Class and then up to the stern, the Lochs had one straight line from bow to level with the aft end of the bridge wings, then were parallel to the waterline to the break in the forecastle then a straight sweep upwards of the quarterdeck to a transom stern. As an example of the time/cost-saving measures, the stern had been squared off, the rounded corners gone with all the complications that forming the plates to achieve this involved. While the change to the sheer sounds radical and, when drawn appears a bit stiff and ungainly, the actual effect was not as hard on the eye as might have been expected. At the same time, the bow was given some more flare for additional buoyancy and to reduce spray and the hull given 6-feet more length and 2-feet more beam at 307'3" and 38'6" respectively. Internally, the boiler room was made longer by 2'6". The other distinguishing aspect was the replacement of the River Class tripod mast with a more stable lattice mast to support the newer radars expected to be available when the Lochs were finished and which needed a more stable base for revolving antennae.

The essence of pre-fabrication was that sections could be made up in dispersed locations – such as by bridge builders – but the size of these fabrications was limited to a length of 29-feet and a width and height of 8 feet 6 inches and a weight limit of 2.5 tons due to railway and road networks and crane capacities. Up to eighty per cent was pre-fabricated in this way and the balance constructed on site by shipyards – some of non-naval type, used to mercantile type construction standards to which, just like the River Class, the Loch Class was designed and built.



Killer of three U-Boats, HMS *Loch Killin* returning to port. Note the three economy-measure straight lines in the sheer. The radar atop the lattice mast is not yet the Type 277 it was designed for but a variant of the Type 271 – possibly Type 271Q or 272. A Type FH 4 HF/DF antenna is just visible at the masthead. The camouflage scheme is basically an all-white hull with a lower flash of Western Approaches Green or Blue – both very pale colours. [commons.wikimedia.org/wikivisually.com]

HMS *Loch Fada*, the first one laid down and essentially the prototype for the construction method, shortly after commissioning. Note she is fitted with the Type 272P radar in a teak and perspex lantern at the top of the lattice mast with the HF/DF antenna well above it. [en.wikipedia.org]

BUILDERS

There were eleven builders:

Ailsa Shipbuilding Company, Troon	2 ships
Barclay, Curle & Co, Whiteinch	1 ship
Blyth Shipbuilding & Drydock, Blyth	2 ships
Burntisland Shipbuilding Company, Fife	3 ships
Caledon Shipbuilding & Engineering Company Limited, Dundee	4 ships
Charles Hill & Sons Ltd., Bristol	3 ships
Harland & Wolff, Belfast	4 ships
Henry Robb Ltd., Leith	3 ships
John Brown & Company, Clydebank	1 ship

Smiths Dock Co., South Bank-on-Tees	2 ships
Swan Hunter, Wallsend	3 ships
28 TOTAL	

While there were eleven builders, apparently a few of these were in overall charge of the process, the other shipyards presumably coming under their control.

BUILDING TIMES

Building times averaged 379 days over a production run of 28 ships – 25 for the RN plus another 3 for the Royal South African Navy. The best construction time was 266 days, Charles Hill & Sons, Bristol, and the worst time was 835 days, Ailsa Shipbuilding Company, Troon. Ailsa also had very poor performance being the slowest builders of the Flower Class too. The well-researched internet site, www.navalhistory.com says this about Ailsa: "*This shipyard had a poor record for completion of build".* But, if we take into account that this was a ship – *Loch Veyatie* – completed after the war was finished and look at the next worst completion time this was still a miserable 559 days (Harland & Wolff) or more than twice the best performance and 47% more than the average performance. (Refer Appendix B) The building time for *Loch Fada* looks slow at 307 days but this ship was the first one laid down and was built by conventional methods and used as a working template so that patterns could be taken from it.

These times need to be seen in perspective and compared with the very similar American-built ships:

Loch Class average time, keel laid to commissioning	379 days (Rrefer Appendix B)
Colony Class average time, keel laid to commissioning	247 days (refer Chapter 8 & Appendix E)
Tacoma Class average time, keel laid to commissioning	347 days (refer Chapter 9 & Appendix F)

The Tacoma Class ships were plagued with problems resulting from shipyards totally unsuited to carry out the orders by way of experience and location so should really be discounted. While the Colony Class building times look impressive by comparison with the Lochs, it should be noted that they consumed considerably more manhours and in this regard were more inefficient.

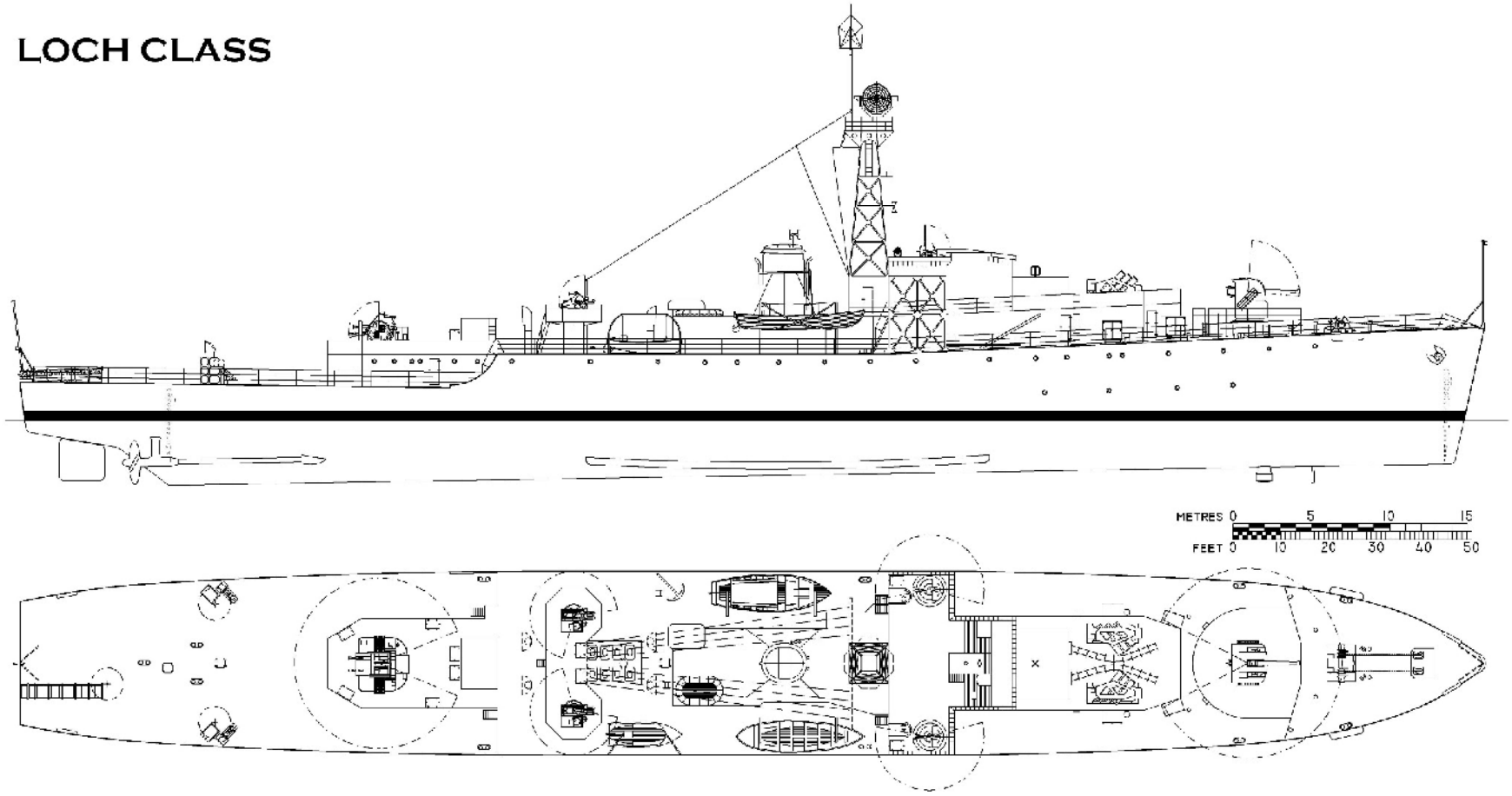
PROPULSION

The Loch Class used the same VTE engines as the River Class. However, two ships, HMS *Loch Arkaig* and HMS *Loch Tralaig* were completed with the same turbines as six of the River Class, 6,500 SHP providing theoretically more speed, 20.25 knots, and only lightly better range. Once again, one would wonder why it was thought necessary that, in a production run of 28 ships, there was some worthwhile advantage in making two non-standard models. I remember reading somewhere that the first rule of production in war-time is to keep building lots of what was already building and what you're good at that works and not diversify into building new and untried models. Russia understood that concentrating on one tank, the excellent T 34, favouring quantity over quality. Germany went the other way expecting that technical superiority in a lesser number of tanks, and aircraft for that matter, would make the difference. It didn't.

ARMAMENT

However, it was in the armament – particularly the anti-submarine fit – that the Loch Class outweighed the River Class by a big margin in capability. The Squid anti-submarine mortar was unusual in that it went from the drawing board into production having first been tested on the destroyer HMS *Ambuscade*. It's first permanent installation – that is designed-and-built-in as distinct from simply placed temporarily on the foredeck of *Ambuscade* for testing – was in HMS *Hadleigh Castle* (a Castle Class corvette and the successor to the Flower Class) and found to be more effective than the Hedgehog spigot mortar. Unlike the Hedgehog which projected 24 relatively small missiles in an oval-shaped pattern ahead of the attacking ship and which exploded only on contact with a submarine, the Squid fired three much heavier depth charges (390 pounds) about 275 -300 yards ahead of the ship and landed in a triangular pattern. The Lochs had two, side-by-side, set in such a way to give a 60-foot separation in depth between the two patterns of charges – in effect a hexagonal pattern. The charges could be set moments before firing with input direct from the ship's ASDIC – a Type 147 – to explode at a required depth. [2] The Squid was roll-stabilised and yaw-stabilised to 30-degrees and was tilted to the horizontal for quick reloading via a trolley and rail system from a ready-use locker fed from a below-deck magazine. Two depth charge throwers and the one depth charge rail were designed to augment the more effective Squid but these were apparently later doubled. Only 15 depth charges were carried with the earlier fit. The drawing on page 148 of Friedman's book shows two depth charge rails and four depth charge throwers. I have chosen to draw the Loch Class with the minimum fit. It does not represent any particular ship and is drawn to reflect the general rather than the specific.

LOCH CLASS



The Loch Class frigates were essentially River Class frigates with the design rationalised for prefabrication where possible, the aim being to produce them more quickly. While they were longer and beamier than the River Class, the main difference, appearance-wise, was the substitution of the curved sheerline by three straight lines and the removal, wherever possible, of curved plating. The biggest single improvement over the River Class was the Squid anti- submarine mortar which was by far the most effective weapon of its type of the conflict - so much so that a conventional depth charge armament was reduced to a mimimum, despite the commodius quarterdeck set aside specifically for it. A lattice type mast was required for the new Type 277s radar antenna.

The main gun armament was an improvement on the River Class in that it was a QF 4-inch Mk V in a HA Mk III mounting, a tall ungainly affair needed to properly enclose a gun with a very high trunnion. This was a useful dual-purpose HA/LA gun as used on the RN's light cruisers of the Arethusa and Leander Class and heavy cruisers of the York and Dorsetshire Class but were unshielded. Because a surfaced submarine presented a very small target, a special projectile named "Shark" was developed that, instead of ricocheting off the water's surface at low angles of fire as 4-inch projectiles were wont to do, Shark entered the water short of the submarine and the trajectory was maintained by special spoiler rings. A hardened nose-cone could pierce the submarine's pressure hull and allow the 24-pounds of Torpex to explode internally. Rocket flare projectors were fitted to each side of the 4-inch mounting for "Snowflake" illuminating flares, essential for combating submarines at night – their favourite time to attack.

The main anti-aircraft mounting was a quad-barrelled, 2-pounder pom-pom, (QF 2-pounder Mk VII) and was mounted where it had a good firing arc on the deckhouse aft of the break of the forecastle deck. This obsolescent weapon was chosen over the harder-hitting 40mm Bofors because it was felt, at the time anyway, that a ship of the Loch's size was too small for the Bofors' requisite American Mk 51 director – a theory that was later to be proved unfounded. Augmenting this were six close-range 20mm Oerlikons: singles in the bridge wings and twin power-operated Mk Vs port and starboard in a raised position at the break of the forecastle. As and when more Oerlikons became available they tended to be added as four singles on the quarterdeck and singles on the forecastle abeam the Squid for a total of ten. But some had as many as twelve. Some of the twin 20mm Oerlikons were sensibly replaced with single 40mm Bofors, presumably by the power-operated and Australian-derived Boffin Gun which was adapted from the twin 20mm Mk V mount.

RADAR

The radar fit also distinguished the Lochs from the Rivers. Instead of the distinctive Type 271's lantern above the bridge, the Lochs had the later Type 277Q tennis racquet-like antenna atop the lattice mast although I have seen photographs of at least two Lochs (*Achanalt* and *Fada*) which appear to have the earlier Type 272 in enclosed Perspex drums. A Type HF4, HF/DF antenna topped the masthead.

HULL STRENGTHENING

The North Atlantic is an unforgiving environment and the Loch Class found certain weaknesses due to the constant hammering they received, usually from being pushed beyond what was expected of them. The design of the forward structure was insufficiently strong to cope so the bows had to be strengthened with extra members to cure the warping and distortion experienced.

POST-WAR

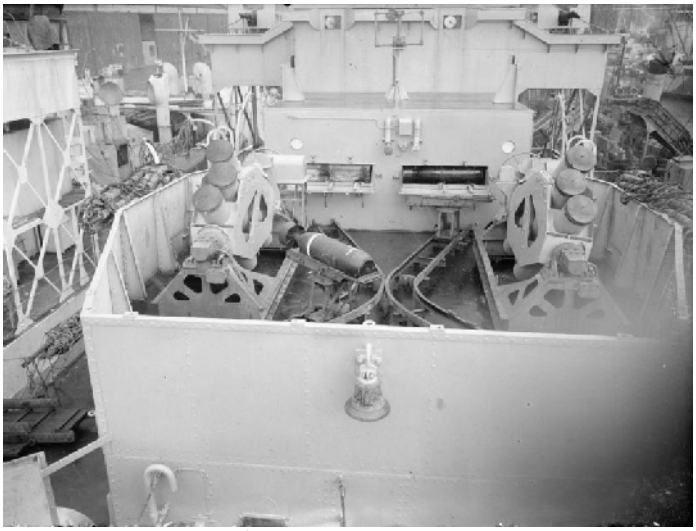
Most of the Lochs and Bays went into the Reserve Fleet after 1946. Six were transferred to the Royal New Zealand Navy between 1948 and 1949 to form the 11th Frigate Squadron. The Korean War saw reactivation of nine Lochs to form two frigate squadrons – one in home waters and the other in the Mediterranean – to release destroyers to serve in Korea.

MODERNISATION PROGRAMME

Seven Lochs underwent a modernisation in the early 1950's principally involving the following:

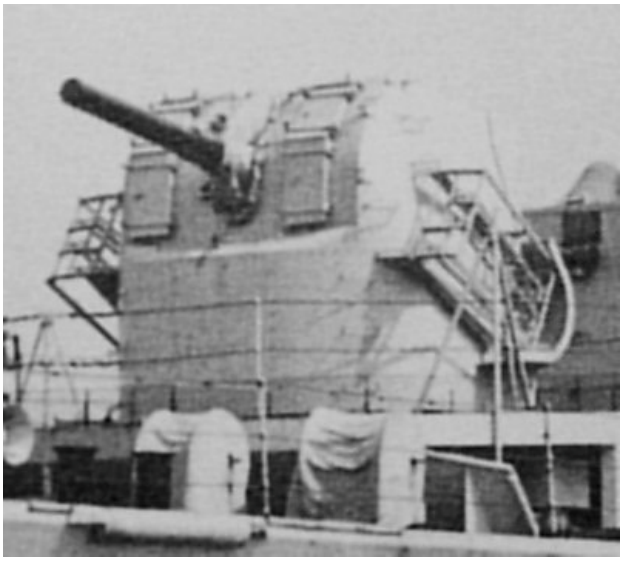
Replacement of the single 4-inch gun with the twin QF 4-inch Mk XVI complete with launching rails for 2-inch illuminating rockets.
Director on the bridge.
Two twin 40mm Bofors Mk V each with a Simple Tachymetric Director. These directors may have been replaced later by Type 282 radar. These were a relatively new, power operated mounting with water cooled barrels.
Single 40mm Bofors Mk VII in each bridge wing, again a relatively new power-operated mounting.
New ANU antenna for the Type 277 radar. This was tiltable and had a height-finding capability.

These Lochs saw service mainly in the Mediterranean Sea, the Middle East and the Far East. In doing so, while they were no match for the current perceived submarine threat due to their lack of speed, they provided a valuable service in these secondary theatres and freed up the more modern conversions of war-built destroyers to dedicated anti-submarine frigates and the new built-for-purpose frigates to honour the Royal Navy's commitments to NATO with respect to the North Atlantic.



A twin Squid mounting on a Loch Class frigate. Note the rails leading from the two hatches where the depth charges were loaded on to the trolleys. Each Squid was tilted 90 degrees so the charges could be placed in the barrels. Even so, the space was cramped and loading six charges must have required extra-ordinary teamwork. [commons.wikimedia.org]

The Loch Class introduced a shielded version of the QF 4-inch Mk V – shown here on HMAS *Canberra*. Note how tall the mount is in order to achieve the elevation for it to be an effective anti-aircraft weapon. [State Library of Victoria: H98.105/3227]

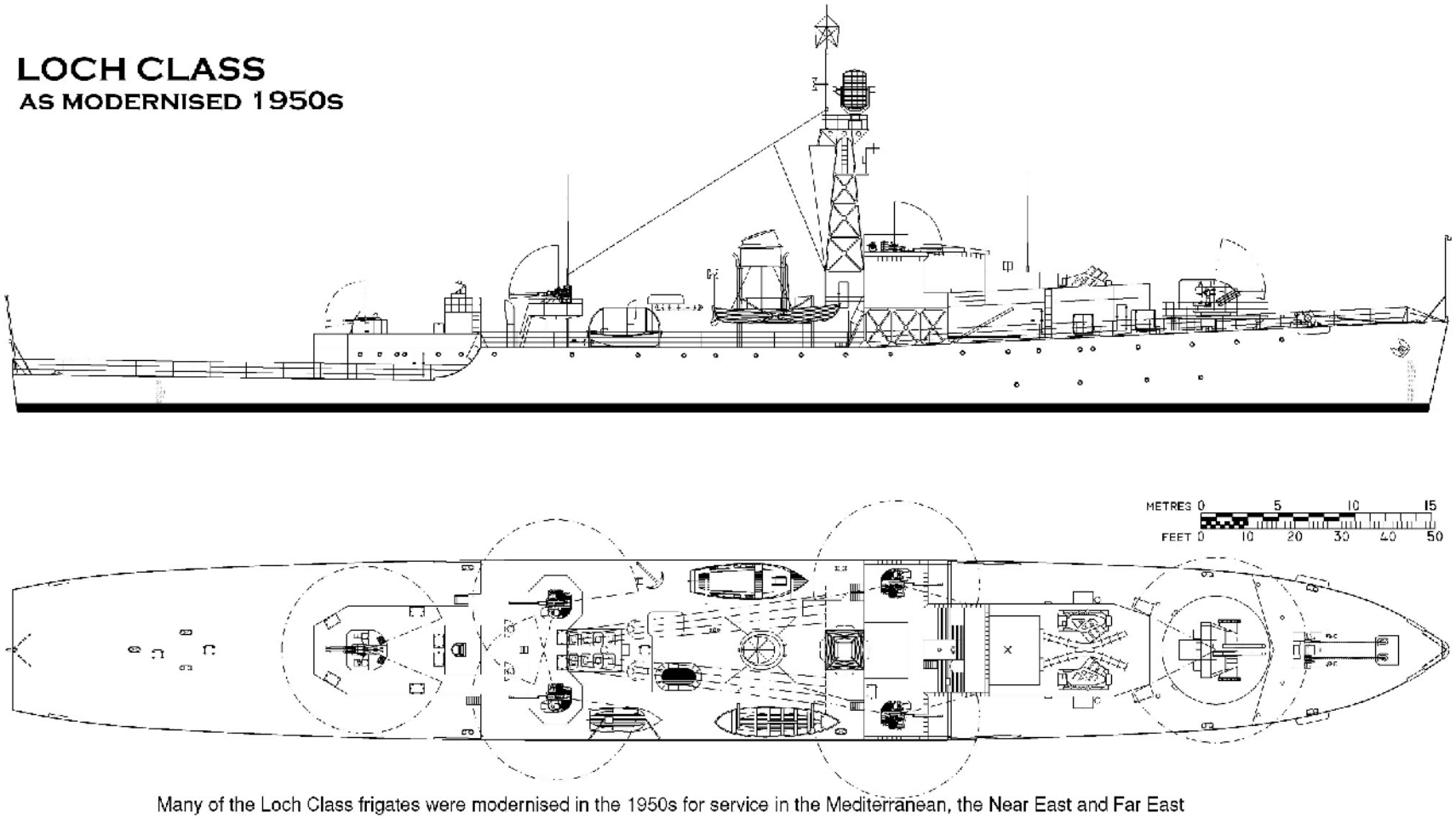


A poor photograph of a QF 4-inch Mk V in its shield with launching rails for 2-inch illuminating rockets on each side. [forposterityssake.ca]

The four-barrelled “multiple pom-pom”. More particularly described as the QF 2-pounder Mk VIII on a MK VII mounting. While capable of putting up a prodigious amount of shells (barring any jams), the range was short and velocity only improved slightly with the models designated with an asterisk. [navalhistory.flixco.info]

The 40mm Bofors – in this case a modified Mk III – became the standard replacement for twin 20mm Oerlikons. Note the rails limiting the gun’s firing arcs and the ready-use stowage. The Bofors was a necessary replacement in the Pacific as the Oerlikon did not have sufficient stopping power to deal with Japanese Kamikaze attacks. [Australian War Memorial P0044.064]

LOCH CLASS
AS MODERNISED 1950s



Many of the Loch Class frigates were modernised in the 1950s for service in the Mediterranean, the Near East and Far East and performed valuable service in these secondary theatres, showing the flag and allowing the more modern frigates - bothe converted World War II destroyers and specialised new-build frigates - to concentrate on the Royal Navy's NATO obligations in the North Atlantic. The main armament was upgunned to the QF 4-inch Mk XVI and the obsolete quad 'pom-pom' was replaced with a power-operated and remotely controlled twin 40mm Mk V. The single 20mm Oerlikons were replaced with single 40mm Mk VIIs - also power-operated. Many of these ships were transferred to Commonwealth navies.

REFUELLING AT SEA

Although the Rivers, Lochs and Bays were long-legged by comparison with their predecessors, refuelling at sea became an established necessity. The British method was relatively simple if slow and cumbersome. It involved trailing a floating hose behind a tanker – or in some cases an escort aircraft carrier or a merchant aircraft carrier that was a converted tanker – and picking this up at the bow of the ship to be refuelled, making the connection and trailing behind until the procedure was complete. The American system, later adopted by the British, was alongside refuelling with the hoses being suspended by derricks. It was quicker and had the advantage that two ships could be refuelled – one to port, one to starboard - and receive other stores at the same time. To facilitate the bow-to-stern, and perhaps for use in the later alongside refuelling, the frigates were fitted with oiling fairleads at foredeck level opposite the mooring bollards and these are clearly visible in photographs of the ships so fitted.

The Royal Navy favoured refuelling by the bow-to-stern method. Here a destroyer, probably an A Class judging by the face of the bridge, is keeping the cable from which the refuelling hose is suspended taut.- a tricky procedure involving many commands to the engine room to alter evolutions. [Australian War Memorial 001982]

CONVERSIONS

Two Lochs were completed as **Coastal Forces Depot Ship**s before War's end:

Loch Assynt (renamed *Derby Haven*)
Loch Torridon (renamed *Woodbridge Haven*)

Details are sketchy but *Derby Haven*'s armament consisted initially of a single unshielded QF 4-inch Mk V mounted fore and aft and four single 20mm Oerlikons in the usual positions of bridge wings and in a raised linked bandstand spanning the engine room skylight hatches. It is interesting that these ships which were never expected to serve in what might be regarded as front-line situations received a far superior main gun than their contemporaries that were in the front line which had to make do with the low-velocity QF 4-inch Mk XIX of which I have previously made mention. Being a coastal forces-oriented ship, one would have thought the armament would have been of the type used by those forces so that training could have taken place. For instance; 4.5in 8 cwt Mark 1 gun, the 40mm Bofors, the 2-pounder in the power-operated Mk XV mounting, the 6-pounder 7 cwt QF Mk IIA to mention but a few.

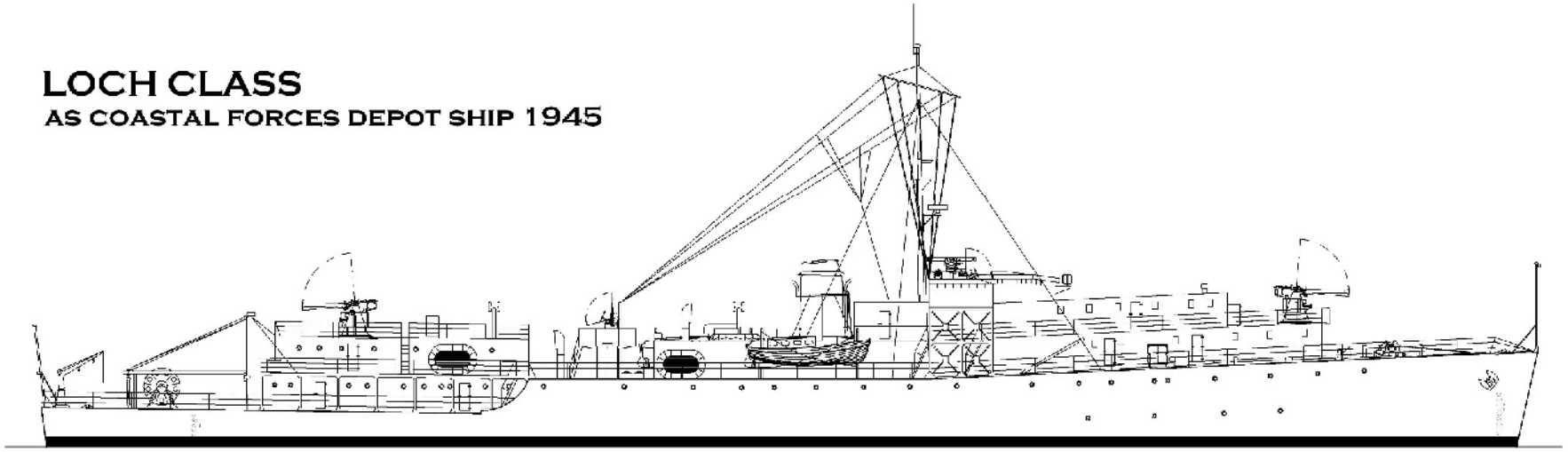
As it turned out, these would have been wasted since *Derby Haven* spent little time in her intended role and was used mainly as an adjunct to various submarine squadrons, variously as a target vessel, as a flag officer's ship and as a depot ship before being sold to Persia (Iran)in 1949.

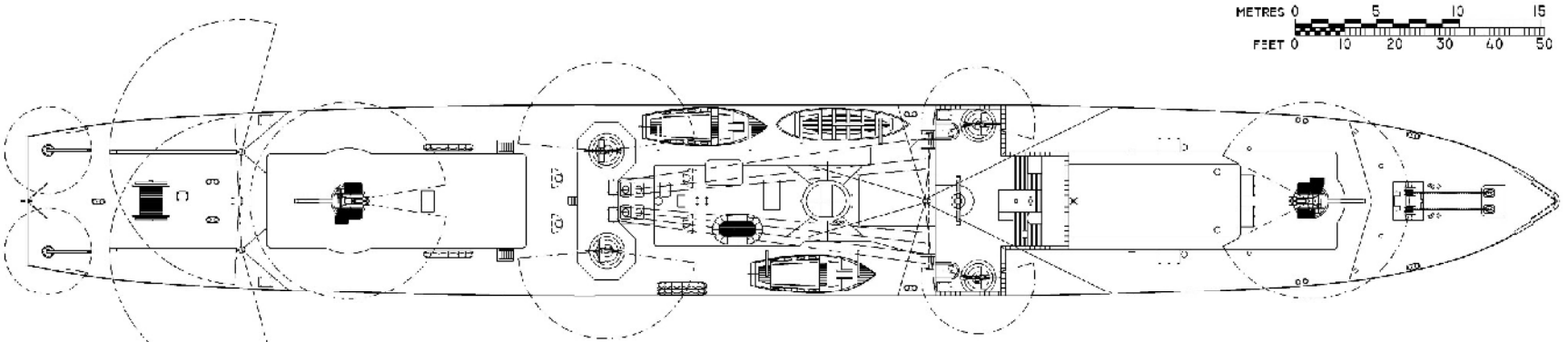
Her sister-ship fared a little better being used mainly as a depot ship for minesweepers operating in the Far East before being scrapped in August 1965. According to Janes Fighting Ships 1958-59, her armament consisted of two 40mm – presumably mounted where the 4-inch weapons had been.

I have drawn HMS *Derby Haven* with the original armament fitted.

LOCH CLASS

AS COASTAL FORCES DEPOT SHIP 1945





Two of the Loch Class frigates were completed as Coastal Forces Depot Ships but too late to see service in World War II. HMS Derby Haven was used as a depot ship for minesweepers before being sold to Persia (Iran) in 1949. HMS Woodbridge Haven saw more use as a depot ship and flag ship for submarine squadrons before service as a depot ship for coastal minesweepers in the Far East. Derby Haven is drawn from a photograph taken in Malta, presumably soon after completion as she is equipped with the QF 4-inch Mk V fore and aft when the few later photographs available show her only with close range weapons.

Two Lochs were completed as **Despatch Vessels** in 1946:

Loch Carron (ex- *Gerrans Bay* and renamed *Surprise*)
Loch *Scamadale* (ex-*Dundrum Bay* and renamed *Alert*)

The term Despatch Vessel is rather a misnomer being a holdover from the days of sail when fast ships were required to carry important dispatches between fleets or from fleets to bases. *Surprise* and *Alert* were used as the yacht of the Commander-in Chief of overseas stations such as the Mediterranean and the Far East– principally to "show the flag" and entertain dignitaries using the covered quarterdeck. The ships were conspicuous with their tall mainmasts at the break of the forecastle deck, necessary for displaying the necessary flags and responding to courtesies.

Armament consisted of a twin QF 4-inch Mk XVI gun where the Squid would have been located plus the normal bridge-mounted Oerlikons – a twin power-operated Mk V or a single power-operated 40mm Bofors Mk VII. Details are sketchy about which ship had which armament. Both may have had Oerlikons then were refitted with Bofors. Photographs show a canvas-covered Hedgehog in the normal foredeck position. Four 3-pounder saluting guns were fitted – their location unknown but probably paired near the break of the foredeck – for the many ceremonial purposes these "showing-the-flag" type ships for which they were mainly used. There were instances, however, where a certain amount of "gunboat diplomacy" was called for and the Despatch Vessels proved up to the task.

The Despatch Vessel, AKA Commander-in-Chief"s yacht, HMS *Surprise* with awnings rigged ready to spread some British diplomacy in a far-away station. [sussesnavy.org]

The Despatch Vessel, AKA Commander-in-Chief"s yacht, HMS *Alert* with awnings rigged aft ready to spread some British diplomacy in a far-away station. [naval-history.net]

Four Lochs were completed as **Survey Vessels** in the period 1948-9:

Loch Eil (ex- *Herne Bay* and renamed *Dampier*)
Loch Glass (ex-*Luce Bay* and renamed *Dalrymple*)
Loch Mochrum (ex-*Pegwell Bay* and renamed *Cook*)
Loch Muick (ex-*Thurso Bay* and renamed *Owen*)

While the photographs of the four survey ship suggest they were all converted to the same design, and examination of the few photographs available shows some discrepancies and I have drawn what might be termed the average on **page)**

These ships were unarmed.

CANCELLATIONS

Fifty-four were cancelled prior to the war's end. None had started construction.

WINS & LOSSES

Four U-Boats were sunk by Loch Class frigates acting on their own.

Eight U-Boats were sunk by Loch Class frigates acting in concert with one or more other ships.

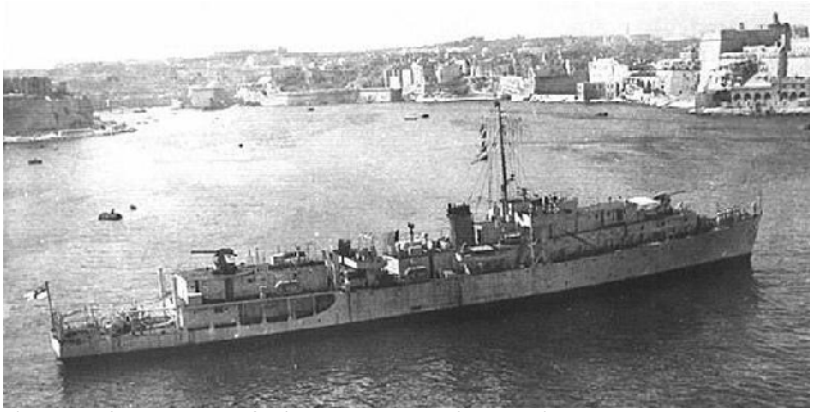
One U-Boat was forced to surface and surrendered by a Loch Class frigate acting in concert with another Loch Class frigate.

No Loch Class frigates were lost.

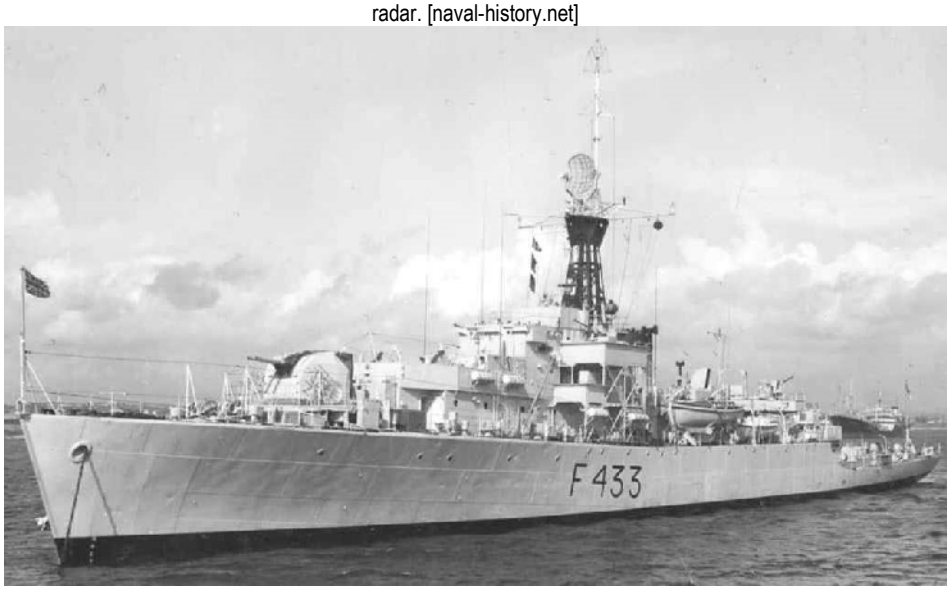
(refer Chapter 10)

Loch Class Data: (as designed)

LOA	307'3"
Beam	38'6"
Draft	9'0" standard, 13'3" deep
IHP	2 x 5,500 for VTE engine
SHP	2 x 6,500 for turbine engines (*Loch Arkaig* & *Loch Tralaig*)
Displacement	1,435 (standard), 2,260 (deep)
Speed	20 knots clean VTE, 20.5 knots clean turbine
Range	4,670 @ 14 knots VTE, Turbine unknown
Guns	1 x 4", 4 x 2-pdr (1 x 4), 6 x 20mm (2 x 2, 2 x 1)
DCT	2
ATW	2 x Squid
Crew	114-151 (records vary)



HMS *Derby Haven* as a depot ship for coastal forces. Note the QF 4-inch Mk V mounts fore and aft. Note the simple pole mast with what looks like an American SG radar. [naval-history.net]



HMS *Loch Insh* was one of the seven Loch Class modernised in the 1950's for service in the Mediterranean Sea, the Middle East and the Far East. They took the pressure off more modern frigates allowing them to attend to responsibilities with NATO in the Atlantic. Note the black ball at the yardarm signifying that she is at anchor. [leithbuiltships.blogspot.com.au]

1. Norman Friedman, *British Destroyers & Frigates, The Second World War &* After, p. 149
2. David K. Brown, *Atlantic Escorts, Ships, Weapons and Tactics in World War II*, p. 120

CHAPTER 6 THE BAY CLASS

BACKGROUND

Anticipating an end to the European war in the 1944-45 time-frame, the British began to make plans to reclaim lost territories in South East Asia – Singapore and Hong Kong especially – and to restore their lost prestige and influence. The Octagon conference in Quebec in September 1944 discussed, amongst other things, the role of the Royal Navy in the war against Japan. While the British Pacific Fleet (BPF) was officially formed on 22 November 1944 – two months after the Conference – it had been years in the making insofar as its predecessor, the Eastern Fleet, had continued to be based at Ceylon (Trincomalee Harbour) after the surrender of Singapore and this had morphed into the reorganised and revitalised British East Indies Fleet.

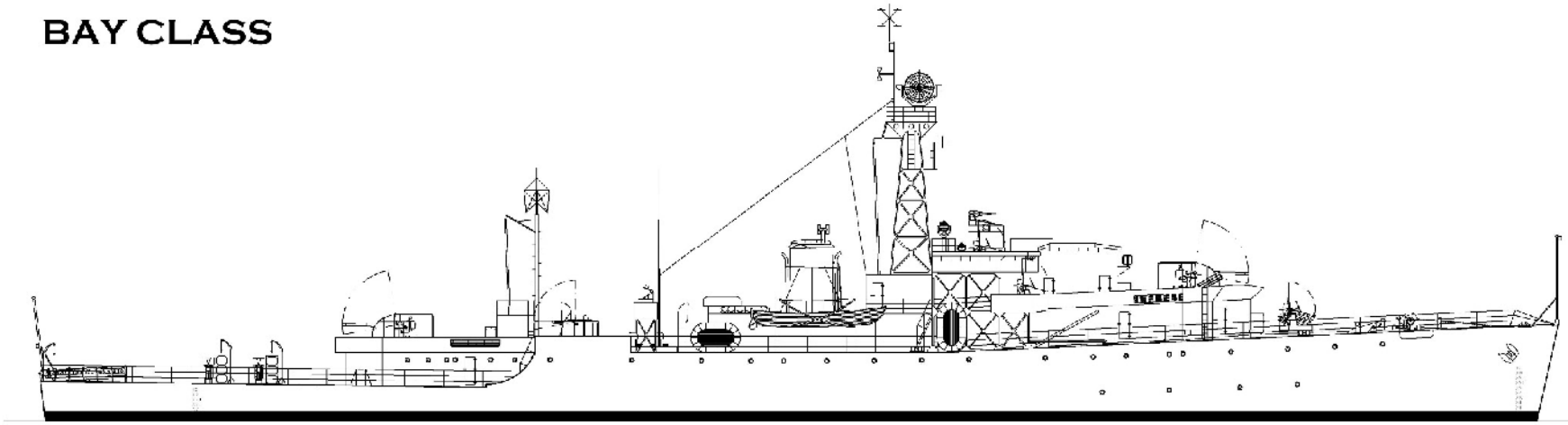
The British plans were resented by the Americans who saw the opportunity to extend their own sphere of Influence in the vacuum left by the British and Dutch withdrawal from South East Asia – the nadir being the fall of Singapore on 15 February 1942. Admiral Ernest King, Commander-in-Chief of the United States Fleet and Chief of Naval Operations was, and always had been, an Anglophobe, and presented obstacles wherever possible – no doubt still smarting from the lesson the Royal Navy had taught him in finally adopting convoys for American East Coast shipping and having to accept RN escort vessels into the USN to plug gaps when the Germans

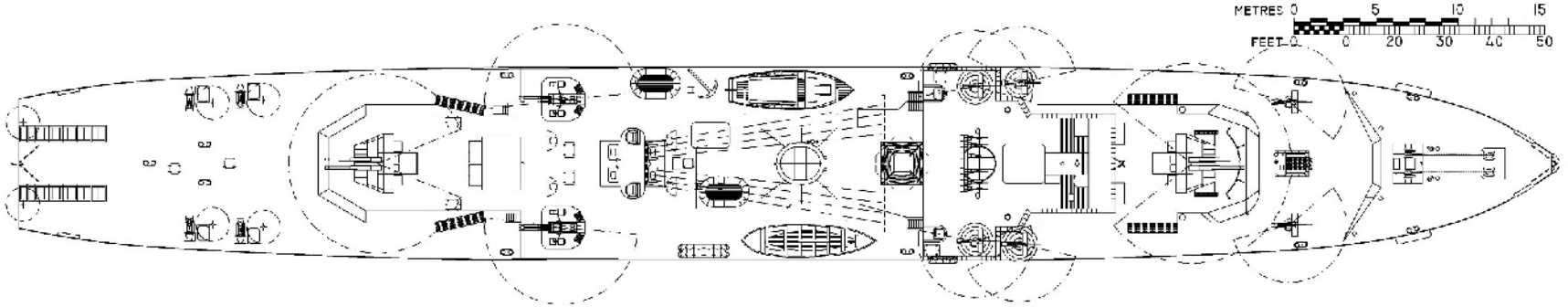
instituted Operation Drumbeat between January-August 1942. Admiral W.F. "Bull" Halsey -Commander, South Pacific Area – wrote in his memoirs, *Bull Halsey: A Biography* by E. B Potter, page 345: *"Prime Minister Churchill, hoping that a victory in that part of the world would offset in Oriental minds the memory of the crushing British defeats in 1941-42, had insisted on having ships of the Royal Navy in on the final defeat of Japan. U.S. Naval leaders neither needed them nor wanted them... an exclusively American attack was therefore in American interests."* David Hobbs in *The British Pacific Fleet: The Royal Navy's Most Powerful Strike Force* quotes Halsey on page 266, *"it was imperative that we forestall a possible post-war claim by Britain that she had delivered even a part of the final blow that demolished the Japanese fleet".*

THE NEED FOR ANTI-AIRCRAFT ESCORTS

The Pacific war saw a need for anti-aircraft vessels more so than the anti-submarine vessels of the Atlantic war. Experience was showing that merchant convoys, the large fleet train required due to the lack of established bases in the Pacific and the type of amphibious task forces that were now the *modus operandi* of the island-hopping campaign towards Japan would be particularly susceptible to air attacks. With this in mind, the Admiralty issued a Staff Requirement TSD 2546/43 on 23 April 1943. To use the modern techno-speak jargon, the BPF would be *"operating in an aircraft-rich environment*".

BAY CLASS





The Bay Class were Loch Class frigates rearmed specifically to serve as anti-aircraft frigates with the British Pacific Fleet. To this end, they mounted two twin QF 4-inch Mk XVI guns directed by Type 285 in a director control tower above the bridge. Type 291 air search radar topped the lattice mast needed to support the Type 277 surface-warning radar. The Type FH4 HF/DF, previously at the masthead of the Loch Class, was moved to a separate mast aft. Close range weapons were two twin 40mm Bofors Mk V which were controlled by separate Type 282 radars. Other armament varied. This drawing shows six 20mm Oerlikons as demonstrated in various photographs. Others had twins on the bridge wings and none elsewhere. In the absence of the Loch's Squid, anti-submarine weapons were boosted to River Class standards.

Although very much the junior partner – and perhaps not wanted, merely tolerated at best – the initial British plans called for a possible three-division amphibious force for which it was estimated a minimum of 56 such anti-aircraft (AA) escorts would be required with only two divisions of the three divisions ever operating in concert. This was a lot of escorts to find in addition to those required for other fleet purposes. [1]

RIVERS OR LOCHS?

Experience was also showing that the British twin QF 4-inch Mk XVI guns on the MK XIX HA/LA mount were a good area defence AA weapon when fitted with improved fuse setting and Remote Power Control coupled to a Director Control Tower with Type 285 gun-laying radar. However, while the River Class frigates were initially earmarked for conversion to the AA role – with two twin mounts – the Loch Class presented a better alternative with their beamier and longer hull – 2'0" and 6'0" respectively. There would be no room for one Squid, let alone two, so the Hedgehog would have to suffice as the primary anti-submarine weapon, backed up by depth charge throwers and depth charge rails on the spacious Loch quarterdecks. Notwithstanding the narrower beam, the RCN – a two-ocean navy now – looked at modifying River Class vessels, but their plans involved only two single QF 4-inch Mk XIX mounts (the infamous "Woolworth Gun") and a good compromise was to replace the forward mount with the twin QF 4-inch Mk XVI and replace the QF 12-pounder 12 cwt aft with a twin 40mm Bofors with a tachymetric director. The RAN went one better, and probably totally independently of any input from Britain being well and truly integrated with the USN, and eventually completed four Improved River Class frigates – too little too late – as Australian Loch types with a very similar armament to the British Loch Class. (Refer Chapter 4, River Class) However, the shortcoming of any arrangement involving the director control tower with Type 285 fire control was that it controlled all mounts meaning that it was not possible, for example, for the forward and aft mounts to engage separate targets.

But the Bay Class were not just the Loch Class with a few guns added. While I was not able to access a good drawing, it was obvious from photographs that the bridge was extended forward and the bridge wings had additions. Being anti-aircraft ships, albeit radar-equipped, it seems plausible that the alterations to the bridge were to accommodate more and better air lookout/spotter/direction positions.

THE NUMBERS GAME

Having made the decision (Staff Requirement TSD 3122.44), the conversion of 30 Loch Class due for completion in 1944-5 to Bay Class was approved in May 1944 then reduced to 26 in June. While the Admiralty wanted the RCN to add twenty of their converted and inferiorly equipped River Class, quite how that fitted with the 56 required earlier is a mystery. What had changed in the interim that the number of ships required and quality of them had dropped? It didn't matter because the idea was cancelled leaving a big deficit that was unable to be filled, thus prejudicing British intentions regarding amphibious warfare. Quite where the three amphibious divisions were going to come from remains somewhat of a mystery also.

Nineteen Bays finally made it off the slips between 13 April 1945 and 11 Aug 1949. The last-mentioned date is a bit misleading because work was suspended for some time after *Mounts Bay* was launched on 8 Jun 1945. The next to last completion was a more respectable 24 August 1945. Only four made it to the BPF: *Bigbury Bay, Veryan Bay, Whitesand Bay* and *Widemouth Bay* but none before hostilities ended.

COMPLETION TIMES

With all the good intentions in the world, the problems besetting the British shipbuilding industry in wartime could not produce badly needed ships quickly enough despite the innovations made in rationalising design and, through that, construction processes such as prefabrication.

The average building time for Bay Class frigates from keel laying down to launching was 207 days with a best of 130 and a worst of 330 days.

Many sources have stated that, in common with the Rivers and Lochs, the problems were that launched hulls tended to lay around with a bottleneck being the fitting out, particularly the electrical works as the ships became more and more technical and the number of suitable qualified personnel did not keep pace with demand.

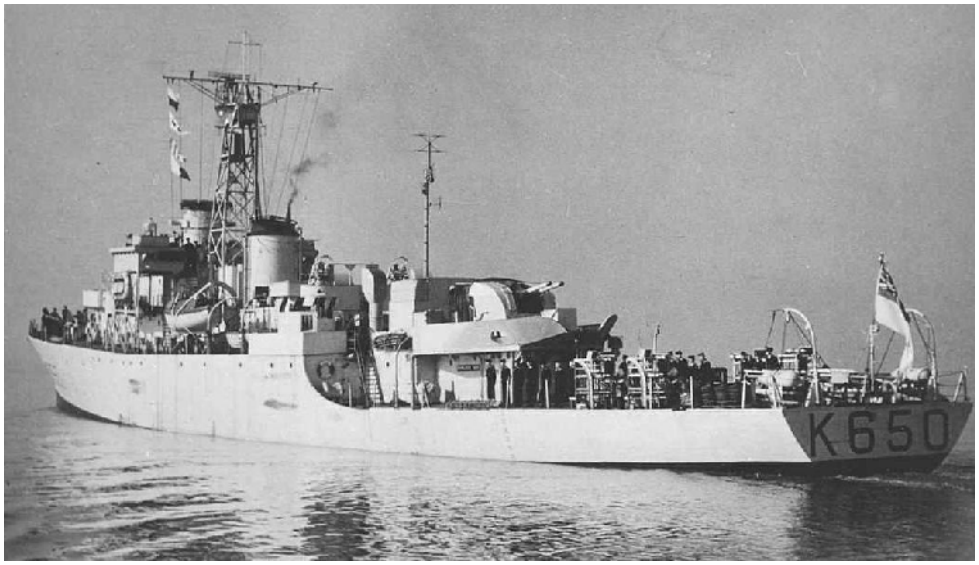
The average fit-out time for Bay Class frigates from launching to completion was an astonishing 319 days which would tend to bear this out. However, as before, the suspended *Mounts Bay* distorts the averages with 1,525 days from launch to completion. The next slowest was 495 days (*Morecambe Bay*) and this was only slightly worse than the 480 days of *Largo Bay* – the first laid down.

The average total building time for Bay Class frigates was 527 days with a best of 339 days and the worst – other than Mounts Bay – of 718 days. In other words, almost a year compared with almost 2 years! When one looks at these sorts of figures, one has to appreciate the next Chapter, the Captain Class frigates. They may have had their faults, but at least they were available.

Brown made the following comments about shipbuilding construction times in Britain:

> *"Strikes were a serious problem, with about one million working days lost in 1944, over three times the 1939 figure. There seems to have been an idea that the war was being fought to preserve British liberties, including the right to strike in defence of trade union practices...Between 1938 and 1945, average wages in engineering roughly doubled from £3.50 to £7.00 per week. This did not go down well with naval crews of vessels fitting out. A Petty Officer's pay had gone up from £2.50 to £3.50 per week, with much longer hours (and no overtime pay), discomfort and considerable danger".* [2]

HMS *Largo Bay* in pristine condition. Note that she is flying the Union Jack from the jackstaff – the only time the Union flag should be referred to as the Union Jack – denoting that, being underway and not at anchor, she is dressed with masthead ensigns (which appears to be the case), or if the Monarch or an Admiral of the Fleet is on board (unlikely!). [photoship.co.uk]



A port stern quarter view of HMS *Porlock Bay* shows to advantage the straight lines of the Loch Class heritage and the squared off transom stern. The radar fit seems non-standard – possibly a Type 293 on the lattice mast and there's a Type 291 on an abbreviated mainmast. [naval-history.net]

ARMAMENT

The main armament of the Bay Class was the twin QF 4-inch Mk XVI on the Mk XIX mounting – a dual-purpose HA/LA weapon with a tried and proven track record as the secondary armament in some battleships, heavy cruisers and light cruisers since the mid- 1930's, as the standard anti-aircraft gun in the famous Tribal Class destroyers and as the main armament in specialised anti-aircraft cruisers and auxiliaries, the Hunt Class destroyers and in the WAIR conversions of V & W destroyers. They had a rate of fire of between 15-20 rounds per minute at angles of elevation between minus 10 degrees to + 80 degrees. Muzzle velocity was 2,660 feet per second with a maximum ceiling of 39,000 feet at 85 degrees elevation.

The Bays' two twin mounts had reasonable arcs of fire – always critical in anti-aircraft ships – but suffered in only having the one director for both mounts as stated earlier. Ideally, each mount would be individually directed allowing them to engage separate targets. This was less an issue when used for area-defence in barrage mode.

Experience showed that a lesser number of twin manual 20mm Oerlikon mounts were superior to the same number of barrels in single Oerlikon mounts, that twin power-operated Oerlikon mounts were superior to the same number or even more of twin manual 20mm Oerlikon mounts, and that single manual 40mm Bofors were superior to twin power-operated Oerlikons because of their greater range and heavier ammunition. So, wherever possible and wherever practical, Oerlikons were replaced by Bofors – initially the army-type air-cooled single mounts, then the power-operated Boffin. This was basically a 40mm Mk III (British) or Mk3 (American) Bofors adapted to fit the base used for the power-operated twin 20mm Oerlikon Mk V and was conceived and first produced in Sydney, Australia. The twin 40mm Bofors, the Mk V mount, was theoretically the equivalent of the four-barrelled 2-pounder "pom-pom", (QF 2-pounder Mk VIII) in that it replaced it, mounting for mounting, but it was far superior insofar as its firepower, accuracy, and the fact that it was controlled by Type 282 radar. The Bay Class had two such mountings at the break of the forecastle. Records seem to vary as to the number and disposition of the Oerlikons. Some state that there were only two twin power-operated mounts – the Mk V model presumably and in the bridge wings. Others state that they were only singles and photographs bear this out – the distinctive shields are present in the bridge wings and in the forward extensions to the signal deck. Other photographs show additional single mountings abreast the Hedgehog for a total of six.

Because there was no Squid, the Bays reverted to a more depth charge-oriented anti-submarine weaponry in support of the Hedgehog but their intended purpose was always anti-aircraft.

A twin QF 4-inch Mk XVI on an HA/LA Mk XIX mounting which was the mainstay of the Bay Class. Shells had to have their fuses set at the fuse-setters located to the extreme left and right-hand sides of the mount before they could be loaded. In anti-aircraft mode, the predictor had to allow for the speed of the aircraft, its course, the time to set the fuses, the time to load the shell, the time to fire, the time of flight of the projectile to the determined altitude in order to have a chance of success – which was rare. [commons.wikimedia.org]

The British-built Bay Class frigates were fitted with the twin 40mm Mk V powered mounting. This one is on the Tribal Class destroyer HMAS *Arunta*. Note that the ammunition supply still requires crew to follow the mount and pass four rounds at a time up to the loaders. [navy.gov.au]

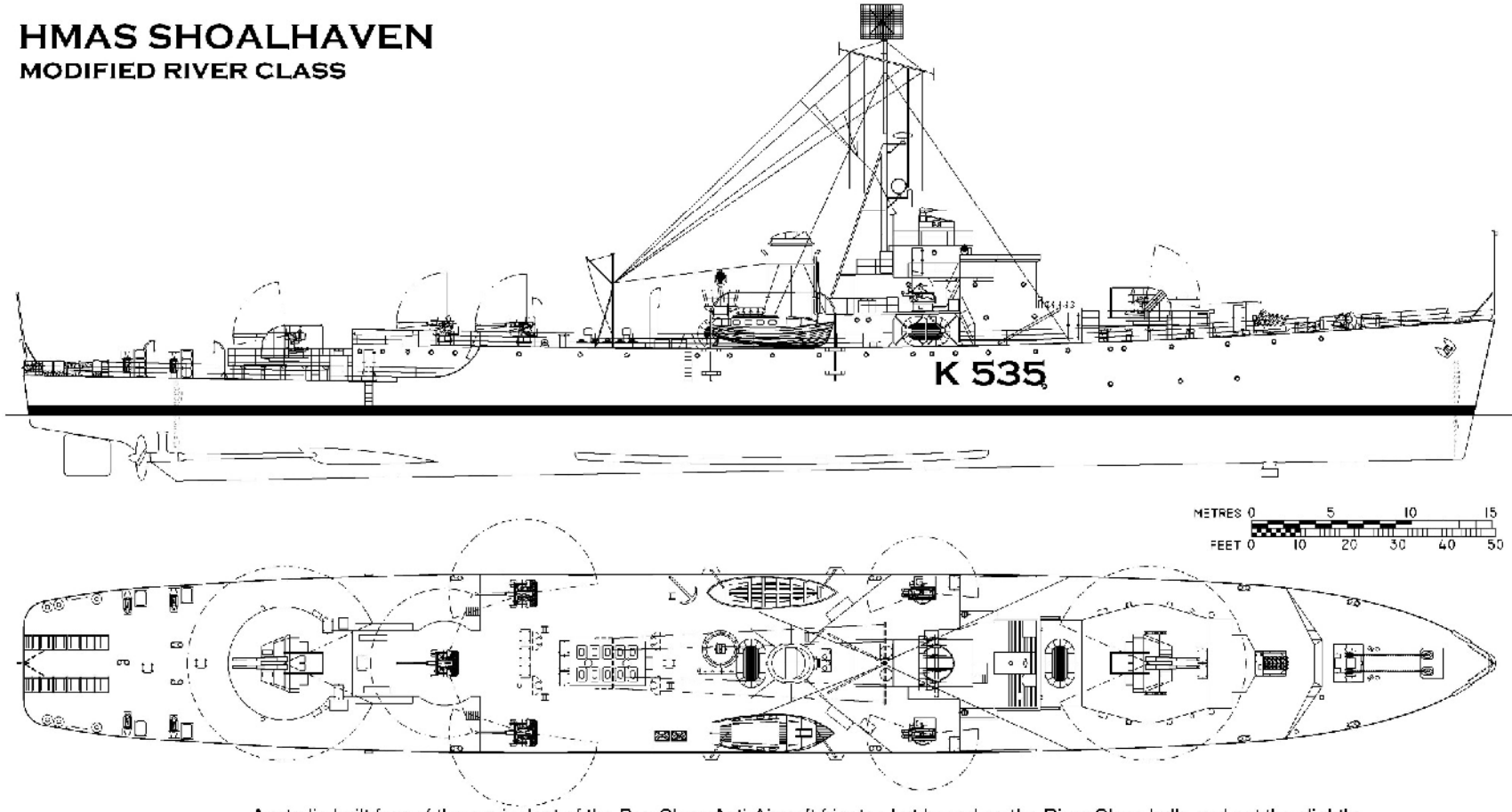
THE ROYAL AUSTRALIAN NAVY'S "BAY" CLASS

The RAN completed four River Class as Modified River Class and were, in effect, a Bay Class type performance specification on a River Class hull. The Royal Canadian Navy proposed something similar but not so nearly well-armed in that they stuck with two single 4-inch Mk XXIVs and sometimes referred to as a MK 24 (either way, models I've never heard of or found any information about but mentioned by Friedman[3] and likely to be peculiarly of Canadian origin) or as an alternative the better twin 4-inch Mk XVI forward and twin 40mm Bofors with Simple Tachymetric Control aft. Australia followed the British lead with the two twin 4-inch mounts and remote power control with Type 285 radar in the single Director Control Tower. Because the River Class hull lacked the beam, principally, of the Loch Class and to a lesser extent the length and collectively the displacement, the Australian Bays had to mount their guns lower down. This stability measure may have been the reason the 20mm Oerlikons normally mounted in the bridge wings – where they could be quickly manned by lookouts who then doubled as gunners, quite an efficient use of crew – were mounted lower, on the signal deck. In this case the signal deck was extended aft and the Oerlikons were twin power-operated Mk Vs. The first sketch plans of the River Class had no bridge wings and Oerlikons on the flag deck level immediately below where they would be later located in bridge wings.[4] Moving the Oerlikons up to the bridge wings had the advantage that they could be manned quickly by bridge personnel, communication was better facilitated between gunners and lookouts and came directly under the captain's control. The bridge proper was a more compact, squared off design compared to the British Bay Class. Three single 40mm Bofors – the simple air-cooled Mk 3 on raised pedestals – were located aft with good firing arcs.

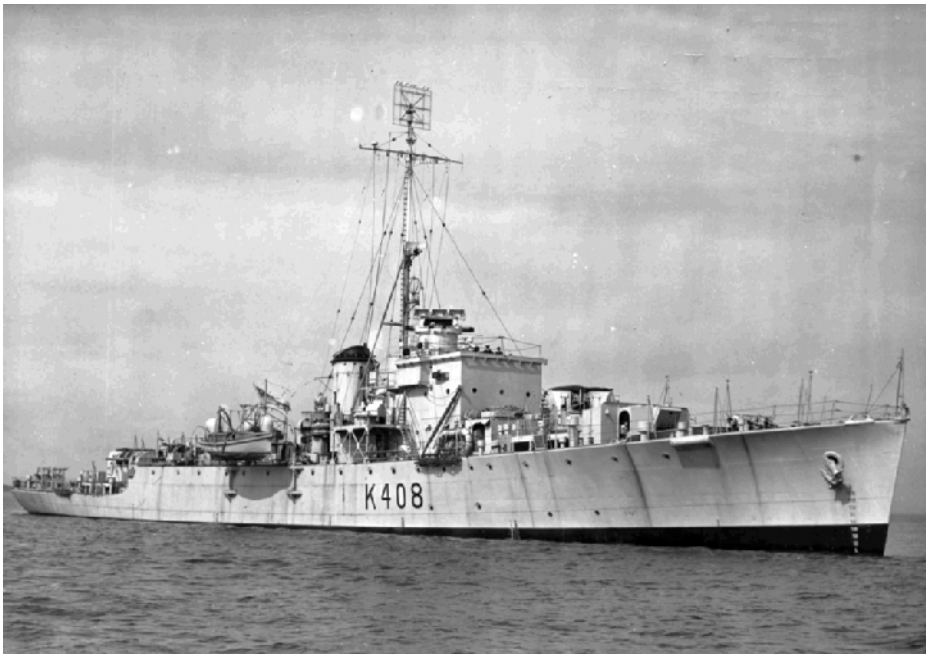
When I overlaid my drawing with the Australian equivalent – the Improved River Class which was the RAN's equivalent to the Bay Class, the Australian "Bay's" forward 4-inch mount was in exactly the same position, relative to the bow, as the British Bay but lower and offered a slightly better firing arc because the bridge front was slightly further aft. Strangely, the aft 4-inch was more than twelve feet further aft on the Australian ship, despite the fact that it was on a shorter hull and offered a better firing arc.

HMAS SHOALHAVEN

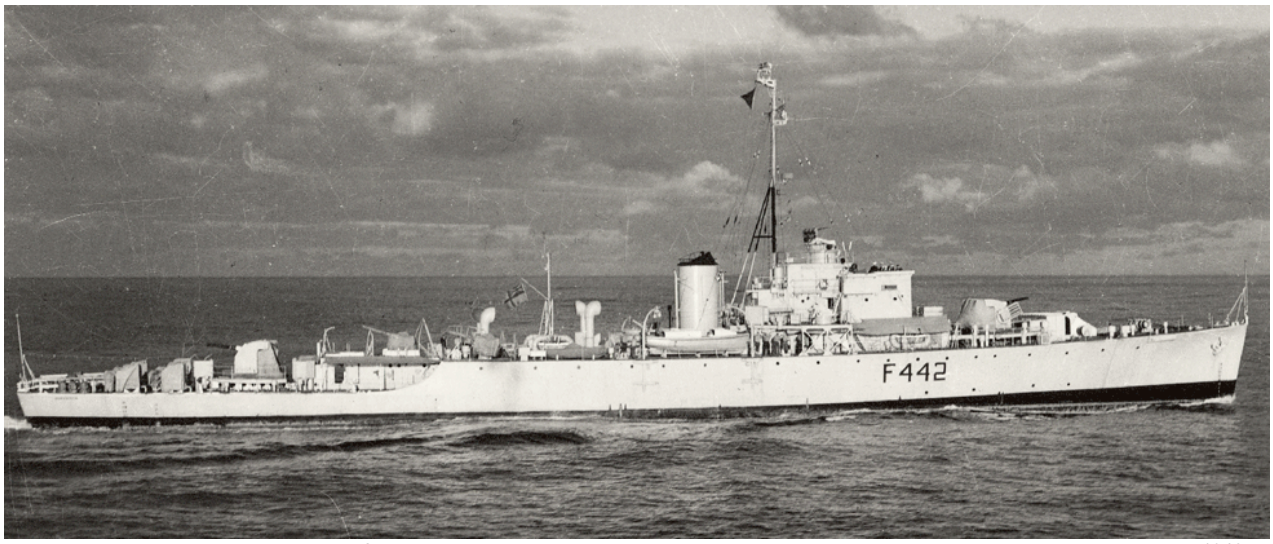
MODIFIED RIVER CLASS



Australia built four of the equivalent of the Bay Class Anti-Aircraft frigates but based on the River Class hulls and not the slightly bigger Loch Class hulls. Therefore, they mounted the same twin QF 4-inch Mk XVI guns lower. These were controlled by a DCT with Type 285 gunnery radar above the bridge. The close range weaponry were three single 40mm Bofors and two twin power-operated 20mm Oerlikons, Mk V, mounted not at bridge level but at signal deck level. The Hedgehog mortar on the foredeck was backed up by the usual four depth charge throwers and two depth charge racks on the quarterdeck. The radar fit was a US Type SG surface-warning and Type SC air-search at the masthead reflecting the integration of the RAN with the USN. None were completed in time to see action due to inordinate delays in production.

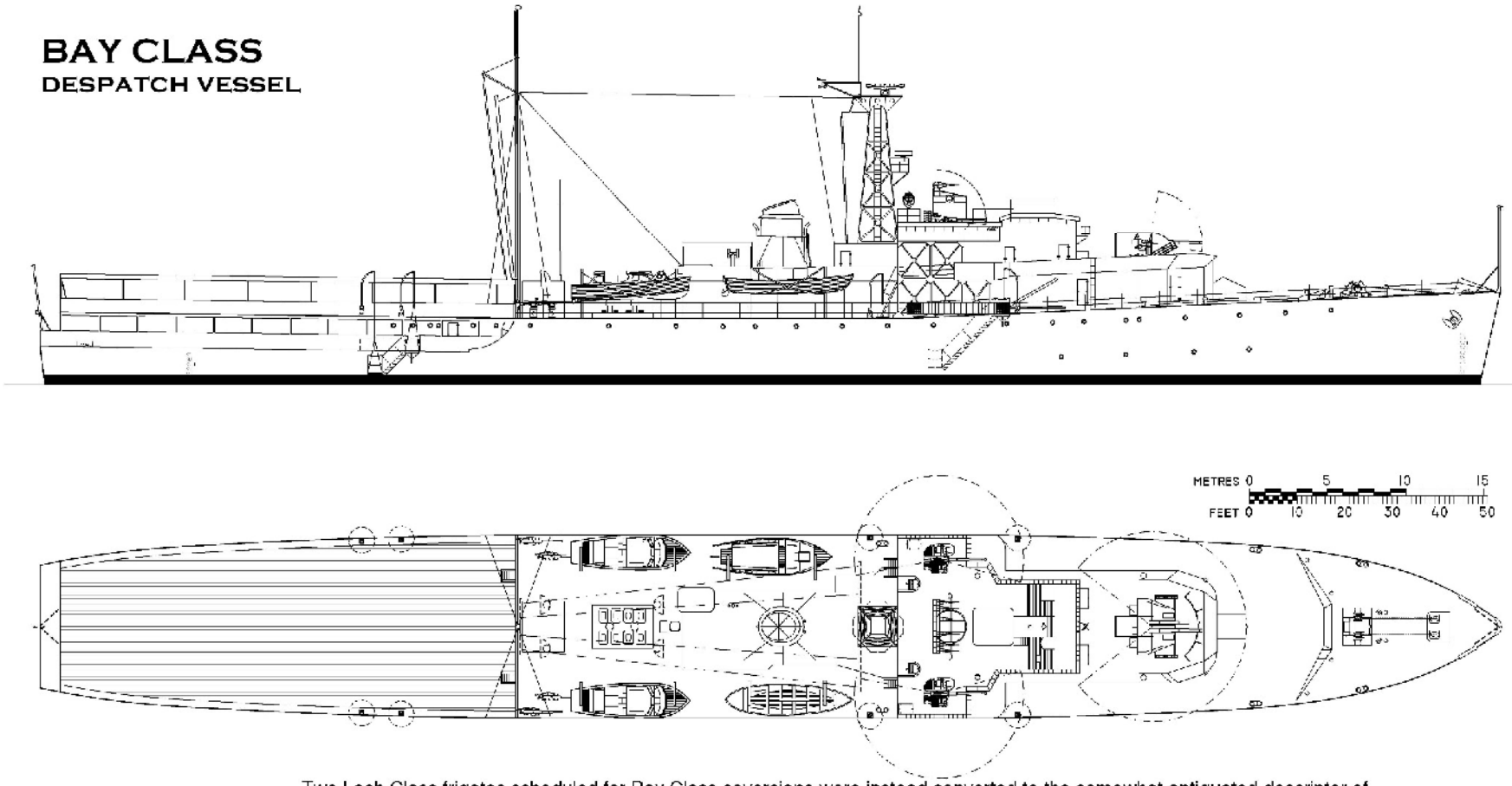


The Royal Australian Navy's equivalent to the Bay Class was a River Class with Bay Class armament – in this case HMAS *Culgoa*. Note the forward 4-inch mount and the director with Type 285 radar are trained to starboard. *Culgoa* is fitted with oiling fairleads for bow-to-stern refuelling, a practice that had been abandoned in favour of alongside refuelling when she was finally completed in April 1947. [navy.gov.au]



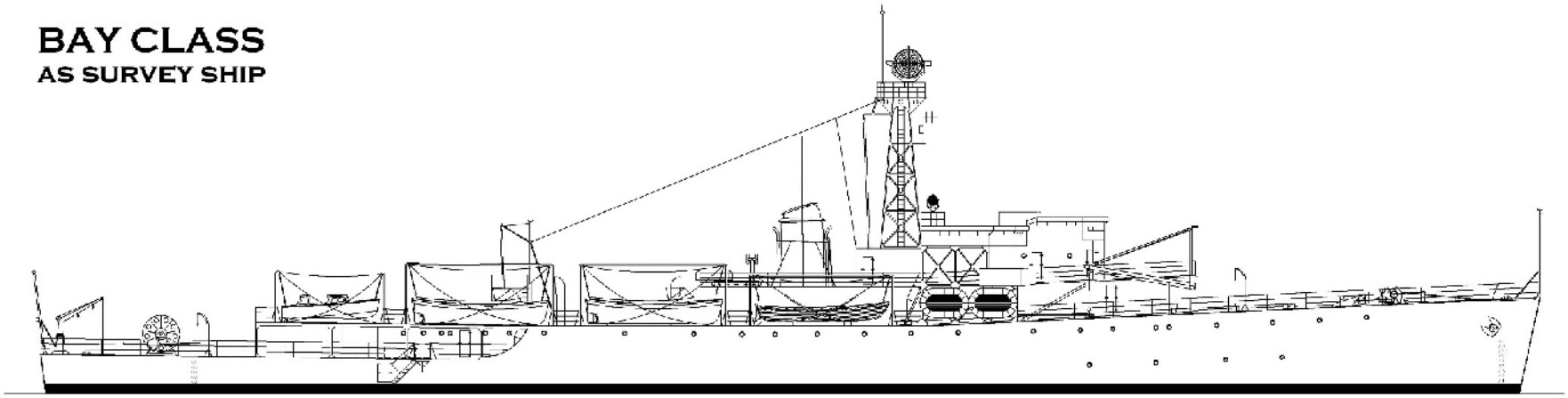
HMAS *Murchison*, a Royal Australian Navy Bay Class, completed too late to see service in World War II, this photographs may well date to the late 1940's or early 1950's judging by the masthead radar. She was decommissioned in January 1956. [navy.gov.au]

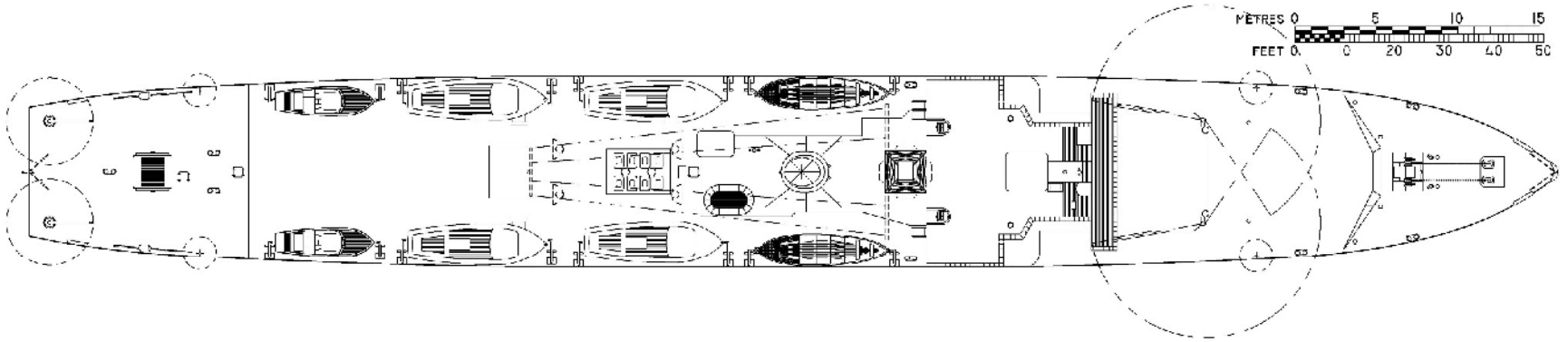
BAY CLASS
DESPATCH VESSEL



Two Loch Class frigates scheduled for Bay Class coversions were instead converted to the somewhat antiquated descriptor of Despatch Vessel in a time of radio communication. This pseudonym was the best the Royal Navy could come up with for what was in real terms Commander-in-Chiefs' yachts for the Mediterranean and Far East Stations in the time before the United KIngdom withdrew from East of Suez. All armament aft of the bridge was removed, the quarterdeck received bulwarks - a long overdue improvement for seakeaping - and was decked over, the large unencumbered space above used for entertaining dignitaries. and generally promoting Britain's interests. Just so the two ships, Alert and Surprise, would not be seen as completely toothless tigers, the 4-inch guns were retained and records vary as to the secondary armament. Some state two twin 20mm Oerlikons, others single 40mm Bofors. A Hedgehog is mounted forward. Four 3-pounder saluting guns were installed for the inevitable ceremonial purposes these ships would have performed.

BAY CLASS
AS SURVEY SHIP



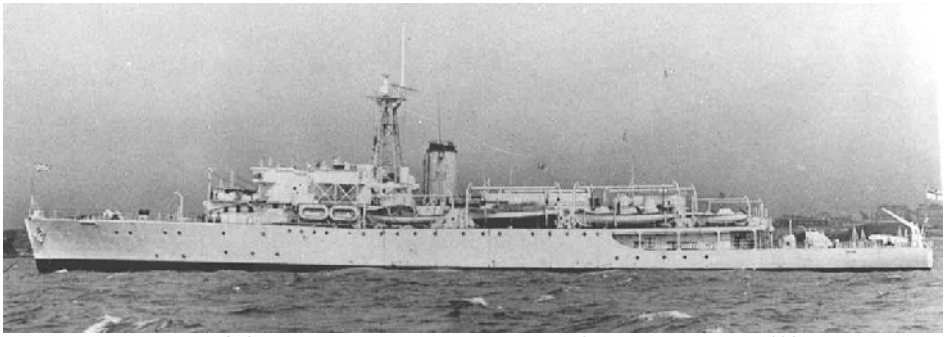


Four Bay Class frigates, all launched in 1945, were completed as Survey Vessels between 1948 and 1950. One was scrapped in 1964, another in 1968 and a third in 1970. Dalrymple was transferred to the Portuguese Navy in 1966 and served until 1985.

Because they were completed too late to see action, the radar fit may not have been the A286 air-warning type as indicated in Chapter 4 and may have been the American type SC in order to facilitate interoperability with the USN in peacetime as well as in any future conflicts. The antennae were almost identical in dimension and appearance although the Australian one had been developed totally independently. (Refer to Australian Radar, Chapter 4)

SERVICE

Only six Bays were completed before the end of hostilities and none actually saw action.



The Bay Class frigate converted to a survey ship, HMS *Cook* in pristine all-white. The last one of her kind served until 1985 in the Portuguese Navy. [naval-history.net]

Bay Class Data: (as designed)

LOA	307'3"
Beam	38'6"
Draft	9''0" standard, 13'3" deep
IHP	2 x 5,500
Displacement	1,370 tons (standard), 1,855 tons (deep)
Speed	20 knots, clean
Range	7,000 @ 15 knots clean
Guns	4 x 4" (2 x 2), 4 x 40mm (2 x 2), 4 x 20mm (4 x 1)
DCT	4
ATW	Hedgehog
Crew	157

1 Norman Friedman, *British Destroyers & Frigates, The Second World War &* After, p.p. 152-3
2 David K. Brown, *Atlantic Escorts, Ships, Weapons and Tactics in World War II*, p. 146
3 Friedman, p. 153
4 Brian Lavery, *River-class Frigates and the Battle of the Atlantic: A Technical and Social History,* p.27

CHAPTER 6 THE CAPTAIN CLASS

It is interesting to note that the 1942 edition of Jane's Fighting Ships has the first entry under what must be the new heading of "Frigates" – which follows "Sloops" (including World War I vintage Flower Class) – two ships; Bentinck (August 22 1942) and Duckworth (Nov20 1943) and the note, *"Launching of these ships was widely reported in American Pres, which stated that Bentinck was the first of 24 ships named after British naval officers to be built at Mare Island for the Royal Navy under the Lend Lease Act. It was added that she was about the size of a destroyer."* [1]

Although this class of frigates were named after captains of the Royal Navy of the Napoleonic wars period that had distinguished themselves, we must look to the United States Navy for the real beginning of the story of how this class – really two separate sub-classes – that comprised this group of ships came into being.

ORIGINS

In 1937 the USN felt the need for a successor to the World War I Eagle Class patrol craft. – a 200-foot steam-powered escort that was supposed to fill the gap between wooden-hulled submarine chasers and fleet destroyers. Sixty of these emergency measure ships were completed on a mass-produced production line basis, but too late for service. In 1939 it was suggested that what was needed was *"an intermediate or second-line torpedo craft or patrol craft somewhere between the subchaser and the modern large destroyer"*. [2] Opinions varied as to the size, armament, speed and therefore propulsion. The *Farragut* destroyer design of 1931 was even considered being re-introduced and altered to suit being the smallest of the recent-build destroyer fleet. Unlike the designs which followed, the Farraguts did not have the now required separation of machinery spaces, its unsuitability to be mass-produced in time of war and the small cost differential as compared with a fleet destroyer and its better capabilities ruled this out.

Naval architects Gibbs & Cox and the USN's Bureau of Ships (BuShips) independently produced proposals. The former suggested one at 1,050 tons and another at 750 tons. President Roosevelt ordered two of each in September 1940 despite them not meeting the USN's requirements – so much so that the order was changed two months later to 1,175- ton units, the precursors to the Destroyer Escorts of the USN.

The Preliminary Design section of BuShips were asked for proposals in August, modified in September and again in October, as per the following table:

Gibb & Cox Aug 1940	Gibbs & Cox	Scheme 1 24 Aug 1940	Scheme 3 19 Sep 1940	Scheme 5 15 Oct 1940	Scheme B Feb 1941	
LWL	292'	264'	294'	300'	260'	280'
Beam	31'	28'	31'	34.5'	32'	34'
Draft	10'4"	9'3"	9'0"	9'9"	8.8'	9'9"
SHP	35,000	25,000	18,000	12,000	6,000	12,000
Displacement*	1,050 tons	750 tons	940 tons	1,175t tons	875 tons 1	,125 tons
Speed	35 knots	35 knots	30 knots	24.5 knots	21.5 knots	24 knots
Range	8,900 @ 15 k	6,100 @ 15 k	6,000 @ 15 k	5,000 @ 15 k	5,000 @ 15 k	6,000 @ 12 k
Guns	2 x 5"	2 x 4"	3 x 5"	4 x 5"	2 x 5"	2 x 5"
TT	2 x 3	2 x 3	nil	nil	nil	1 x 3

*Standard
[3]

For a while, Scheme 3 was favoured but the potential cost difference between this type of ship with its reduced capability and a fleet destroyer was "*too small to be worthwhile*". [4] Later experience proved that three Destroyer Escorts could be built for the cost of two fleet destroyers. Some even suggested the ratio was two for one and three for one. I am of the opinion that these calculations were based only on the manhours involved and ignored the materials content.

The vacillation continued until Captain E.L Cochrane, a qualified naval architect and head of the Preliminary Design section of BuShips, chose to develop Scheme 3 into what became Scheme B in February 1941. Cochrane had been Assistant Naval Attaché in Britain in 1940 and had been impressed, in principle, with the Royal Navy's new Hunt Class (Type II) of escort destroyers – 279'10", 19,000 SHP and 27.5 knots, 3,600 miles @ 14 knots. He was not impressed with their narrow beam (28'10" in Type I increased to 31'6" in Type II) short range (they were never intended for trans-Atlantic duty) or their wet foredecks. The last-mentioned was a bit like the pot calling the kettle black since no USN destroyer of the time was noted for dry foredecks in a seaway (due, mainly, to the placement of a heavy

gun armament well forward). He did like, particularly, the British practice of an open bridge for watch-keeping in convoys and for all-around visibility plus the torpedo tubes (Type III) for self-defence and a heavy gun armament (6 x 4-inch designed). He brought these thoughts back to America with him and put them to together in Scheme B.

BRITAIN'S STIMULUS

Despite an "on-again-off-again" approach to the problem with various changes being inflicted by the General Board, on 19 May 1941 the proposed order for fifty ships of a type still not fully determined was cancelled. Despite the cancellation, Cochrane did not shelve the plans and persisted with the design. This was fortuitous because on 23 June the Royal Navy – through its USA-based British Supply Council – asked for 100 escort type destroyers. While the British knew of the existence of the BuShips program in principle it seems that it was pure happenstance that its design requirements closely matched the still-borne Scheme B and was formulated as a seventh design, BDE (British Destroyer Escort) Design in July 1941, as follows:

LWL	280' (Note: not LOA)
Beam	34'
Draft	9.5'
Disp	1,144 tons
SHP	12,000
Speed	24 knots
Range	6,000 @ 12 knots
Guns	3 x 3"
TT	nil

[5]

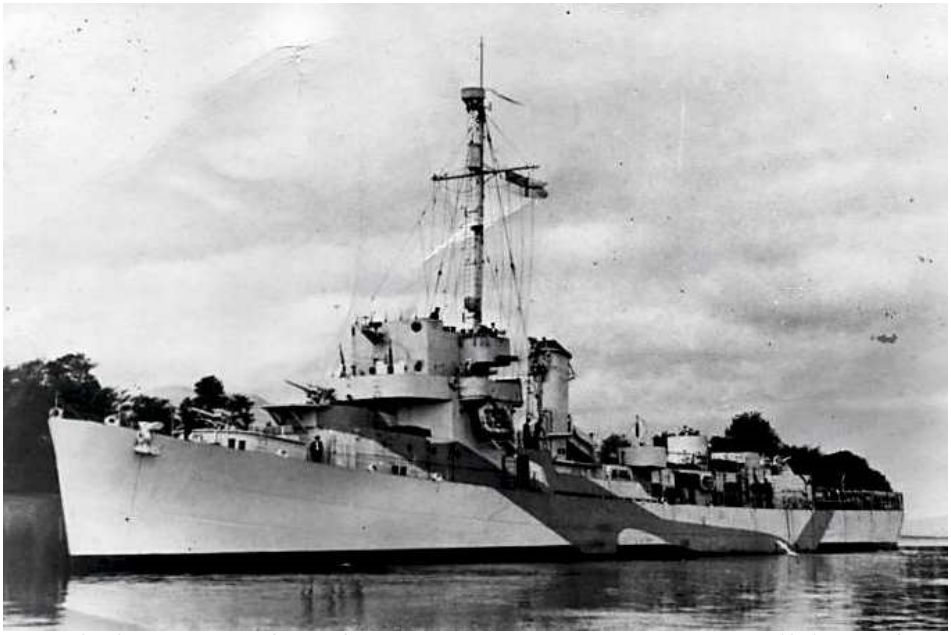
DESIGN EVOLUTION & RESULTANT PROBLEMS

The various sources consulted do not reveal the exact sequence as to what design steps took place or, indeed, how the appearance of the BDE evolved. On face value, it would appear that the hull design – featuring a flush deck with a pronounced sheer leading to a high, weatherly bow – was probably a consistent feature of the many preceding schemes. What changed, as a result of the British requirements, was the tall open bridge with the ASDIC office, or hut as it was called (locker or cupboard were probably better words because it was very small and cramped!), built in to the front face of the bridge for better communication.

The next major changes were all basically logistic related after the order for the first fifty was approved by President Roosevelt on 15 August 1941.

First, was the issue of propulsion. The design called for steam propulsion – boilers providing high-pressure steam to two steam turbines driving two propeller shafts via reduction gears. The demand for these precision-made turbines of various sizes was stretching even America's industrial capacity beyond the limit. Turbines were required for destroyers, cruisers, battle ships and aircraft carriers plus the extensive United States Maritime Commission's program of freighters and tankers. The demand was such that 2,710 Liberty ships used vertical triple expansion reciprocating engines of a simple, reliable design that dated back in principle to the 1880's.

In typical American can-do fashion, alternatives were quickly established and what started out as one design for 100 ships ended up as five designs for 505 ships. (See table, below) Brown says the total was 498 but gives no details. [6] The Captain Class Frigate Association claims 563 ships built. (www.captainclassfrigates.co.uk)



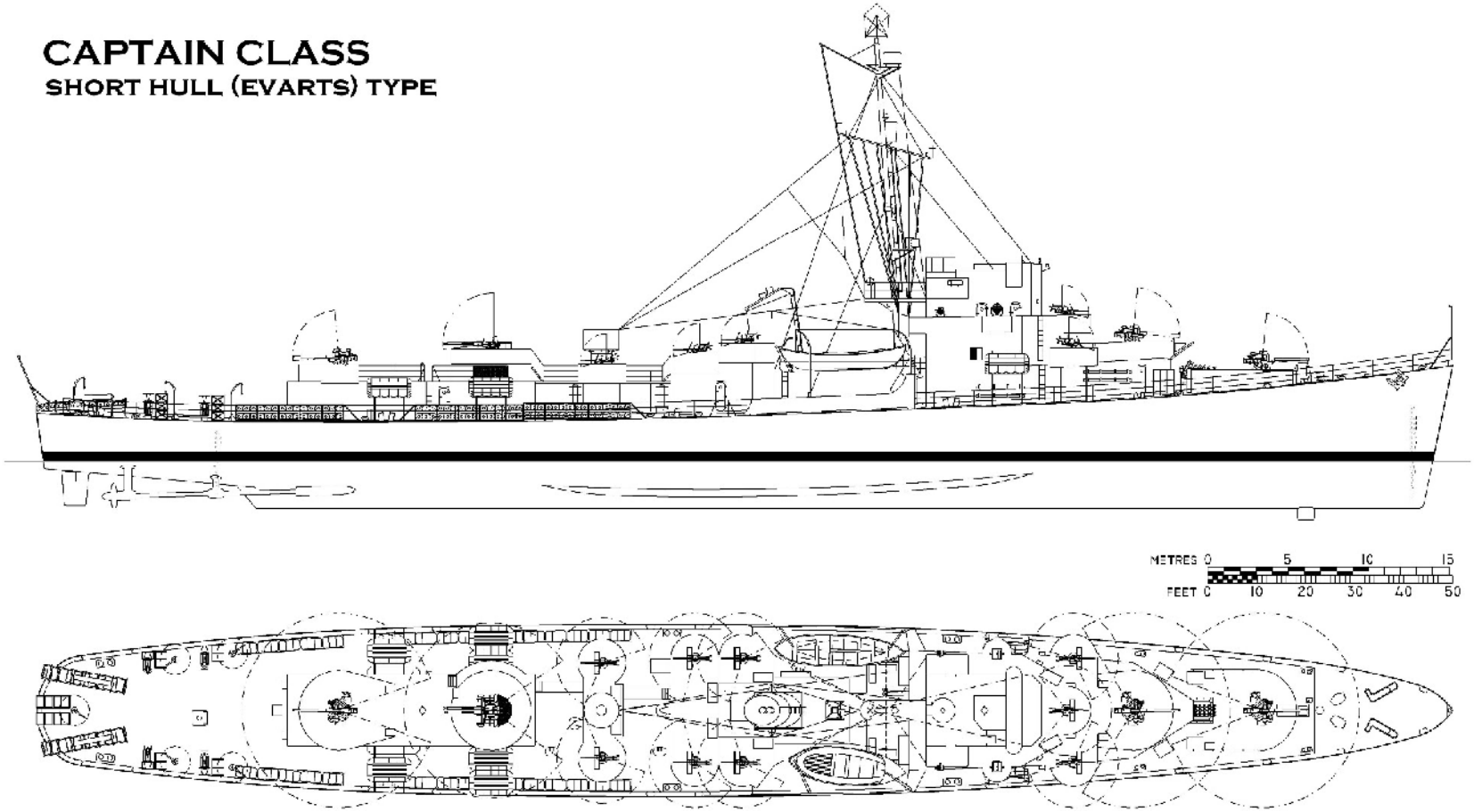
HMS *Bentinck*, the most successful of the lonhg-hulled Captain Class with three shared U-boat kills to her credit: U-1051 with HMS *Aylmer*, HMS *Calder* & HMS *Manners,* U-774 with HMS *Calder* and U-636 with HMS *Bazely* and HMS *Drury* – all Captain Class frigates. This photograph shoes her looking pristine in what might have been her delivery type camouflage pattern without HF/DF fitted to the mast so may have been taken in the Caribbean during working up exercises. [navsource.org]

The first solution was diesel propulsion in place of steam, but even this had its issues. The engine of choice was a General Motors Tandem diesel of the type then used in the USN's submarines. These were the Model 278A,16-cylinder engines of 1,500 BHP and to avoid the bottleneck of gearbox production they were coupled in pairs to generators driving 3,000 HP electric motors to each shaft for a top speed of only 20 knots – less than was required. Eight motors – four per generator – would have delivered 24 knots.

However, the demand for diesel engines was such that an alternative power plant had to be devised and steam-driven electric turbines replaced the four diesels. This required a longer and beamier hull and this became the Buckley Class. The power output doubled to 12,000 SHP for an increase to 24 knots. Eventually the Royal Navy received 46 of these long-hulled ships but they were fitted with the same armament as the short-hulled Evarts Class. They were all built by Bethlehem Hingham Shipyard in Massachusetts.

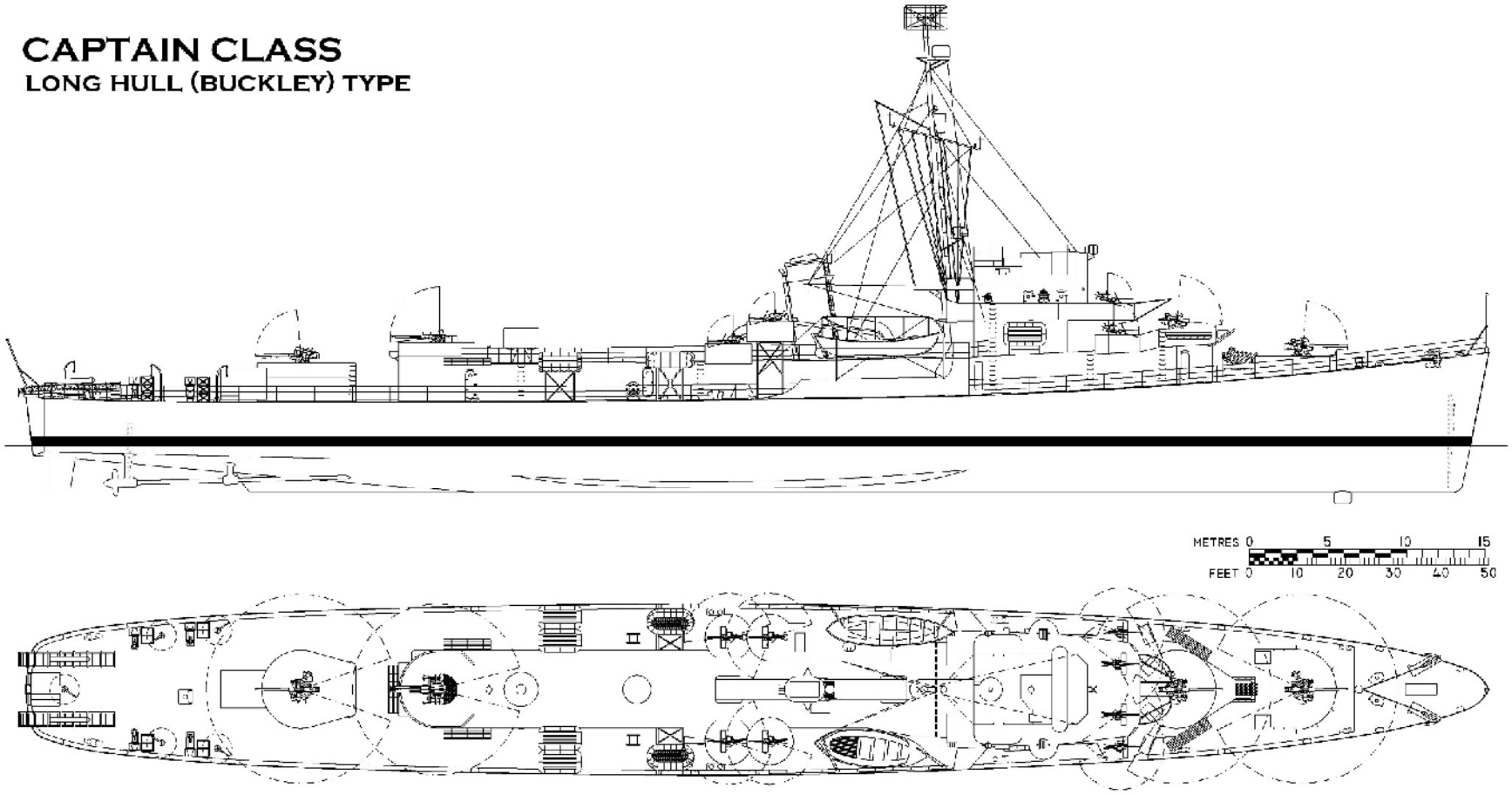
CAPTAIN CLASS

SHORT HULL (EVARTS) TYPE



This drawing depicts a Short-Hulled version of the Captain Class as generally modified for service with the Royal Navy The US Type SA air-warning radar antenna at the masthead has been replaced by the more useful Type FH4 HF/DF antenna. A crow's nest has been added below the compact Type SL radar antenna. While the twin 40mm Bofors is present, aft, photographs tend to show that it was more common to mount a single 20mm Oerlkion in this commanding position. Note too the extra depth charge stowage - up to 200 charges - both usefull and necessary for improving stability as the Captains were notoriosly 'stiff' and needed extra topweight to slow their rolling.

CAPTAIN CLASS
LONG HULL (BUCKLEY) TYPE

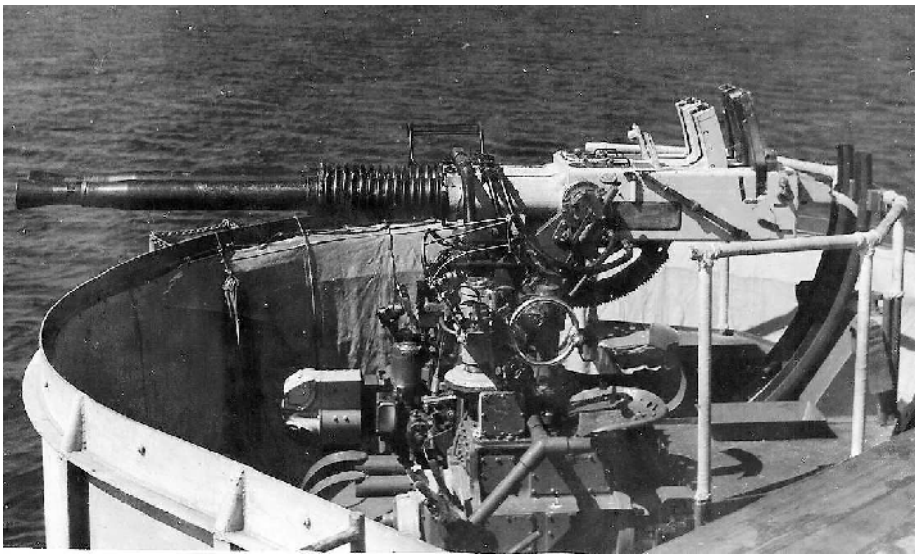


This drawing depicts a Long-Hulled Captain Class frigate with some of the modifications made to suit Royal Navy requirements. As with the Short-Hulled versions, note the 27-foot Montagu whaler located to port. The number of depth charge throwers has been halved but a shelter has been added for their crews. Extra life rafts have been added but the extra depth charges have not. The US Type SA air-warning radar antenna is still at the masthead, yet to be replaced by the preferred HF/DF antenna which was judged to be more suited to anti-submarine warfare. The normal radio direction-finding aerial has been moved to the front of the bridge but wind deflecting baffles are yet to be fitted to the open bridge.

ARMAMENT

Although the dual-purpose 5-inch gun was not in the Royal Navy's arsenal it seemed prepared to accept this as a consequence of the order. It was a far better gun anyway than the British equivalent due – at the very least – to its better anti-aircraft capabilities. However, demands for this weapon outstripped supply and preferences were given to what the USN regarded as front-line ships – although Liberty ships managed to find a place in the queue for one on each stern. The alternative was the 3"/50 cal Mk 20 or 22 (the differences in Marks were minimal and related to barrel construction and longevity), a dual-purpose weapon that the British came to regard as not having sufficient hitting power to puncture a submarine's hull and equally deficient as an anti-aircraft weapon. *"Everyone knows the 3-inch projectile will not put a dent in a pat of butter"* – Captain of HMS *Duckworth.* [7] (Refer Appendix I) The weight that these mounts saved over the much heavier 5"/38 cal mount, as did the decision to discard the torpedo tubes that had been introduced in the Type III Hunt class, were to have other consequences that will be described later under STABILITY. It is not clear whether the ships were commissioned and worked up with the torpedo tubes fitted. Some sources suggest they were removed after arrival in Britain, along with many other "modifications" to suit RN requirements. Just what these were and why they weren't incorporated in the original build is also unclear. What is known is that the 27-foot Montagu whaler was fitted to the port side although having examined many photographs this does not seem to have been a uniform modification.

The Captain Class introduced the much-derided 3"/50 cal Mk 20-22 to Royal Navy service. This photograph is of a USN DE. [ussslater.org]



The Captain Class in RN service were fitted with the new twin 40mm Bofors Mk I in place of the four-barrelled 1.1" machine cannon. Many photographs of Captain Class frigates show the Bofors replaced by a single 20mm Oerlikon. This gun is on the Escort Aircraft Carrier, HMS *Battler*. [royalnavyresearcharchives.org.uk]

However and whenever, the torpedo tubes were replaced. The replacement for them, weight-wise, was a water-cooled twin 40mm Bofors Mk I, although not in the same location. The quadruple 1.1" machine cannon that was supposed to super-fire over the aft 3"/50 cal in 'X' position was never fitted to the RN's ships – which was just as well because it was an obsolete and ineffective weapon anyway and the superior Bofors occupied the same position. In USN service, the Bofors would have been served by a Mark 51 gun director, elevated forward of the mounting. Photographs show a similar tub on the RN ships but no apparent director fitted in it but there may have been a Simple Tachymetric Director, not apparent in photographs.

The designed short-range anti-aircraft weapons to augment the Bofors were single 20mm Oerlikons. The short-hulled versions had three forward of the bridge and six aft of the funnel whereas the long-hulled versions had four in front of the bridge and four aft of the funnel.

While the Bofors was by far superior to the Oerlikon, I have seen photographs of many Captains where only a single Oerlikon is present where the Bofors was expected to replace the 1.1" machine cannon. Perhaps this was due to a shortage of Bofors guns or a belief that the Oerlikon was more useful in a battle with a surfaced U-boat at close quarters. Certainly, by the time the Captains were coming into service the threat from German aircraft – where the Bofors was definitely the superior weapon – was negligible as the Allies had achieved air superiority in the theatres where the Captains operated. That would have changed had the Captains been sent to the Far East after VE Day in which case they would have required a significant upgrade to their anti-aircraft weaponry.

Although the USN ships mounted 8 depth charge throwers (DCT), the RN ships mounted only 4 for a ten-charge pattern – the fourteen-charge pattern which required 8 throwers having by then been discredited. Tests in November 1942 proved that so many charges caused interference with one another resulting in premature explosions or failures to explode. While the torpedo tubes in other RN destroyers were used to launch the Mk 10 Heavy Depth Charge (one-ton), special rails were added to the quarter deck for this purpose although not necessarily at the time of delivery. A Hedgehog anti-submarine mortar was fitted abaft 'A' Mount. ASDIC was Type 144 which was specifically suited to the Hedgehog although some, perhaps the early ones, had Type 128D as fitted to the Hunt Class. Brown says some had Type 147 installed but this was a type designed to work with the much later Squid anti-submarine mortar which was never fitted to the Captain Class. [8] Unlike their British-built escort ships which had Type 271 surface-warning radar, the US-built ships had the American SL sets with the compact antenna high up on a steel, pole mast. However, there are photographs of HMS *Lawford* when converted to a Landing Ship Headquarters Small – LSH(S) - that shows a Type 272 on the bridge plus an SL antenna on the mast plus a Type 291 air-warning antenna at the masthead. Because the Allies has air superiority, the masthead-mounted SA, air-search antenna was either never installed in America or installed then abandoned in most ships in favour of a Type HF3 or more likely Type 4 HF/DF antenna as this had proved to be an essential tool in locating U-boats while communicating their bases or other U-boats.

PRODUCTION

A total of 97 of this Evarts Class would be built of which the Royal Navy ultimately received 32. Because all later ships had longer – and beamier – hulls to receive the turbo-electric machinery, the Evarts would be come to be known as the "short-hulled" destroyer escorts". An interesting phenomenon of naval architecture and hydrodynamics is that although the larger hull displaced more, its longer waterline length generated a higher top speed (21 knots) with the same power due to the reduction in wave-making resistance. Conversely, doubling the power – 6,000 to 12,000 only added another 3 knots. (See table, below)

The design of the BDEs was always centred around the use of mass-production techniques: the flush deck, all welded construction, longitudinal and transverse framing but to naval standards, not mercantile standards as was the case with the RN's River Class frigates. First orders were placed on 1 November 1941 at the Navy yards: Boston – Charlestown Navy Yard (DE 1-12), San Francisco – Mare Island Naval Shipyard (DE 13-36) and Washington – Puget Sound Naval Shipyard (DE 37-50). But another 250 for the USN required three specific new Government shipyards.

When America entered the war against Germany on 11 December 1941, the USN had an immediate requirement for the very anti-submarine escorts just beginning to be built. The result was that four of every five being built were allocated to the USN. Production was slow to start with but gathered way as the manufacture of components was farmed out to industries across the country.

For the USN however, the demand was such that further alternatives had to be sought, all fitting within what was adopted as the standard log hull, as follows:

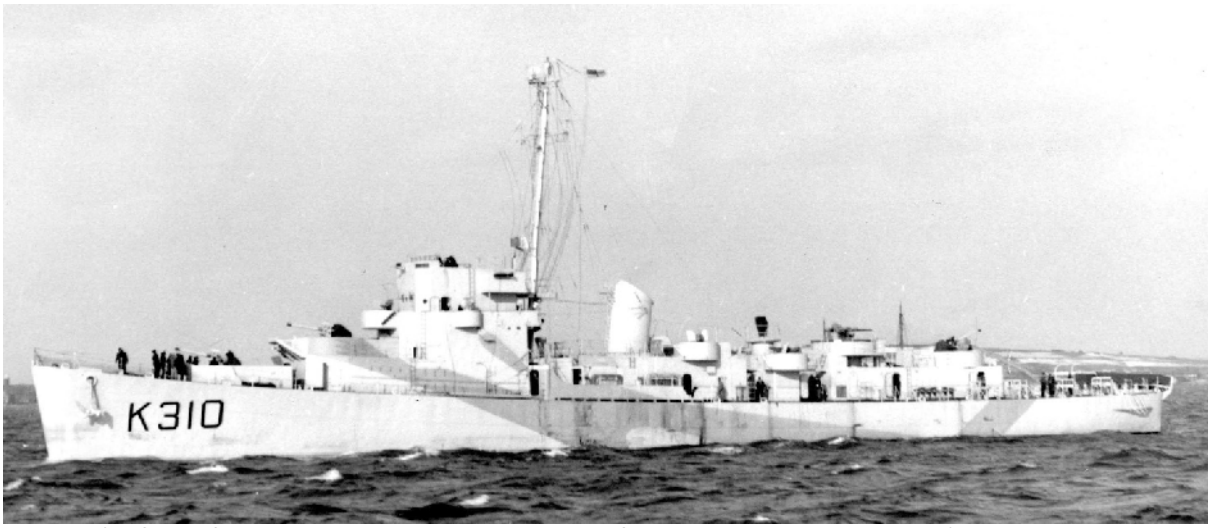
Edsall Class with Fairbanks Morse reduction geared drive diesels.
Cannon Class with the same propulsion as the *Evarts* Class.
Butler Class *with* Westinghouse steam turbine with double reduction gears which was the original propulsion system intended.
Rudderow Class with the same propulsion as the *Buckley* Class.

ORDERS, BUILDING TIMES & DELIVERIES

The first British order was laid down on 5 April 1942, launched on 27 June 1942 and commissioned as HMS *Bayntun* on 20 January 1943. On 25 January, the BDE classification was dropped in favour of DE and the BDE classification applied only to six ships – 1, 2, 3, 4, 12 and 46.

All but one of the 32 Evarts Class were built at Boston's Charlestown Navy Yard – the exception being HMS *Drury* being built at the Philadelphia Naval Shipyard.

Building times were much quicker than any of the British frigates. For example, for the Evarts Class the shortest building time was 106 days (*Kingsmill*) and the longest was 424 days (*Drury* – the only one built by the Philadelphia Navy Yard) and the average was 182 days from laid down to commissioning. For the Buckley Class the shortest building time was 53 days (*Fitzroy*) and the longest was 324 days (*Bentinck*) and the average was 145 days from laid down to commissioning. It should be remembered that *Drury* and *Bentinck* were, in effect, the prototypes of each class being the first laid down and were quite understandably slower being subject to a certain amount of trial-and-error experimentation to perfect techniques before being applied to the production run.



HMS *Bayntun* was the first Captain Class delivered and came under much scrutiny. She proved capable despite criticism of the design participating in the destruction of no less than four U-Boats: U-757 with HMCS *Camrose,* U-1279 with HMS Lock Eck and HMS *Braithwaite,* U-989 h HMS *Braithwaite,* HMS *Loch Dunvegan* and *Loch Eck* and U-1278 with HMS *Loch Eck. Bayntun* is seen here with a predominantly white hull and either a Western Approaches Blue or Green flash. She seems to be one of the few that retained the twin 40mm aft yet she mounts only one 20mm Oerlikon forward. [navsource.org]

The last Evarts Class for the RN was laid down on 25 September 1943, launched on 2 November 1943 and commissioned as HMS *Inman* on 13 January 1944.

The first Buckley Class for the RN was laid down on 5 April 1943, launched on 30 June 1943 and commissioned as HMS *Affleck* on 29 September 1943.

The last Buckley class for the RN was laid down on 5 November 1943, launched on 21 December 1943 and commissioned as HMS *Hotham* on 8 February 1944.

Refer Appendix D

STABILITY

In service the Captains, short or long-hulled, proved to be too stiff. That is, when they rolled, the gyration action was short and quick: - side to side – the mark of a ship with too much weight below the waterline and not enough above it, to put it in layman's terms. The opposite condition is termed tender. That is, when a ship rolls through a bigger angle and slowly because there's either not enough weight below the waterline or too much above it. Taken to extremes, this can cause a capsize. (For a more technical explanation refer Appendix G) This latter problem of topweight plagued many RN ships when extra equipment was added during war-time and either ballast had to be added deep down in the hull to compensate as they became top heavy and potentially dangerous or compensating

weight-saving measures had to be taken; such as cutting down the heights of funnels, removing some ship's boats and other equipment. It was exactly the opposite with the Captain Class. Designed for 5-inch guns and torpedo tubes, the replacement of the larger and heavier guns with 3-inch guns and deleting the torpedo tubes reduced topweight and made a hull – which was probably a little on the stiff side to begin with due to its shape and weight distribution – even stiffer. The bilge keels, designed to reduce rolling, were extended in length and depth as and when dockyard time was available and this apparently helped but increased the ships' turning circle. Extra depth charges were carried on deck – something that caused problems in other RN ship that were tender – and ammunition was stowed further forward. A consequence of the bilge keels and moving weight around was that the bow was slower to rise in a big sea. Changes always have consequences. Consideration was given to replacing the unpopular 3-inch guns with the more standard RN's twin 4-inch in the "A" position and a Squid in "B" position. Material shortages and dockyard availability put paid to that innovation. Besides, after May 1943 the tide had turned in the Battle of the Atlantic and all eyes were being turned to the war in the Pacific and this was becoming more of an anti-aircraft problem for the Allied navies.

The first DE to arrive in Britain, HMS *Bayntun*, was naturally the subject of many inspections and tests. One, from a member of the British Director of Naval Construction Department, reported *inter alia*:

> *"The most striking feature in the hull design is the large beam to draught ratio for the relatively light armament. This has resulted in a comparatively large GM* (metacentric height) *for the size of the vessel and a resulting tendency for excessive rolling …[which] may prove an unpopular feature of this class…"* [9]

These were very prescient words indeed.

The captain of HMS *Duckworth* reported *inter alia*:

> *"It is unenviable to serve on a ship on which all hands are hoping for a draft note. It is influenced by excessive and uncontrollable rolling which is a factor which obscures every virtue these ships may possess. It cannot be urged too strongly before the market is flooded that all the most strenuous measures be taken to mitigate this overwhelming defect in all vessels of this class".* [10]

In 1943, which would have been shortly after the first Captain Class were coming into service, reported:

> *"The motion of the Captain Class Frigates in a seaway, though not excessive in extent, is so violent in character as to be a menace to life and limb, to equipment and to property, to seasoned stomachs, and to normally equable nerves and tempers. Morale cannot fail to be affected. Fighting efficiency will certainly suffer".* [11]

I can speak from experience what it feels like to be on a boat which is too stiff: a yacht of mine was dismasted at night in an ocean race and its very short and quick gyration (rolling) motion in the rough seas afterwards was most unpleasant due to the absence of the counteracting weight of the mast and rigging and the damping effect of the sails.

HABITABILITY

The RN sailors were impressed with the new ships when they stepped aboard – less so the officers perhaps for their quarters, while located under the bridge instead of aft, were more spartan than they were accustomed to. If it could be made of steel and pre-fabricated somewhere in America and brought to the shipyard for simple installation, then it was. Unlike RN ships, there was no cabinetry to be seen. The ships were equipped with bunks instead of hammocks and such never-before-seen luxuries as chilled water dispensers, washing machines and coffee makers. Messing was by the totally new cafeteria type instead of the antiquated *collect-it-from-the-galley-and-carry-it-to-your-mess* type long favoured in the still class-conscious Royal Navy. Ventilation was largely mechanical and there were no ports in the hull whatsoever.

PERFORMANCE

One feature of the Captain Class was the twin rudders – one behind and directly in line with each propeller and, as such, in the slipstream where they proved far more beneficial in effecting much tighter turning circles than comparable-sized frigates with single rudders on the centreline: Diesel-Electric Captain Class 280 yards @t 16 knots versus River-Loch Class 330-400 yards @ 12 knots. [12]

There was some criticism about seaworthiness and the ships' inability to driven within 4 points of the sea above 10 knots in the prevailing short seas of the North Atlantic. [13] Assuming the reference is to the 32-point Compass Rose, this means a 45-degree angle to the oncoming sea and that if driven within that angle the ship would pitch or slam too violently. If so, this must have made station-keeping and maintaining certain courses very difficult and the reduction in speed would have reduced anti-submarine capacity.

IMPROVEMENTS

Like so much equipment sourced from America, instead of changing doctrine to suit the equipment, the equipment had to be changed by the RN to suit its operational doctrine. This happened with the first ships that made the voyage across the Atlantic – the fifty old, four-piper, flush-deck destroyers that formed the Destroyers For Bases Agreement of 1940. Despite the desperate times, much precious dockyard time, effort and money was spent making changes that, in retrospect, did very little indeed to make these superannuated ships of any more use to the RN than they would have been if left untouched save for long-overdue maintenance. [14] And, so it was with the Captain Class. Instead of building the81ikimeded changes into the design when they were on the slipways – where possible and where absolutely necessary of course – the RN waited until they had been commissioned, worked up in the peaceful water of the Caribbean and made their first trans-Atlantic voyage before the following sorts of improvements were undertaken, though not necessarily in one tranche:

A crow's nest was fitted to the mast. – a simple thing to have undertaken at the time of building that would not have added a single day to the delivery time if organised properly.
A 27-foor Montagu whaler – the Navy's preferred rowing boat and on its inventory since the 1890s – was added to the port side with either quadrantal or radial davits (photographs do not show sufficient detail to determine this). One must ask: how did the USN manage to function satisfactorily with just the standard 26-foot motor whaler?
Extra life rafts of the Carley type were added on elevated and inclined skids. The USN used the same or similar rafts and could have been added during construction.
Wind deflectors were added to the bridge leading edges – but, just perhaps, this was a result of lessons learnt.
A canvas shelter was added aft for the depth charge crews.
Oiling fairleads were fitted forward because British oiling-at-sea practice was to take oil from astern of the oilers – something that was well established and should have been built in to the design brief.
The bridge layout was altered – probably as a result of operational experience – and a two-level director was fitted to improve visibility.

Armament and similar-related changes, over time, involved:

Replacing the US Mark 4/British Mk II Oerlikon mount – which required a man to raise and lower the gun via a left-hand side elevating wheel with the simpler fixed height pedestal mountings (Mk IIA / Mk IIIA / Mk VIIA) which used a series of stepped platforms around the gun to allow the gunner to elevate or depress the barrel, thus probably saving one crew-member per mounting.
Adding more depth charges in racks along each side, forward of the forward-most depth charge throwers, apparently bringing the total up to an impressive 200 charges.
Adding spray/blast shields to "B" mount and, occasionally it appears from photographs, to "A" or "X" mount.
Adding smoke floats to the depth charge rails in addition to the fixed chemical smoke generators provided.
Adding 2-inch rocket flare projectors for Snowflake illuminating rockets to the sides of "A" or "B" mount where shields were fitted.
Adding vertical-firing Snowflake illuminating rockets to the sides of bridge wings.
Adding MF/DF (Medium Frequency Direction Finding) antenna to the front of the bridge.
Adding HF/DF – "Huff Duff" – High Frequency Direction Finding antenna Type FH4 to the top of the mast at the expense of the SA air-search radar.
TBS (Talk Between Ships) was fitted.
"Foxer" – a noise-producing antidote to the GNAT, trailed behind the frigate – was fitted aft starting in 1944.
ASDIC was upgraded.
For the 14 Captains converted to Coastal Forces Control, see below.
For the 3 Captains converted to Landing Ship Headquarters Small, see Other Uses, below

DAMAGE CONTROL

I have been unable to find anything more specific on this subject other than the following quote from the captain of HMS *Duckworth* who reported *inter alia*:

> *"Built presumably in the principle of 'never repair, sink or replace', these ships present no problem at all as to damage control. There is none. All main electric power cables run along the ship's side, as do all store-rooms. Shoring would be impossible in most spaces and this drawback may be particularly exasperating if a bomb near miss or shell splinter penetrates the hull. There is no proper pumping line…There is no emergency power supply".* [15]

However, when I noted the number of Captains that were the subject of torpedo damage that did not sink, were towed to port or had to be sunk by friendly fire, I would have to say that the *Duckworth* captain's comments may have been a bit biased and unfair. It would appear that the German G7es (T5) *"Zaunkönig"* torpedo, called the GNAT (German Naval Acoustic Torpedo) by the Allies – was the

primary culprit. This electric torpedo left no tell-tale wake and homed in on the noise generated by the ships' propellers, generally blowing off the whole stern, depth charges and all which, hopefully, were set to "Safe". While this would immobilise the ship, providing the aft bulkheads held, flooding and any outbreaks of fire could be kept under control, of the 13 Captains torpedoed, 2 had to be sunk by friendly forces and 7 survived to reach port under tow. Of the four that were sunk, 1 was bombed and 3 were from torpedoes. Of these three, one sank in 25 minutes, one lasted over two hours and the other was taken in tow and foundered the next day. One would need to look at the action reports to know how, where and under what circumstances the fatal damage was suffered before accepting at face value the scathing comments, above.

As an example of survivability, when HMS *Halsted* was attacked by two German Destroyers, *Jaguar* and *Möwe*, off Cherbourg on 11 June 1944 she was hit in the bow by one torpedo – presumably a conventional type. The explosion demolished the bow back to the bridge killing one officer and 32 ratings. The forward bulkhead held, HMS *Fernie* came alongside and assisted and *Halsted* was towed back to Portsmouth. (ADM 267/135 Damage Reports and Files – HMS Halsted)

Another example, this time mine damage, was that of HMS *Ekins*. Two ground mines exploded under her on 16 April 1945 off Ostend, Belgium causing the engine rooms to be flooded and holing the ASDIC compartment, further forward. Despite the damage, she limped back to port.

The sixteen lost were as follows:

Bombed and sunk: *Lawford* (glide bomb)

Torpedoed and sunk *Gould* (broke in two, stayed afloat for 25 minutes)
Blackwood (taken in tow, foundered next day)
Bickerton (had to be sunk by torpedo from HMS *Vigilant*)
Bullen (torpedoed and sunk)
Capel (torpedoed, broke in two, sank two hours later)
Goodall (forward part of ship blown away, had to be sunk by gunfire from HMS *Anguilla*)

Torpedoed and towed to port *Halsted* (torpedoed by German destroyer, bow blown off, towed to port, declared constructive total loss)
Goodson (torpedoed in the stern, towed to Portland, declared constructive total loss)
Whitaker (torpedoed, lost much of bow, towed to port Londonderry then Belfast, declared constructive total loss)
Mounsey (torpedoed, towed to Kola Inlet (Russia), repaired and placed back in service)
Affleck (torpedoed, towed to port, declared constructive total loss)
Manners (torpedoed, towed to port, declared constructive total loss)
Redmill (torpedoed, towed to port, declared constructive total loss)
Trollope (torpedoed, beached, towed to port, declared constructive total loss)*

Mined and towed to port: *Dakins* (mined, reached port, declared constructive total loss)
Duff (mined, reached port, declared constructive total loss)
Ekins (mined, reached port, declared constructive total loss)

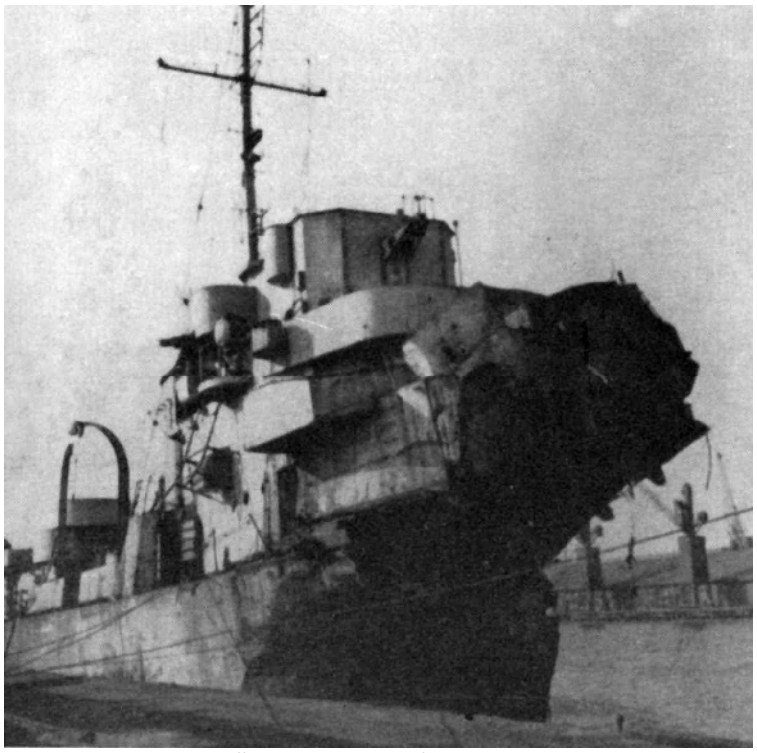
Given that all but one of the torpedoings were, apparently, due to the technically advanced and deadly GNAT, and that the three minings did not sink, I think it is fair to say that the Captain Class frigates had better than average built-in damage control.

Footnote: *There is some controversy about this, some records stating that *Trollope* ran aground causing her loss. However, the war record of HMS *Stevenstone* (L 16), a Hunt Class destroyer is clear:

June 6th, Assisted in rescue work and with wounded after HM Frigate TROLLOPE was torpedoed during action against E-Boats in Seine Bay off Le Havre. (Note: HMS TROLLOPE was badly damaged and later beached at Arromanches). (source: www.naval-history.net) This is supported by The National Archives record ADM 1/29839: *Awards to five officers and men when HMS Trollope was torpedoed off Normandy by E-boats July 5/6 1944. Date recorded as June 5/6 on front cover.*

Perhaps the last word should be left to the famous U-Boat killer, Captain Donald Macintyre referring to the torpedoing of HMS *Bickerton*: *"…although most of the stern and quarter-deck were missing, the remainder of the ship from the after engine-room bulkhead was sound as a bell. Once again one of these splendid little ships had shown their amazing capacity to take punishment and survive."* **[16]**

A dramatic photograph of HMS *Redmill* missing most of her stern, courtesy of a German GNAT torpedo fired by U- 1105. She was towed to Londonderry Port, Northern Ireland but declared a constructive total loss. Note the *"Not Under Command*" signal – two balls from the yardarm. HMS *Rupert* is standing by but moving at a speed slow enough not to attract another GNAT or towing her Foxer decoy. [uboat.net]



HMS *Halsted* managed to survive having her bow blown off back to the bridge after being torpedoed in a night encounter with two German destroyers. The bulkheads held and she was towed back to Portsmouth by HMS *Fernie* and declared a constructive total loss. [bretagne39-45.fr]

ESCORT GROUPS

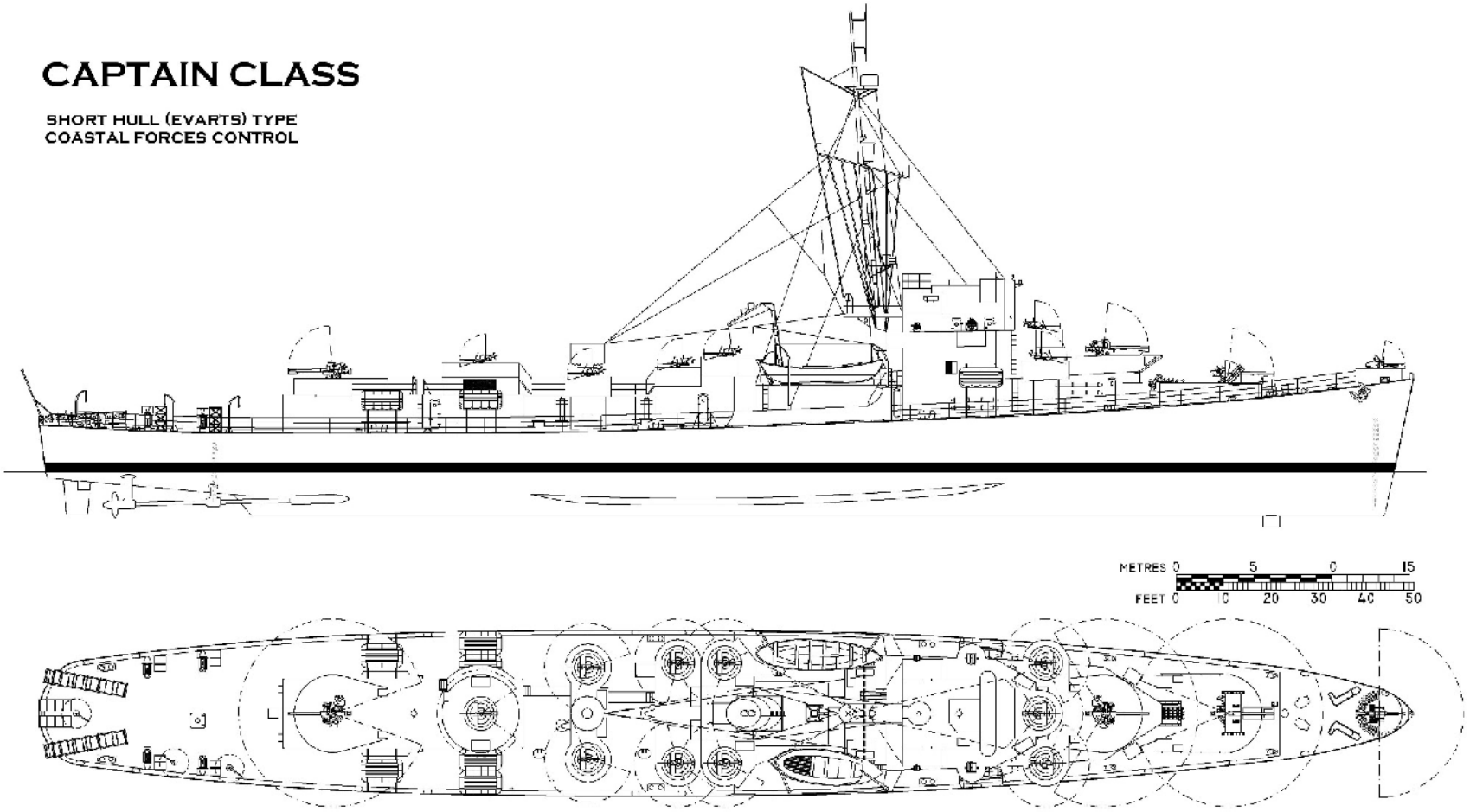
Captain Class frigates formed the 1st, 3rd, 4th, 5th, 15th and 21st Escort Groups. The usual format was three each of the short-hulled and long-hulled versions. (Captain Class Frigate Association)

COASTAL FORCES CONTROL

Fourteen Captain Class were adapted to serve as Coastal Forces Control Frigates for operations against enemy coastal shipping and E-boats in conjunction with Motor Torpedo Boats and Motor Gun Boats using their superior radar for detection and direction. According

CAPTAIN CLASS

SHORT HULL (EVARTS) TYPE
COASTAL FORCES CONTROL



A total of fourteen Captain Class frigates of both hull types were adapted specially to support coastal forces working mainly in the North Sea. Their superior radar, assisted by a communications interept device called 'Headache', proved useful and they were equipped with a 2-pounder 'Bow-Chaser" as an anti-E-boat measure. The drawing shows 'A' mount with a shield and 2-inch rocket flare projectors fitted. The shield was more usually fitted to 'B' mount but photographs also show shields to 'X' mount. Note the 20mm Oerlikon aft in place of the 40mm Bofors.

to the Captain Class Frigate Association, eight were the long-hulled type and they do not refer to any others. They operated out of Harwich or Portsmouth in the North Sea and English Channel. To fulfil their roles, extra equipment was fitted in the form of a vertical "Headache" antenna at the masthead to intercept German radio transmissions and for a QF 2-pounder Mk VIII was specially fitted as a "bow chaser" mounted right in the bow with a limited firing arc. Photographs show that the 20mm Oerlikons in front of the bridge would appear to have been mounted as a pair at the higher level where a single would normally have been mounted and the pair at the lower level deleted – probably to improve firing arcs in the sort of close encounters that coastal forces could expect. Apparently, the bow-chasers were removed as were the 20mm Oerlikons in front of the bridge and were replaced by a pair of single 40mm Bofors, presumably side-by-side on the upper level where they had the best firing arcs.

OTHER USES

In June 1944, following the cessation of hostilities in Europe and presumably with a view to their use in the ongoing Pacific campaign, the RN asked the USN to rearm 20 of the Captain Class with two 5-inch/38 guns – one fore and one aft – but nothing came of this. [17]

As mentioned in the River Class section, the Captain Class were considered for considered suitable for conversion to **Landing Ship Headquarters Small** (LSH(S). Three ships, *Dacres, Kingsmill & Lawford* were ready and served on D-day. Like the Rivers, their armament was reduced – one 3-inch/50 cal removed but the number of 20mm Oerlikons was increased to thirteen. Photographs quite clearly show the lengthened deckhouse providing some extra accommodation. According to Friedman, a "beaching craft" was shipped and a photo on navsource.com refers to a *"skimming flat dish motor-boat handled by torpedo davit port side"* and what does indeed look to be a small dinghy in that position. There is no other davit system visible large enough to handle a 6-10-ton Landing Craft Personnel (LCP). My drawing is based on photographs of HMS *Lawson* which was unfortunately lost to a glider bomb off the Normandy beaches two days after the D-Day landings.

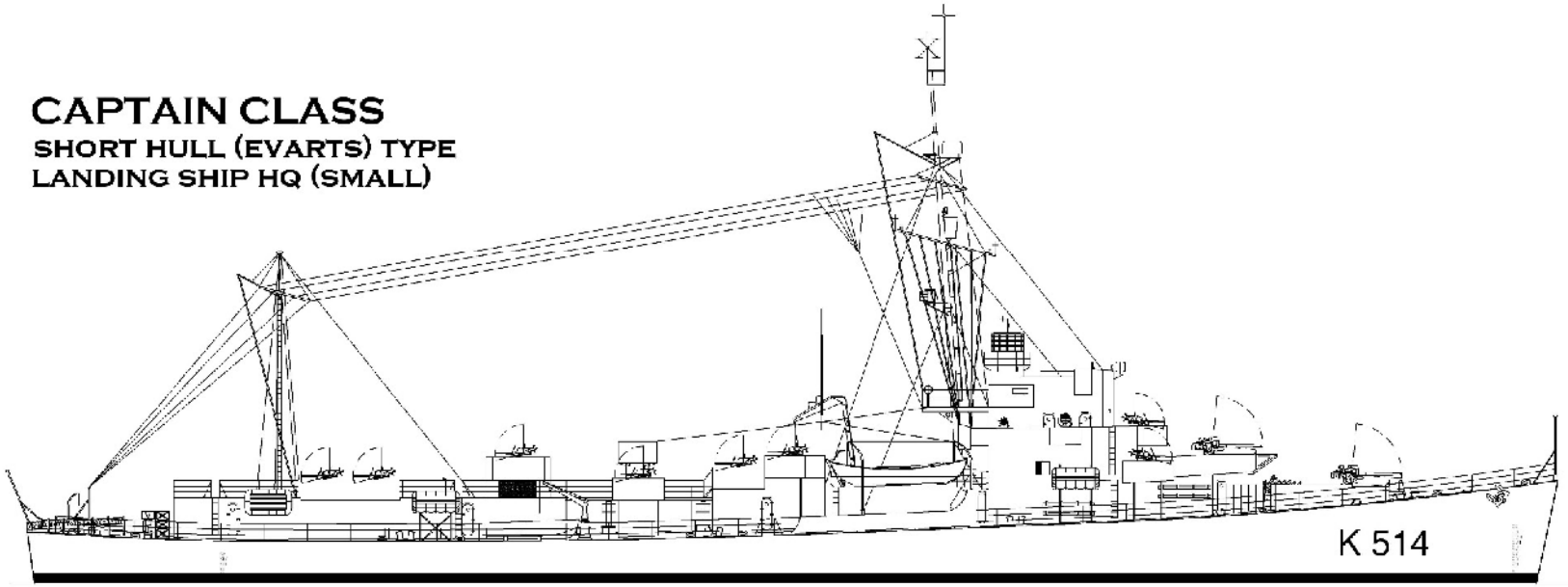
HMS *Lawford* converted to a Landing Ship Headquarters (Small) LSH (S). Note that she still has her full complement of depth charges in rails at the stern. Also, the small boat alongside, below the torpedo-loading davit that has been installed, is probably the "skimmer" or runabout reported as having been carried. [photoship.co.uk]

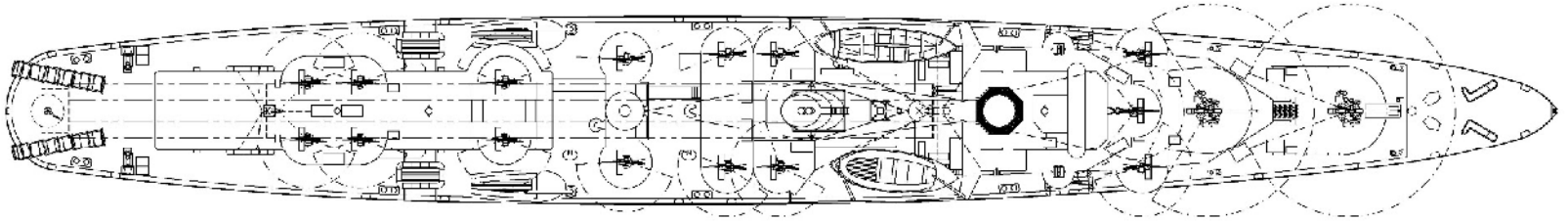
One of the uses to which the LSH(S) was put was to use the highest possible vantage point – in the case of the River Class it would seem to have been where the Type 271/2 antenna may have been removed (photographs are rare!) for a fighter direction position. This requirement became more pressing with the amphibious nature of the war in the Pacific and it was contemplated that some Captain Class and Colony Class (heaven forbid for their near absence of ventilation!) would be converted to **Fighter Direction** ships. In the Captains, two of the 3-inch/50 cal mount would have been removed and replaced by twin 40mm Bofors, augmented by 6 single Bofors – presumably replacing the normal 20mm Oerlikons which, by then, had proved to be less effective against persistent Japanese aircraft attacks – particularly Kamikaze. A mixture of American SA surface search radar and British Type 277 radar – which would have required a lattice mast – was envisaged. Six ships were earmarked but nothing eventuated. [18]

I have drawn my interpretation of what such a Fighter Direction Ship might have looked like based on the information available.

CAPTAIN CLASS

SHORT HULL (EVARTS) TYPE
LANDING SHIP HQ (SMALL)

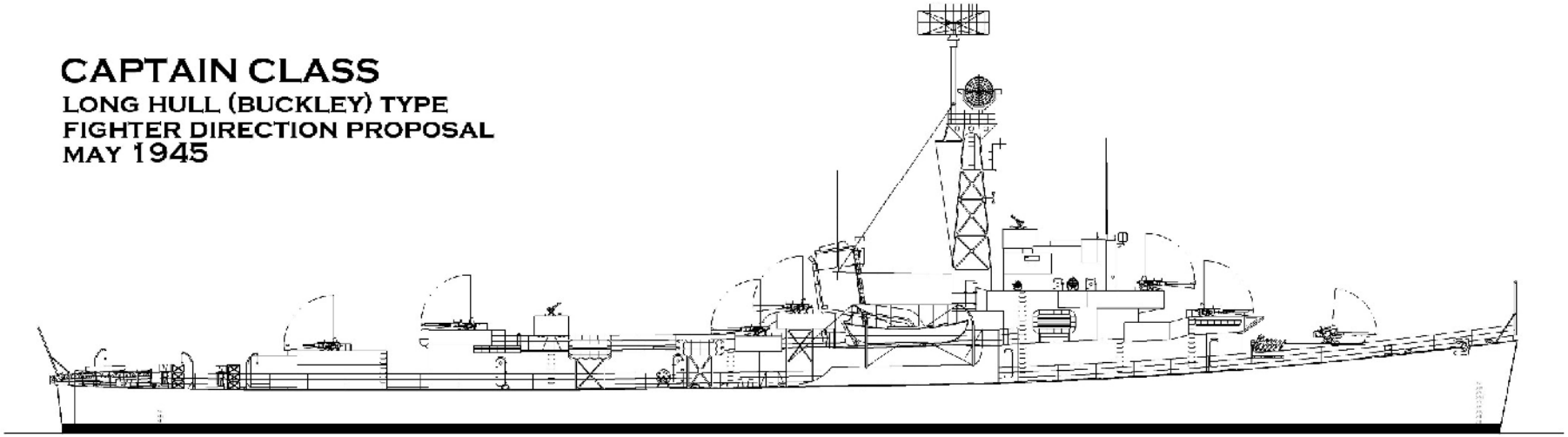


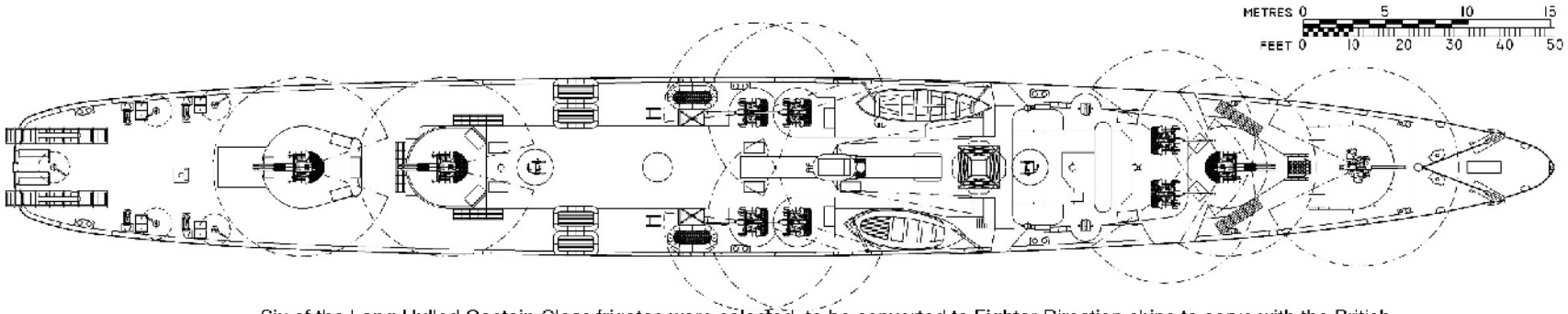


Three of the Short-Hulled versions of the Captain Class frigates were converted to Landing Ship Headquarters (Small) for the D Day invasion in 1944. Photographs suggest the conversions were not absolutely identical. This drawing depicts HMS Lawford as best as can be determined from the few photographs available. Note that there are fifteen single 20mm Oerlikons fitted yet reference works refer to thirteen despite clear photographic evidence. The radar fit is an unusual one with Type 291 at the masthead, US Type SL below it and Type 272 on the bridge. The mainmast well aft supports the extra communication aerials required for the considerable number of extra staff accommodated onboard. Swift runabout type boats are located to port and starboard.

CAPTAIN CLASS

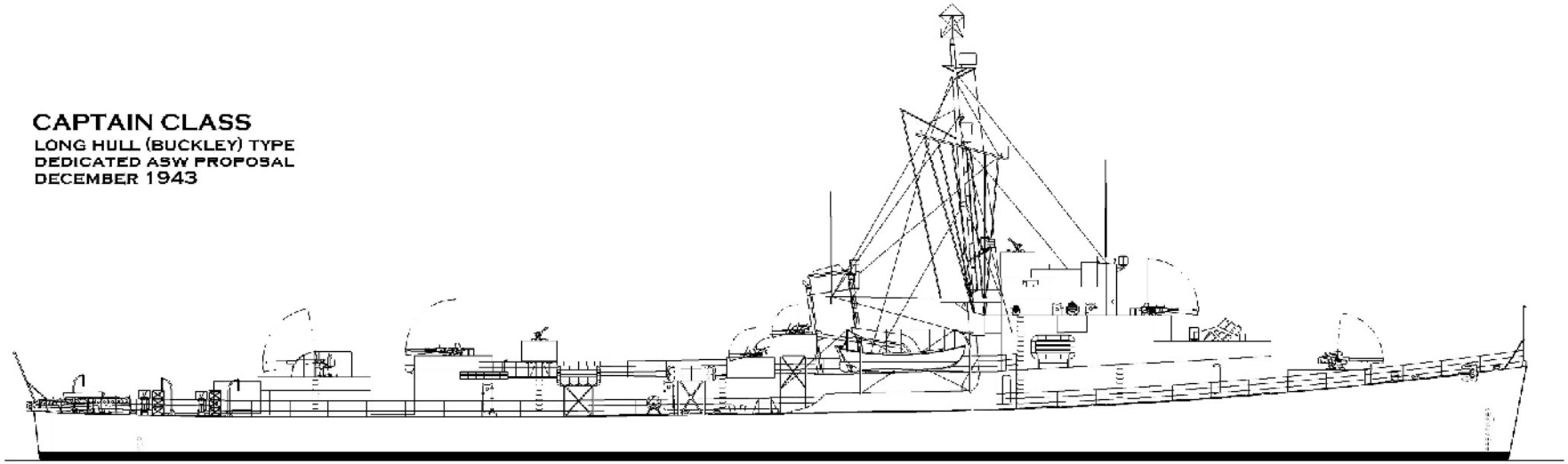
LONG HULL (BUCKLEY) TYPE
FIGHTER DIRECTION PROPOSAL
MAY 1945

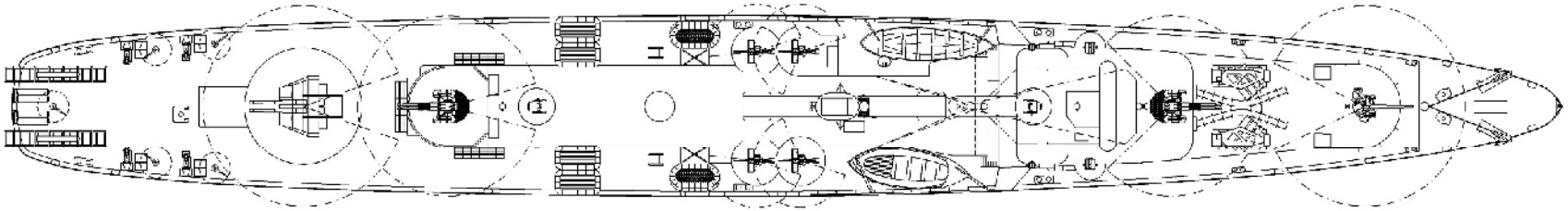




Six of the Long-Hulled Captain Class frigates were selected to be converted to Fighter Direction ships to serve with the British Pacific Fleet. No drawings are available but what is known is the proposed armament and radar fit and, for the latter, it is assumed that a lattice mast - like the Loch Class - would have been needed to support the large Type 277P antenna with the US Type SC-4 above it. The four single Bofors have simply been located in place of the 20mm Oerlikons. It is assumed that USN Mk 51 fire control would have been necessary for each of the the twin Bofors mounts. Work was abandoned on the conversions when Japan surrendered and the ships were returned to the USN under the terms of Lend Lease.

CAPTAIN CLASS
LONG HULL (BUCKLEY) TYPE
DEDICATED ASW PROPOSAL
DECEMBER 1943





As late as December 1943, six months after the Battle of the Atlantic had reached its peak and merchant ships losses were steadily declining as U-boat losses were increasing, the Royal Navy considered equipping Captain Class frigates still building as specialised ASW escorts with a double Squid ahead-throwing mortar forward and a twin QF 4-inch Mk XIV aft. Due to aerial superiority, air-search radar has been forfeited in favour of Type FH4 HF/DF - more commonly called 'Huff Duff' - at the masthead with US Type SL radar below although Type SU radar was available. ASDIC would likely be Type 144 backed up by Type 147B.

As late as December 1943, six months after the Battle of the Atlantic has reached its peak and merchant ship losses were steadily declining just as U-boat losses were increasing, the Royal Navy briefly entertained the concept of equipping Captain Class frigates still building in America as **specialised anti-submarine escorts** with a double Squid mounting in "B" position and a QF 4-inch Mk XVI in "Y" position. No details are available as to the secondary/close-range weaponry but a mix of 40mm Bofors backed up by 20mm Oerlikons would have followed what was then current practice.

My drawing interprets this limited information.

It was the diesel-electric Captains that found a passive post-hostilities role in the Pacific as suppliers of temporary electricity in Hong Kong (*Rowley, Stockham* and *Tyler*) and in Singapore (*Hotham* and *Spragge*).

Hotham moved to Hong Kong later in 1945 and returned to Britain in 1947 before being sent on a similar mission to Malta in 1948. On return to Britain her machinery was removed – presumably worn out – and she was used for experiments in gas-turbine propulsion until 25 April 1952 when the Lend-Lease terms required her return. However, she was simultaneously handed back to the RN under the newer American-sponsored Mutual Defense Assistance Program before finally being returned on 13 March 1956 for scrapping in the Netherlands on 1 November 1956.

DISPOSALS

The Captain Class were all subject to the Lend-Lease agreement which meant, in effect, they were only on loan to the RN and, as such, were subject to be returned at the pleasure of the United States as they were the property of that country. The terms of the agreement provided that the war materiel was to be used until returned or destroyed. Frankly, their return suited the RN because with the cessation of hostilities the maintenance of a non-active fleet was a maintenance headache and it suited Britain because it reduced its liabilities regarding the amounts payable under the provisions of the Lend-Lease agreement. The outstanding cash balance was to be repaid over 50 instalments starting in 1951 and attracting interest at 2% per annum. The last instalment - £42.5M – was paid on 29 December 2006. Another truly expensive war!

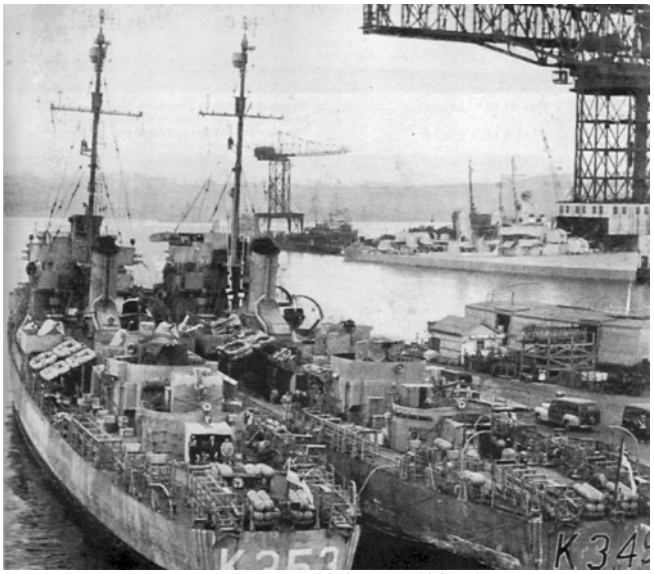
Records of dates that ships were returned to the USN vary between sources and some ships simply do not appear to have critical dates recorded at all. Other than *Hotham*, referred to above, all remaining Short-hulled Captain Class seem to have been returned by 2 May 1946, the majority in two batches of 10 ships – the first as 20 August 1945 – presumably in Britain – followed by a further 10 in February-March 1946.

If one considers the dates of apparent sold-for-scrapping as distinct from the earlier date of when a ship was officially struck off the USN's list, then the shortest-lived Short-hulled Captain Class seems to have been HMS *Hoste*: commissioned 3 December 1943 and sold for scrapping 7 May 1946 – a life of 886 days or just over 2 years and 5 months.

Perhaps the shortest lived Long-hulled was HMS *Retalick*: commissioned 8 December 1943, returned to the USN on 25 October 1945 and sold for scrapping on 7 May 1946 – a life of 881 days or just under over 2 years and 5 months.

It is interesting to note the dispensability of the Captains once returned to the USN compared with the *Edsall, Cannon, Butler and Rudderow* classes of the USN which were retained or transferred to other friendly navies. The RN's Captains were quickly scrapped save *Balfour* and *Louis* which were sold to the states of New York and Pennsylvania for New York Maritime Academy and an unknown use respectively.

Refer Appendix D



HMS *Calder* and HMS *Essington* alongside each other at Brooklyn Navy Yard, 20 October 1945 after being returned to the USN. Note that the aft 3"/50 cal has a shield. [navsource.org]

WINS & LOSSES

Eight U-Boats were sunk by Captain Class frigates acting on their own.

Twenty U-Boats were sunk by River Class frigates acting in concert with one or more other ships or aircraft.

There is one disputed sinking of a U-boat, U-648, not included in the above.

In addition, three midget (Seehund) submarines were sunk and three E-boats were sunk solely by Captain Class frigates and a further three E-Boats were sunk acting in concert with other warships.

Seventeen Captain Class frigates were lost; thirteen to torpedoes, three to mines and one to a glider bomb. Of these, losses, four were sunk outright, one had to be sunk by gunfire, one by torpedo and the others reached port or were towed to port where they were ultimately declared constructive total losses.

(refer Chapter 10)

DESTROYER ESCORT COMPARISON TABLE

TYPE	GMT*	TE**	FMR***	DET****	WGT*****	TEV******
Class	*Evarts*	*Buckley*	*Edsall*	*Cannon*	*Butler*	*Rudderow*
LOA	289'6"	306'0"	306'0"	306'0"	306'0"	306'0"
Beam	35'0"	36'9"	36'10"	36'10"	36'10"	36'10"
Draft (loaded)	9'0"	11'0"	10'5"	11'0"	13'4"	11'0"
Displacement	1,140 tons	1,400 tons	1,200 tons	1,240 tons	1,350 tons	1,450
SHP	6,000	12,000	6,000	6,000	12,000	12,000 tons
Speed	19 knots	24 knots	21 knots	21 knots	24 knots	24 knots
Range	*4,670 @14*	*3,870@14* [19]	n/a	n/a	n/a	n/a
Guns	3 x 3"	3 x 3"	3 x 3"	3 x 3"	2 x 5"	2 x 5"
TT	nil	3 x 21"	3 x 21"	3 x 21"	3 x 21"	3 x 21"
DCT	8	8	8	8	8	8
Constructed	97	102	85	66	83	72
To RN	32	46				

*General Motors Tandem diesel
**Turbo Electric
***Fairbanks Morse Reduction Gear diesel
****Diesel Electric Tandem
*****Westinghouse Geared Turbine
******Turbo Electric Drive (5")
[20] with the exception of Draft figures which vary depending on sources

Captain Class Data: (as designed)

Short Hulled		**Long Hulled**
LOA	289'6"	306'0"
Beam	35'0"	37'0"
Draft	10'9"	12'6"
SHP	2 x 6,000 diesel electric	2 x 6,000 turbo electric
Displacement	1,150 tons (standard), 1,450 tons (deep)	1,300 tons (standard), 1,840 tons (deep)
Speed	20 knots	24 Knots
Range	4,670 @ 14 knots clean	3,870 @ 14 knots
Guns	3 x 3" (3 x 1), 2 x 40mm (1 x 2), 9 x 20mm (9 x 1)	3 x 3" (3 x 1), 2 x 40mm (1 x 2), 9 x 20mm (9 x 1)
DCT	4	4
ATW	Hedgehog	Hedgehog
Crew	198	Over 200

1 Jane's Fighting Ships 1942, p. 67
2 Norman Friedman, *U.S. Destroyers; An Illustrated Design History*, p.137
3 Ibid, p.140
4 Ibid, p.141
5 Ibid, p.140
6 David K. Brown, *Atlantic Escorts, Ships, Weapons and Tactics in World War II*, p. 103
7 Friedman, p.160
8 Brown, p. 103
9 Friedman, p. 159
10 ibid, p. 160
11 ibid, p. 160
12 Brown, p.143
13 Friedman, p.160
14 John Henshaw, *Town Class Destroyers: A Critical Assessment*, pp.35-6
15Friedman, p.160
16 Captain David Macintyre, U-Boat Killer, p. 168
17 Friedman, p. 155
18 Ibid, p. 156
19 Brown, p. 143
20 Al Ross, *Anatomy of the Ship, The Destroyer Escort England*, p. 8

CHAPTER 8 THE COLONY CLASS

GENESIS

The most enlightening source on the origin of the Colony Class frigates was David Hendrickson's, *The Patrol Frigate Story: The Tacoma-class frigates in World War II and the Korean War 1943-53.* Previously I had been unable to determine precisely whether it was the United States Navy or the Royal Navy which provided the stimulus and which came first, the Tacoma Class for the USN or the Colony Class frigates for the RN. In many respects it is irrelevant because they were, in effect, one and the same thing – just as the Evarts Class and Buckley Class of the USN were the Captain Class of the RN, although the former were two different types anyway.

Hendrickson states that it was Admiral Ernest King's recommendation (as head of the USN) that Gibbs & Cox, the naval architects, redesign the River Class frigate as an all-welded vessel subject to prefabrication and mass production. I find this assertion a little hard to digest. King was a professed Anglophobe. To deign to recommend a ship design from Britain simply was not in his persona. He could not even bring himself to adopt in principle British recommendations that the convoy system be adopted when America was losing ships at an alarming rate along its eastern seaboard during Germany's Operation Drumbeat in January to August 1942 such was his antipathy. His arm was twisted to accept British help in the form of the transfer of corvettes and anti-submarine trawlers and this must have galled him. That attitude persisted when he actively resisted the inclusion of the British Pacific Fleet in having any part in America's campaign to win the Pacific war. But he was not alone in that. (refer Bay Class frigates earlier) Captain Stanley Darling, OBE, DSC and two bars, VRD, RANR (Retd), commanding officer HMS *Loch Killin* November 1943-June 1945, with three U-boats to his credit, was commanding a corvette in the Caribbean at the time and said,

> *"At that stage the US convoy system was not yet fully developed and there was still some residual reluctance to adopt out of hand anything British"*. (Australian Naval Historical Review, January 1980)

Irrespective, it does seem undeniable that within the USN there was a realisation that more and more escort vessels were needed beyond what was already committed to construction and it does seem entirely reasonable that they would have looked to what their allies were achieving with the assets available to them. In this regard, by December 1942 the fifteen River Class frigates commissioned were already proving themselves as a superior type of escort.

USN EXPERIENCE

The USN had received its first direct experience of River Class frigates – albeit ones especially equipped to suit them – when they commissioned USS *Asheville* and USS *Natchez* in December 1942 respectively after they were transferred from the RN and RCN respectively while under construction in a variation of Lend Lease. (See Chapter 4) Considering that this corresponds with the time the orders for the Tacoma Class was placed, no actual operational experience could have had any part to play in the design of the Tacoma Class. At best, there might have been feed-back from access to the plans and specifications from the time the decision was made to acquire the two ships and from access to the ships while under construction.

Hendrickson states that the River Class *"called to the attention of the American Navy, partly because of their similarity to the Des in size, speed and armament."* Size, that is overall length, was about the only really comparable element. Displacement-wise, the Rivers were heavier being a generally bigger volume hull. Engine-wise, how does one compare a ship driven by reciprocating engines with all machinery, such as force-draft blowers, anchor engines and steering engines being driven by single cylinder steam engines (except two turbine-driven generators furnishing electric power) with the American Des with a sophisticated mixture of diesel, diesel-electric and turbo electric propulsion? And, as to armament, the most heavily armed River Class was – at the time – relatively under-armed compared with the perhaps over-generous armament fit out that the Des were designed for. But the crew complement was a measure of that – eventually up to 150 for the Rivers and at least 200 to begin with for the Des. (Hendrickson states 190 as the complement of the Tacoma Class) Those extra RN crew numbers were difficult for a hard-pressed nation to find after three years at war. One thing not mentioned was range. In that regard, the River Class was considerably superior. Also, seakeeping – as proved by the use of the American equivalents as weather ships. (See below)

TACOMA CLASS ORDERS

President Roosevelt ordered the United States Maritime Commission to award sixty-nine contracts to merchant shipyards on 8 December 1942. The order was increased to one hundred, four were later cancelled and twenty-one were approved for construction for transfer to the RN under Lend Lease. According to the Imperial War Museum's photograph collection of what became to be known as Colony Class frigates, these ships were called Maritime Commission Class, at least in the very early stages despite the names clearly being those of British colonial possessions.

Where some of the confusion as to precisely who was the instigator might arise due to the fact that it was the twenty-one built at the specially established Walsh-Kaiser shipyard at Providence, Rhode Island that slid down the launching ways and were commissioned well ahead of the seventy-five built at seven other shipyards for the USN, particularly those on the Great Lakes. (See below) Since the British ships were completed first, it would seem plausible for it to have become common belief that the Tacoma Class were copies of the Colony Class.

The Destroyer Escort USS *Lorain* being launched sideways, 18 March 1944. [wikivisually.com]

Colony Class frigates under construction. Note the long, narrow bridge above a wheelhouse with seven prominent ports.
The considerable flare to the bows contributed to the seakeeping qualities of the River Class and the derivatives. [navsource.com]

TACOMA CLASS DESIGN CHANGES

The Gibbs & Cox adaptation looked a bit like, but was not the same as, the River Class. One must ask: who gave Gibbs & Cox the design brief? It can't have been from experience learnt from the *Asheville* and *Natchez* because they were commissioned the same month the orders were placed by the Maritime Commission. Since the Tacoma Class were all maned by the United States Coast Guard, did that service have any part to play at all in the design process? It's quite possible because in hull shape, the River Class was much closer to a Coast Guard cutter than any DE of the USN. How much input, if any, did the RN have in its order for twenty-one ships or did it just take what was offering?

Apart from welded construction, what were the significant changes?

> The hull dimensions were changed: beam was increased by a foot and length overall by 2'9", the main reason, apparently to accommodate American-made VTE machinery which, for some unaccountable reason, although of the same IHP as the River

Class, occupied more space. The author, David K Brown, in his book, *Nelson to Vanguard: Warship Design and Development 1923-1945*, page 132, claims that the engines were Skinner Uniflow. This is not strictly correct. Skinner Unaflow was Skinner's own trade name for these engines which used a uniflow principle. The Skinner Unaflow engines were used in the 50-strong Casablanca Class Escort Carriers built by Kaiser and various Grate Lakes car ferries.
The bridge was changed to one that was longer fore and aft and narrower. It retained the River's bridge wings and signal deck and looked to be a totally workable arrangement.
The wheelhouse had seven quite large portholes.
There was only one ship's boat, the usual 26-foot motor whaleboat.
The armament mirrored that of the *Asheville* and *Natchez* but was beefed up to include even more close-range weapons, viz nine 20mm Oerlikons and was certainly not a preferred armament for the RN with their 3-inch guns as their main weapons.
The mast was a simple tall steel pole instead of the tripod and radar was the American SA (air-search) at the masthead and SL (surface-search) below it. No HF/DF was fitted.
The anti-submarine fit followed USN practice and was eight depth charge projectors and two depth charge tracks (USN parlance) plus the British Hedgehog forward.
The internal layout was altered to suit USN requirements.

BRITISH ORDERS

Unlike the Captain Class with their relatively rich history, details of the Colony Class as to how, when and by whom the orders were placed and under what circumstances have eluded me. According to at least two photographs in the Imperial War Museum's Collections section, HMS *Antigua* and HMS *Anguilla* (IWM A23048 and A22682 respectively), these frigates at least were known as the Maritime Commission Class. This is the only reference I have been able to find to this classification – all others being to the ships being names after British colonies.

ROYAL NAVY CHANGES

Again, and unlike the Captain Class, records are bereft of detail here or simply, perhaps, unlike the Captain Class, the RN simply accepted the Colony's as-is, where-is, and got on with the job. Photographs of Colony Class ships look, on the face of it, identical to Tacoma Class ships. Gone seem to be the requirement to have a 27-foot Montagu whaler and a crow's nest. I have previously been critical of the RN changing equipment to suit doctrine rather than changing doctrine to suit equipment but perhaps by the time the Colony Class came along, so had a change of attitude. Perhaps a very small example supporting this is the case of the two US Xanthus Class repair ships ordered by the RN and taken over without any apparent change; HMS *Assistance* and HMS *Diligence*. Here, and maybe for the first time, crews had to get used to the USN's superior 5"/38 cal Mk 37 and its associated fire control plus all the other USN equipment so unfamiliar to them rather than change the armament to suit what the RN was used to.

As with the Captain Class, the Colony Class frigates were equipped below to a standard both above and below that of British-built ships for the RN. On the one hand they were spartan in what might be termed furnishings. On the other hand, appliances were lavish: iced water, ice-cream makers, potato peelers, washing machines and no voice-pipes but speakers instead and a telephone exchange. Cafeteria messing was by then the norm.

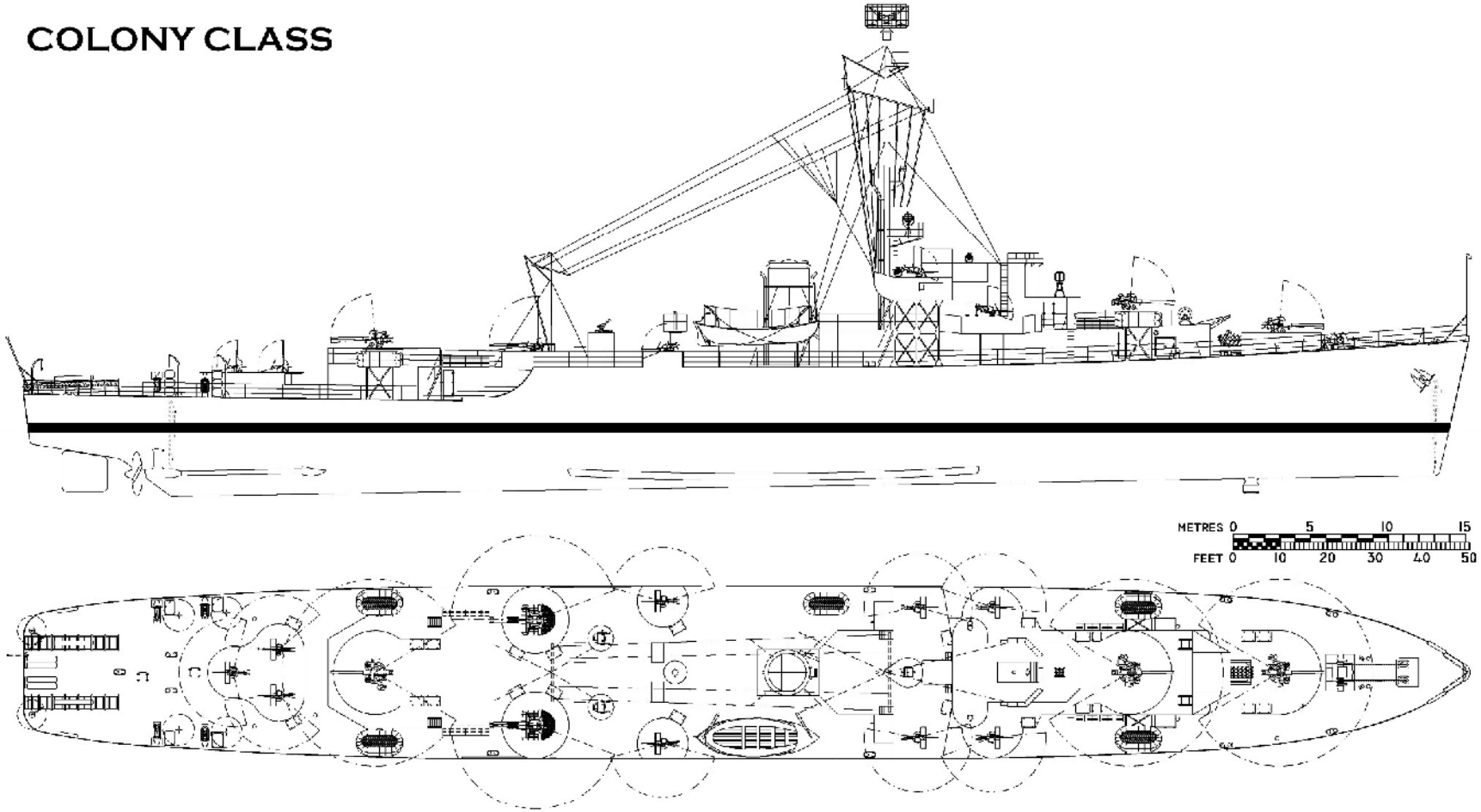
HMS *Tortola*. Note the American SA and compact SL radar antennae on the mast and the cross-shaped TBS antennae on the yardarm. Also, the complete absence of portholes/scuttles in the hull. [navsource.com]

HMS *Caicos* converted to a Fighter Direction Ship, specifically to detect German V-1 missiles launched from the Netherlands. Note the Type 277 radar antenna, folded flat, aft of a mainmast presumably holding other warning equipment. [commons.wikimedia.org]

One ship, HMS *Caicos*, was the only one to experience any substantial change to its equipment although the precise details are unknown. What is known is that she was somewhat euphemistically designated a Fighter Direction Ship although by definition this was not strictly its use in the normally accepted sense. For example, the Fighter Direction Ship example of HMS *Boxer* is a ship crammed with radar and other antennae, as is the smaller Fighter Direction Tender ex-LST 13. *Caicos* appeared to have none of these save a Type 277P or Q antenna in place of the aft 3-inch gun mount and, probably, some extra IFF and communications equipment. What it could not have had was the large Combat Information Centre-type facility that *Boxer* had complete with the Ground Control Interception facility and the multitude of specialised staff necessary to perform the role of detecting, identifying and directing masses of aircraft. What *Caicos* was used for was as a radar picket vessel, stationed in the North Sea to detect V-1 rockets heading towards Britain. Whether that function involved actually directing land-based fighter aircraft to intercept the V-1s is unknown.

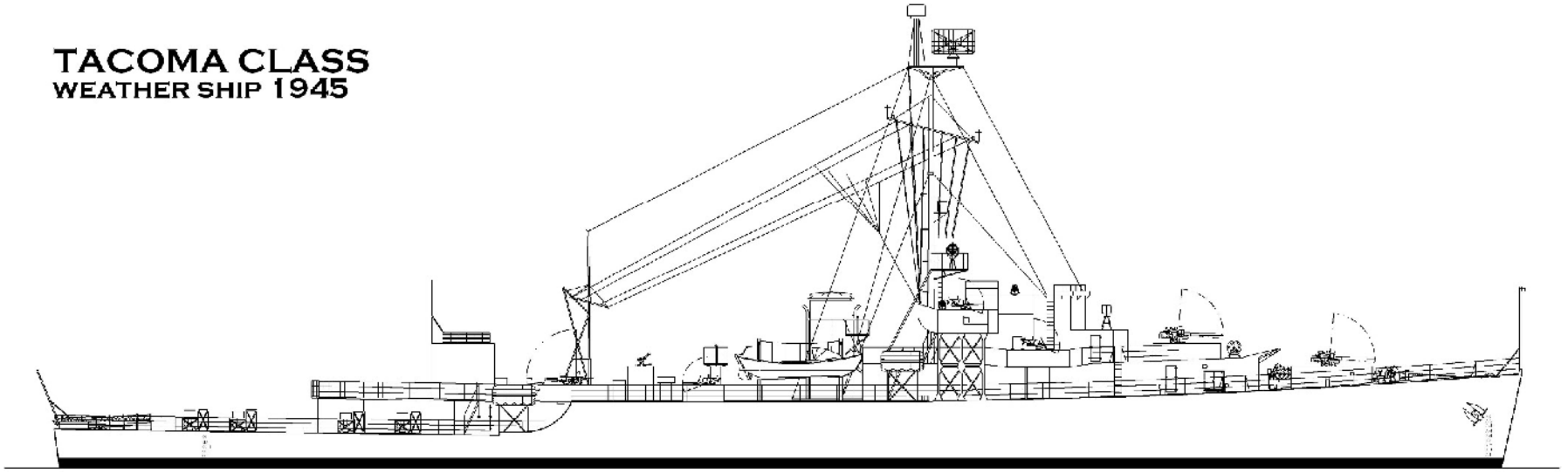
My drawing is of a standard Colony Class as far as can be determined from photographs.

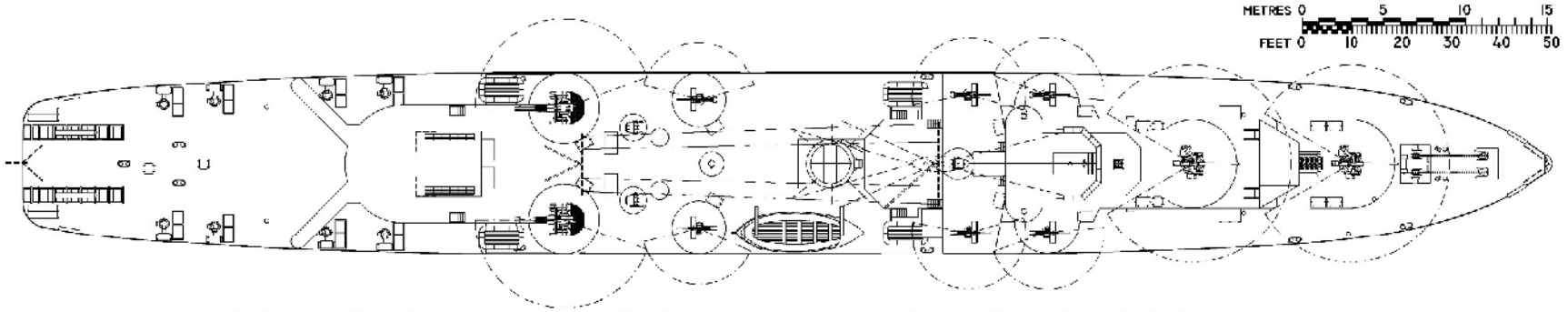
COLONY CLASS



The Colony Class frigates were first termed Maritime Commission Class reflecting the fact that they were built in the United States of America under the auspices of the Commission for Britain by way of the Lend Lease agreement. They were an all-welded local interpretation of the River Class frigates but differed mainly as to armament - in some respects worse, others better. The 3"/50 cal guns were regarded by the RN as inferior to the British 4-inch varieties. However, the two twin 40mm Bofors with Mk 51 fire control were superior to what was being fitted to British-built frigates, In addition, they mounted no less than nine 20mm Oerlkons and had US Type SA air-search and Type SL surface-search radars plus the usual Headgehog and depth charge fit with British ASDIC. The equivalent in USN service were the Tacoma Class Patrol Frigates.

TACOMA CLASS
WEATHER SHIP 1945





The Tacoma Class Patrol Frigates were the American equivalent of the Royal Navy's Colony Class frigates having come from the same drawing board - Gibbs & Cox. However, unlike the British ships, the seventy-five built for the USN (but manned by United States Coast Guard personnel) suffered extra-ordinary delays having been built in eight different shipyards. Forty-four were either converted or completed as weather ships with the armament removed aft (except for depth charge equipment) and a hangar installed for weather balloons. The Tacomas were chosen for this task due to their seakindliness and range. After the end of the war in Europe, these ships had their upperworks painted yellow for recognition purposes. Twenty-eight Tacomas were handed over to the Soviet Navy in a one-sided agreement to aid in the war against Japan.

DELIVERY PROBLEMS WITH TACOMA CLASS

The good intentions of spreading the load of new construction of the Tacoma Class to be built to mercantile standards to shipyards previously un-associated with naval construction but versed in a variety of mercantile construction – Great Lakes steamers for example – was to backfire on the Maritime Commission.

The construction program proceeded well at the two California shipyards – Consolidated Steel (San Pedro) and Kaiser Cargo (Richmond) with keel-laying to commissioning averaging no more than seven months. Eighteen of them reported to the 7th Fleet in the Southwest Pacific in 1944 the rest following in 1945.

However, the Great Lakes shipyards – two each on Lake Superior, Lake Erie and Lake Michigan – averaged fourteen months from keel-laying to commissioning. (Refer Appendix G) All but four served in the Atlantic and adjacent waters. Contributing to the delays was the fact that all forty-five had to transit the lakes, then through the Chicago Drainage Canal, the Illinois River and down the Mississippi to New Orleans or Houston on the Gulf of Mexico for final fitting out. In order to achieve this, because of the draft restrictions of nine-feet in places, they had to be raised by pontoons and were towed as barges. Contrasting this, masts were lashed to the deck because of height restrictions.

Foreseeable and avoidable problems also arose such as the project's managers, Kaiser Cargo, designing components too large for the available cranes at the Great Lakes' shipyards to lift causing redesigns.

The unfortunate fact remains that the Lakes-built Tacomas arrived too late.

QUALITY PROBLEMS WITH THE COLONY CLASS

While Walsh-Kaiser were the most efficient at producing the Colony Class as compared with the seven other shipyards producing the Tacoma Class sister-ships (Refer Appendix G), they were not without their post-production faults. The old proverb, *"More haste, less speed*" come to mind. Machinery problems plagued the class, frequently delaying acceptance with trials having to be run and re-run until bugs were sorted out. Problems with main propeller shaft bearings were endemic. Considering the relative simplicity of the machinery as compared with the more usual warship outfit of turbines and double reduction gearboxes, one can only put these problems down to corners being cut in the hectic almost frenzied atmosphere that must have prevailed to achieve near impossible construction times. Of course, these reductions came at a cost: manhours! British equivalents took much less manhours but dragged out over a considerably longer period. The cost of a Colony Class was reputedly £560,000 or $2.25m at the time when the DE cost was $5.50m. The benefit of the adaptation of the British design to American practices had its value, despite the number of manhours to achieve quick completions.

DESIGN FAULTS

A cost-cutting measure – and thereby time-saving measure – was the abandonment of scuttles (portholes) in the hull and the substitution of more mechanical ventilation. This was not an issue, apparently, in the Colony Class expected to be used in the cold North Atlantic waters. However, the USN expected, and did use, their Tacoma Class in more temperate waters and found below decks unbearably hot. Clearly the mechanical ventilation as designed was not adequate to cope. As Hendrickson says, *"frigate sailors complained bitterly of inadequate ventilation that generated stifling conditions below decks"*. [1]

Like the Liberty ships, there were some issues with cracking of the steel adjacent to opening and at sharp corners – all a function of the type of steel used and the welding process, both overcome by suitable bracing which a rivetted structure (like the River Class was) avoided by its very nature.

While not a design fault, as such, but rather one that was known about, was the single rudder that was not in the slipstream of the two propellers. Gibbs & Cox could have very simply designed a twin rudder system to give the Tacoma/Colony Class a better turning circle had the design brief included this element. Apparently, it was not considered sufficient a design fault to warrant this.

WEATHER SHIPS

A testament to the weatherliness of the River Class – occasioned by the flare to the bow, the freeboard carried well aft, its deep draft – is the fact that forty-four of the Tacoma Class were converted to weather ships and were stationed in the Northern Pacific, the Southern Pacific, the Western Pacific, the Philippines, the east coast of America and, mainly, the Atlantic from, variously, May 1945 to September 1946. Twenty-two were stationed in the Pacific and twenty-four in the Atlantic at the peak.

The modification involved the removal of the aft 3"/50 cal gun and the addition of a balloon hangar in its location with two special projections to assist, presumably, in the launching procedure. Strangely, the anti-submarine and all close- range weaponry was retained.

After VE day the decks and superstructures were painted yellow as a high-visibility measure to distinguish these ships from normal naval warships. This was more as an aid as plane guard and air-communication vessels for trans-Atlantic aircraft according to Hendrickson. [2]

USS *Peoria*, a Tacoma Class Patrol Frigate converted to a weather ship but still in the two-tone camouflage. The hangar replaced the aft 3"/50 cal mount and was used for weather balloons. Note that the anchors are a fabricated Danforth type and deck vents are simple goosenecks – all to simplify and speed production. [photoship.co.uk]

THE RUSSIAN CONNECTION

Operation Hula transferred twenty-eight Tacoma Class frigates (and many other smaller warships including landing craft) to the Soviet Navy in May 1945 in what turned out to be a rather one-sided and never properly fulfilled agreement for the Russians to commit fully to fighting the Japanese and, particularly, invading the Sakhalin and the Kuril islands. They were returned in 1949 less one that was wrecked. Many were subsequently distributed to the Japanese and Korean navies. (See Appendix G)

WINS & LOSSES

Two U-Boats were sunk by Colony Class frigates acting on their own.

Three U-Boats were sunk by Colony Class frigates acting in concert with one or more other ships.

No Colony Class frigates were lost in action.

(refer Chapter 10)

Colony Class Data: (as designed)

LOA	304'0"
Beam	37'6"
Draft	13'3" deep
IHP	2 x 5,500

Displacement	1,509 tons (standard), 2,238 tons (deep)
Speed	20 knots
Range	6,400 @ 14 knots clean
Guns	3 x 3" (3 x 1), 2 x 40mm (1 x 2), 9 x 20mm (9 x 1)
DCT	4
ATW	Hedgehog
Crew	220

1 David Hendrickson, *The Patrol Frigate Story, The Tacoma-class frigates in World War II and the Korean War 1943-53,* p. 5
2 Ibid, pp.125 & 134

CHAPTER 9 CAMOUFLAGE

Camouflage, whether it was applied to warships, aircraft or military equipment was designed to achieve one, or two, of three things: concealment, confusion, or deception.

Concealment applied more in a situation such as a ship in a harbour. At sea, this was more difficult and a scheme which made a ship harder to distinguish in one sort of light might have had the opposite effect in other lights. Reduced visibility was achieved by painting vertical surfaces to harmonize with the horizon, and horizontal surfaces to blend with the sea.

Confusion was achieved by Dazzle style camouflage that used shapes or colours, or a combination of both, to make it difficult to estimate range, speed and bearing. Other methods of achieving confusion included painting a false bow wave so that the enemy would over estimate a ship's speed. Disruptive camouflage was also designed to break up the outline of a ship making its size and type more difficult to establish by painting obtrusive patterns on vertical surfaces

Deception was aimed at making a ship look like something it was not. For example, painting a section of the bow and stern painted black – the bow with a white – dividing slash. The aim of this was to foreshorten the hull and, as such, the enemy would underestimate either the size of the ship or its range.

Some camouflage methods attempted to serve two of these purposes. However, a camouflage scheme for one theatre might not be suitable for another. Changing schemes was time consuming – even if the base surface was in good order – and expensive. Paint colours weren't consistent relying on formulae for mixing and the application itself was often open to interpretation and amateurish when done by crew-members rather than professional dockyard workers who weren't guaranteed to get it right anyway. The TLAR – *that looks about right* – formula was generally applied when it came to painting.

Malcolm Wright's excellent book, *British and Commonwealth Warship Camouflage of WWII: Destroyers, Frigates, escorts, Minesweepers, Coastal Warfare Craft, Submarines & Auxiliaries*, illustrates no less than forty-three different schemes that applied to frigates. Some of these were one-off, spur-of-the-moment, using-what-was-available concepts with little science behind them. Some, as Wright says, were *"probably an invention of the wardroom using whatever was available from her paint locker"*. Whatever the actual shades specified, the final shades of paint varied. Unlike today, when paint comes either pre-mixed and coloured from the factory or coloured at the point of sale to a shade, ships in RN had formulae with which to mix paint and these formulae were complicated using pigmented powders and liquids. Lots of things could go wrong with this, and almost certainly did. Ships were rarely camouflaged bow to stern, truck to waterline all at the one time. Often paint was applied *ad hoc* or touched up between assignments by crew members. Paint faded. Storms took their toll. It was rare for a ship to look pristine. From 1943 onwards, paint began to be pre-mixed and schemes became more standardised.

The Admiralty Western Approaches Scheme was a completely different and somewhat radical approach to camouflage – the traditional thinking being that darker was better. Peter Scott, a serving RN officer and a naturalist, suggested that ships should be painted overall

white with contrasting patches – ultimately polygonal shapes were chosen – of light sea blue and light sea green. This was adopted in mid-1941 for use exclusively on destroyers and anti-submarine escort ships.

This white background was sometimes used with various applications of darker colours like blue and black.

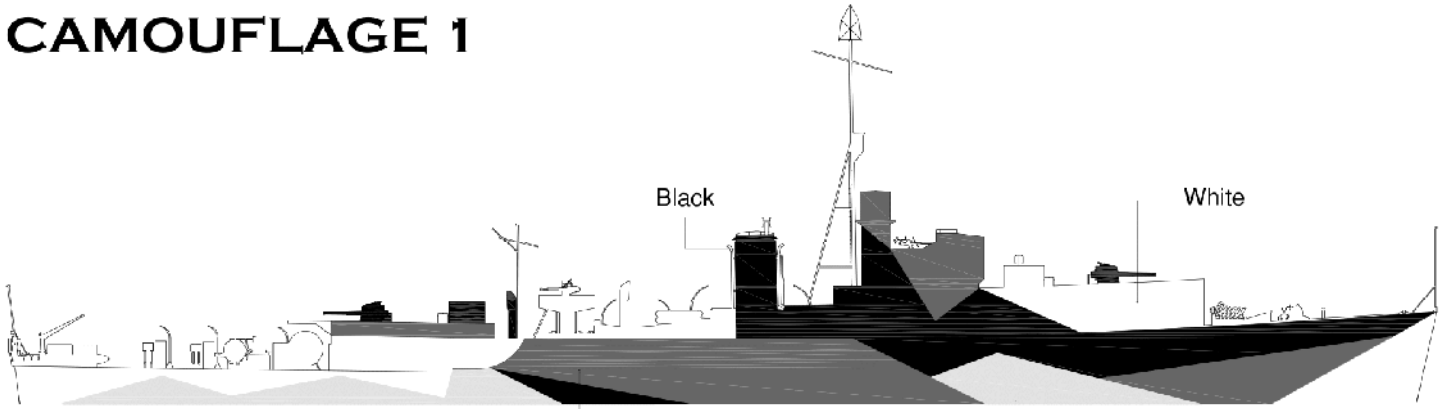
The traditional pale grey was broken with darker greys, pale and dark greens and also dark blue, mainly in geometrical slashed shapes but sometimes organic waves.

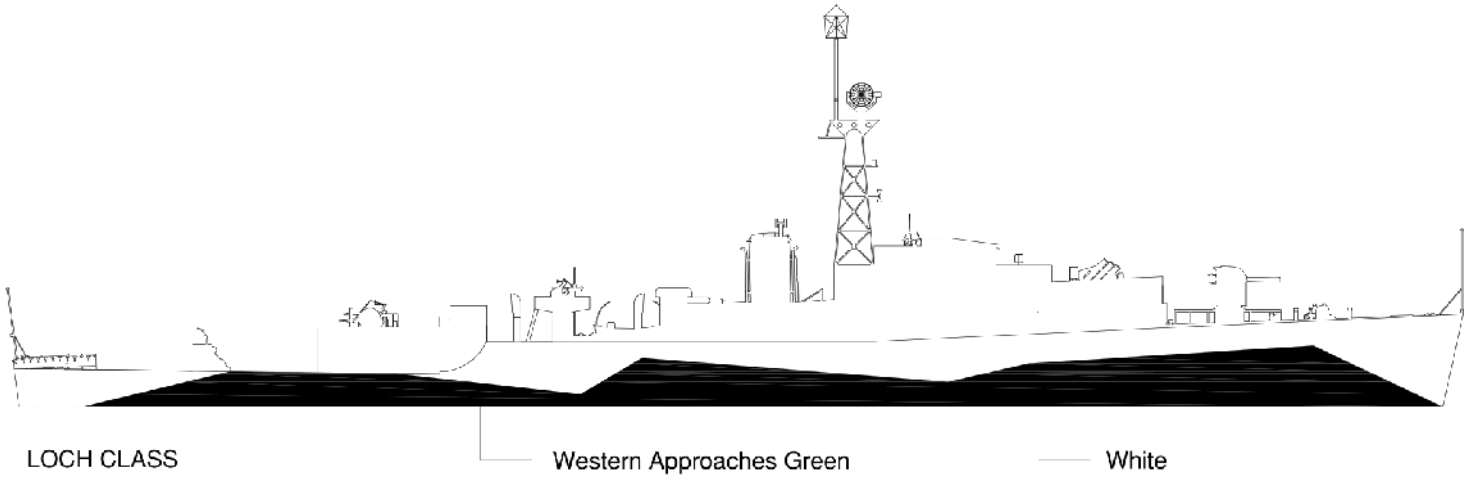
One ship, HMS *Somaliland*, was painted a two-tone green and another, HMS *Nith* as a Headquarters Ship off the D-Day beaches was painted a startling Red Lead – not so much a camouflage measure as a recognition feature!

The Royal Australian Navy ships followed United States Navy camouflage protocols since they were so closely integrated with their task forces. An overall dark blue was favoured but this was later varied by additions of grey, particularly when ships became attached to the British Pacific Fleet and adopted the two-tone blue-grey scheme.

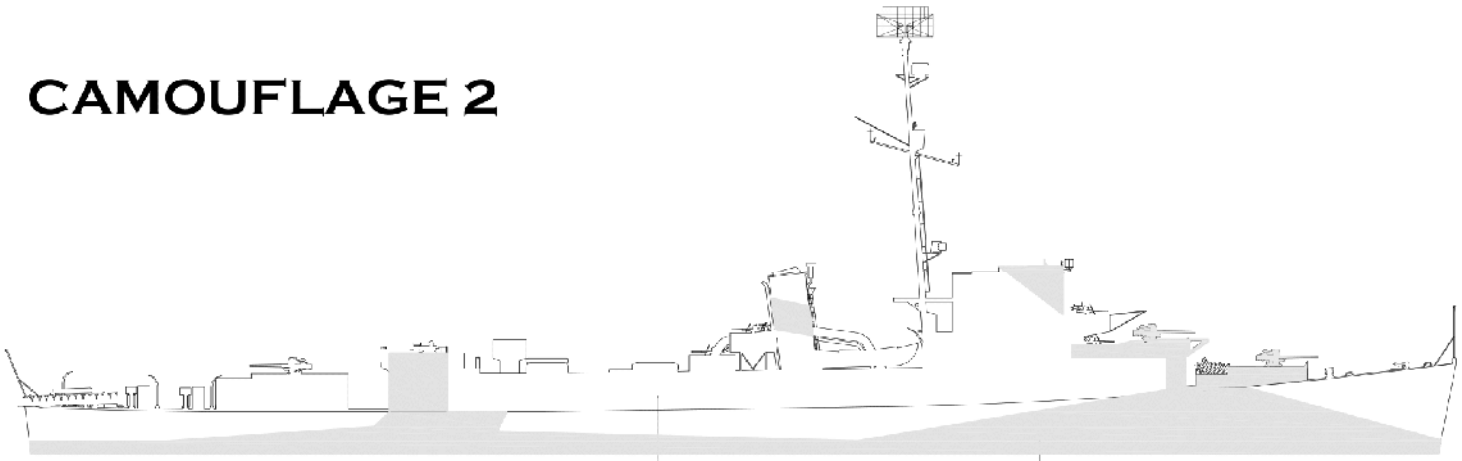
I have chosen to illustrate four different camouflage styles of the very many variants.

CAMOUFLAGE 1





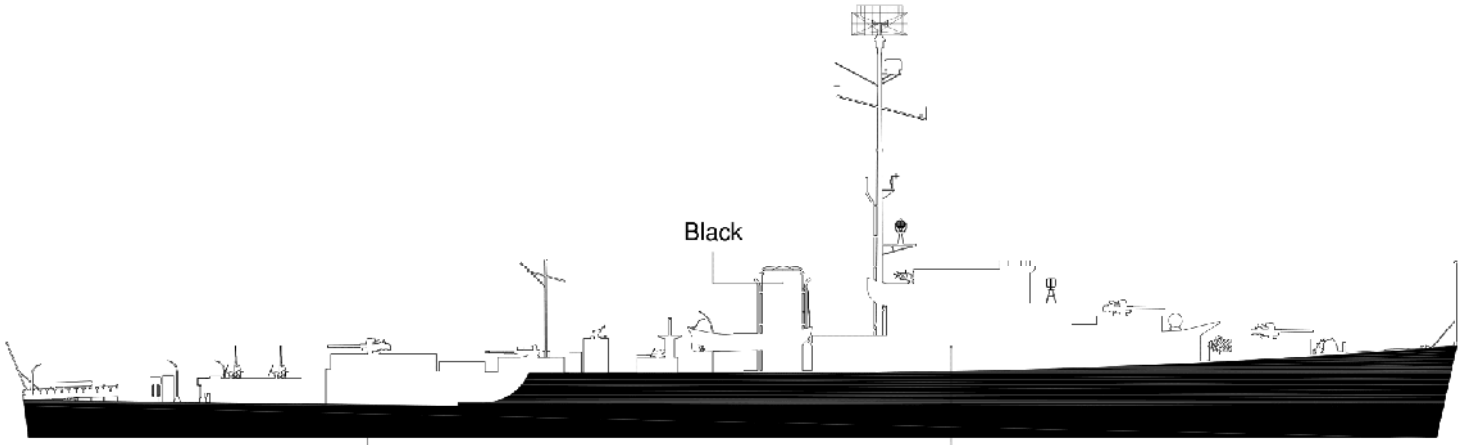
CAMOUFLAGE 2



CAPTAIN CLASS

White

Western Approaches Blue



Black

COLONY CLASS

PB 10 (Blue)

507C (Far East Grey)

The River Class frigate has a four-tone geometric pattern on a basic white hull. There are interlocking colours of B6 (Mid Grey), MS3 (Slate Green) and Western Approaches Green (as mentioned above). Canadian-built ships seemed to favour a generally darker two-tone scheme with the darker shade – or perhaps two shades – in two long organic waves from the bridge structure down to the waterline amidships.

The Loch Class frigates, appearing later, seemed to standardise using far more white being visible with just one or two pale contrasting colours applied to the hulls with parts of the superstructure occasionally picked out. As indicated earlier, there seems to have been no specification for this and no two ships were ever likely to have been identical.

The Captain Class apparently came from the American shipyards in the basic USN Haze Gray (Grey) with contrasting dark organic-type longitudinal flashes. Since these ships were being built to order, it seems odd that they could not have been painted and handed over as the RN wanted them. Perhaps the finer print of the Lend Lease agreement precluded this sort of refinement.

The Colony Class depicted has a simplified scheme, similar to the British Pacific Fleet's (BPF)scheme with the hull in PB10 (Dark Blue) and the superstructure in 507c Light Grey. The BPF's variations included painting only the lower hull in a dark blue or painting the lower hull with a dark blue panel, presumably to give the hull a foreshortened look, possibly to confuse anticipated torpedo attacks from aircraft or Kamikazes.

CHAPTER 10 WINS & LOSSES

RIVER CLASS

Wins: (in alphabetical order)

HMS *Annan*	16 October 1944	Sank *U-1006*
HMS *Glenarm*	17 January 1944	Sank *U-377* with HMS *Wanderer*
HMS *Helmsdale*	9 September 1944	Sank *U-484* with HMS *Portchester Castle*
HMS *Jed*	19 May 1943	Sank *U-954* with HMS *Sennen*
	14 June 1943	Sank *U-334* with HMS *Pelican*
HMS *Lagan*	12 May 1943	Sank *U-89* with HMS *Broadway* and Fairey Swordfish from HMS *Biter*
	13 May 1943	Sank *U-753* with HMCS *Drumheller* and a Canadian Sunderland
HMCS *Matane*	22 April 1944	Sank *U-311* with HMCS *Swansea*
HMS *Nadder*	12 August 1944	Sank *U-198* with HMS *Findhorn* and HMIS *Godavari*
HMS *Nene*	20 November 1943	Sank *U-536* with HMCS *Calgary* and HMCS *Snowberry*
	24 February 1944	Sank *U-257* with HMCS *Waskesiu*
HMS *Rother*	27 August 1943	Sank *U-134*
HMCS *St. Catharines*	6 March 1944	Captured *U-744* with HMS *Icarus*, HMCS *Chilliwack*, HMCS *Gatineau and HMS Kenilworth Castle*
HMCS *St John*	1 September 1944	Sank *U-247* with HMCS *Swansea*
16 February 1945	Sank *U-309*	
HMCS *Swansea*	14 April 1944	Sank *U-448* with HMS *Pelican*
	22 April 1944	Sank *U-311* with HMCS *Matane*
	1 September 1944	Sank *U-247* with HMCS *St John*
	10 March 1945	Sank *U-845* with HMS *Forester*, HMCS *St. Laurent* and HMCS *Owen Sound*

HMS *Spey*	11 July 1942	Sank *U-136* with HMS *Pelican*
	16 February 1944	Sank *U-406*
	19 February 1944	Sank *U-386*
HMS *Swale*	17 May 1943	Sank *U-657*
	6 April 1944	Sank *U-302*
HMS *Tavy*	5 July 1944	Sank *U-390* with HMS *Wanderer*
HMS *Test*	26 May 1943	Sank *U-436* with HMS *Hyderabad*

Losses: (in chronological order)

HMS *Lagan*	20 September 1943	Torpedoed by *U-270*, towed to port and declared a CTL
HMS *Itchen*	23 September 1943	Torpedoed by *U-666* and sunk
HMS *Cuckmere*	11 December 1943	Torpedoed by *U-223*, towed to port and declared a CTL
HMS *Tweed*	7 January 1944	Torpedoed by *U-305* and sunk
HMCS *Valleyfield*	7 May 1944	Torpedoed by *U-548* and sunk
HMS *Mourne*	15 June 1944	Torpedoed by *U-767* and sunk
HMS *Cam*	18 July 1944	Damaged by underwater explosion when own depth charges exploded a wrecked ship, towed to port and declared a CTL
HMCS *Chebogue*	4 October 1944	Torpedoed by *U-1227*, towed to port and declared a CTL
HMCS *Magog*	14 October 1944	Torpedoed by *U-1223*, towed to port and declared a CTL
HMCS *Teme*	29 March 1945	Torpedoed by *U-315*, towed to port and declared CTL

LOCH CLASS

Wins: (in alphabetical order)

HMS *Loch Achray*	12 April 1945	Forced *U-1024* to surface and surrender with HMS *Loch More*
HMS *Loch Dunvegan*	14 February 1945	Sank 24 *U-989* with HMS *Eck*
	24 August 1944	Sank *U-354* with HMS *Mermaid*
HMS *Loch Eck*	3 February 1945	Sank *U-327* with HMS *Bayntun* and HMS *Braithwaite*
	14 February 1945	Sank *U-989* with HMS *Loch Dunvegan*, HMS *Bayntun* and HMS *Braithwaite*
	17 February 1945	Sank *U-1278* with HMS *Bayntun*
HMS *Loch Fada*	27 February 1945	Sank *U-1018*
HMS *Loch Insh*	6 December 1944	Sank *U-297* with HMS *Goodall*
	29 April 1945	Sank *U-307*
HMS *Loch Killin*	31 July 1944	Sank *U-333* with HMS *Starling*
	6 August 1944	Sank *U-736*
	15 April 1945	Sank *U-1063*
HMS *Loch More*	12 April 1945	Forced *U-1024* to surrender with HMS *Loch Achray*

HMS *Loch Ruthven*	12 March 1945	Sank *U-683* with HMS *Wild Goose*.
HMS *Loch Shin*	4 February 1945	Sank *U-1014* with HMS *Loch Scavaig*, HMS *Nyasaland and* HMS *Papua*
	29 April 1945	Sank *U-286* with HMS *Anguilla* and HMS *Cotton.*
HMS *Loch Scavaig*	4 February 1945	Sank *U-1014* with HMS *Loch Shin,* HMS *Nyasaland* and HMS *Papua*

Losses:

No Loch Class frigates were lost in action

BAY CLASS

Wins:

The Bay Class frigates were not completed in time to have an impact.

Losses:

No Bay Class frigates were lost in action

CAPTAIN CLASS (in alphabetical order)

Wins:

Short-Hulled Group

HMS *Bayntun*	8 January 1944	Sank *U-757* with HMCS *Camrose*
	3 February 1945	Sank *U-1279* with HMS *Lock Eck*, HMS *Braithwaite*
	14 February 1945	Sank *U-989* with HMS *Braithwaite,* HMS *Loch Dunvegan* and HMS *Loch Eck*
	17 February 1945	Sank *U-1278* with HMS *Loch Eck*
HMS *Bazely*	23 November 1943	Sank *U-648* with HMS *Blackwood* and HMS *Drury* (this is a disputed Sinking according to U-boat.net's records)
	25 November 1943	Sank *U-600* with HMS *Blackwood*
	21 April 1945	Sank *U-636* with HMS *Drury* and HMS *Bentinck*
HMS *Blackwood*	23 November	Sank U-*648* with HMS *Bazely* and HMS *Drury* (this is a disputed sinking according to U-boat.net's records)
	25 November	Sank U-*600* with HMS *Bazely*
HMS *Cooke*	29 June 1944	Sank U-*441* with HMS *Domett*, HMS *Duckworth*, HMS *Essington* and a RAF Liberator (This has been reported as U-988 but U-Boat-net records this as having ben sunk by RAF aircraft on 22 June)
	26 July 1944	Sank U-*214*
HMS *Domett*	29 June 1944	Sank U-*441* with HMS *Cooke,* HMS *Duckworth*, HMS *Essington* and a RAF Liberator (This has been reported as U-988 but U-Boat-net records this as having ben sunk by RAF aircraft on 22 June)
HMS *Drury*	23 November 1943	Sank *U-648* with HMS *Bazely* and HMS *Blackwood* (this is a disputed sinking according to U-boat.net's records)
	21 April 1945	Sank *U-636* with HMS *Bazely* and HMS *Bentinck*
HMS *Foley*	21 November 1943	Sank *U-538* with HMS *Crane*
HMS *Garlies*	1 March 1944	Sank *U-358* with HMS *Affleck*, HMS *Gore and* HMS *Gould*

HMS *Gore*	26 February 1944	Sank *U-91* with HMS *Affleck* and HMS *Gould*
HMS G*ould*	26 February 1944	Sank *U-91* with HMS *Affleck* and HMS *Gore*
HMS *Grindall*	15 April 1945	Sank *U-285* with HMS *Keats*
HMS *Keats*	27 January 1945	Sank *U-1172* with HMS *Bligh* and HMS *Tyler*
	15 April 1945	Sank *U-285* with HMS *Grindall*
HMS *Louis*	24 August 1944	Sank *U-445*
HMS *Manners*	26 January 1945	Sank *U-1051* with HMS *Aylmer*, HMS *Bentinck and* HMS *Calder*

Long-Hulled Group

HMS *Affleck*	26 February 1944	Sank *U-91* with HMS *Gore* and HMS *Gould*
	1 March 1944	Sank *U-358* with HMS *Garlies*, HMS *Gore* & HMS *Gould*
	16 March 1944	Sank *U-392* with HMS *Vanoc* and Catalina aircraft
HMS *Aylmer*	6 May 1944	Sank *U-765* with HMS *Bickerton*, HMS *Bligh* and two Fairey Swordfish from HMS *Vindex*
	26 January 1945	Sank *U-1051* with HMS *Bentinck*, HMS *Calder* & HMS *Manners*
HMS *Balfour*	18 July 1944	Forced *U-672* to the surface and later sank
HMS *Bentinck*	26 January 1945	Sank *U-1051* with HMS *Aylmer*, HMS *Calder &* HMS *Manners*
	8 April 1945	Sank *U-774* with HMS *Calder*
	21 April 1945	Sank *U-636* with HMS *Bazely* and HMS *Drury*
HMS *Bickerton*	6 May 1944	Sank *U-765* with HMS *Aylmer*, HMS *Bligh* and two Fairey Swordfish from HMS *Vindex*
	25 June 1944	Sank *U-269*
HMS *Bligh*	6 May 1944	Sank *U-765* with HMS *Aylmer*, HMS *Bickerton* and two Fairey Swordfish from HMS *Vindex*
27 January 1945	Sank *U-1172* with HMS *Tyler* and HMS *Keats*	
HMS *Braithwaite*	3 February 1945	Sank *U-1279* with HMS *Bayntun* and HMS *Loch Eck*
	14 February 1945	Sank *U-989* with HMS *Bayntun*, HMS *Loch Dunvegan* and HMS *Loch Eck*
HMS *Byard*	17 October 1943	Sank *U-841*
HMS *Byron*	27 March 1945	Sank *U-722* with *HMS Fitzroy and* HMS *Redmill*
8	April 1945	Sank *U-1001* with HMS *Fitzroy*
HMS Calder	26 January 1945	Sank *U-1051* with HMS *Aylmer*, HMS *Bentinck &* HMS *Manners*
	8 April 1945	Sank *U-774* with HMS *Bentinck*
HMS *Conn*	27 March 1945	Sank *U-905*
	30 March 1945	Sank *U-965* with HMS *Rupert*
HMS *Cotton*	29 April 1945	Sank *U-286* with HMS *Anguilla* and HMS Loch *Insh*
HMS *Curzon*	21 July 1944	Sank *U-212* with HMS *Ekins*
	22/23/December 1844	Sank E-Boat *S-912*
HMS *Duckworth*	30 June 1944	Sank *U-441* with HMS *Cooke,* HMS *Domett,* HMS *Essington* and a RAF Liberator (This has been reported as U-988 but U-Boat-net records this as having ben sunk by RAF aircraft on 22 June)
	14 August 1944	Sank *U-618* with HMS *Essington* and RAF Liberator

	24 February 1945	Sank *U-1208* with HMS *Rowley*
	26 March 1945	Sank *U-399*
	29 March 1945	Sank *U-1169* (once assumed to be *U-246*)
HMS *Ekins*	21 July 1944	Sank *U-212* with HMS *Curzon*
	I January 1945	Sank *Seehund* midget submarine
	12/13 April 1945	Sank two *Linsen* explosive motor boats
HMS *Essington*	30 June 1944	Sank *U-441* with HMS *Cooke,* HMS *Domett*, HMS *Duckworth* and a RAF Liberator (This has been reported as U-988 but U-Boat-net records this as having ben sunk by RAF aircraft on 22 June)
14 August 1944	Sank *U-618* with HMS *Duckworth* and RAF Liberator	
HMS *Fitzroy*	27 March 1945	Sank *U-722* with *HMS Byron and* HMS *Redmill*
	8 April 1945	Sank *U-1001* with HMS *Byron*
HMS *Redmill*	27 March 1945	Sank *U-722* with *HMS Byron and* HMS *Fitzroy*
HMS *Rowley*	27 February 1945	Sank *U-1208* with HMS *Duckworth*
HMS *Rupert* 3	0 March 1945	Sank U-965 with HMS *Conn*
HMS *Rutherford*	9 April 1945	Sank two E-Boats
HMS *Seymour*	3 July 1944	Sank *U-1191* with HMS *Onslaught*, HMS *Oribi*, HMS *Brissenden*, HMS *Wensleydale* and HMS *Talybont*.
	1 March 1945	Sank E-Boat *S-220*
HMS *Stayner*	5 August 1944	Sank *U-671* with HMS *Wensleydale*
	19 September 1944	Sank E-Boats *S-183, S-200* and *S-702* with HMS *MTB 724* and *728*
HMS *Torrington*	11 March 1945	Sank *Seehund* midget submarine
	13 March 1945	Sank Seehund midget submarine
HMS *Tyler*	27 January 1945	Sank *U-1172* with HMS *Bligh* and HMS *Keats*

Losses: (in chronological order)

Short-Hulled Group

HMS *Blackwood*	15 June 1944	Torpedoed by *U-764*, taken in tow and foundered next day
HMS *Capel*	26 December 1944	Torpedoed by *U-486* and sunk
HMS *Goodall*	29 April 1945	Torpedoed by *U-286*. Sunk by gunfire from HMS *Anguilla* next day
HMS *Goodson*	25 June 1944	Torpedoed by *U-984*, towed to port and declared a CTL
HMS *Gould*	1 March 1944	Torpedoed by *U-358* and sunk
HMS *Lawford*	8 June 1944	Bombed and sunk
HMS *Manners*	26 January 1945	Torpedoed by *U-1051*, towed to port and declared a CTL

Long-Hulled Group

HMS *Affleck*	26 December 1944	Torpedoed by *U-486*, towed to port and declared a CTL
HMS *Bickerton*	22 August 1944	Torpedoed by *U-354*. Sunk later by torpedo from HMS *Vigilant*
HMS *Bullen*	6 December 1944	Torpedoed by *U-775* and sunk

HMS *Dakins*	25 December 1944	Damaged by mine, reached port and declared CTL
HMS *Duff*	30 November 1944	Damaged by mine, reached port and declared CTL
HMS *Ekins*	16 April 1945	Damaged by mine, reached port and declared CTL
HMS *Halsted*	11 June 1944	Damaged by E-Boats, towed to port and declared CTL
HMS *Redmill*	27 April 1945	Torpedoed by *U-1105*, towed to port and declared CTL
HMS *Trollope*	6 July 1944	Torpedoed by E-Boat, beached, then towed to port and declared CTL
HMS *Whittaker*	1 November 1944	Torpedoed by *U-483*, towed to port and declared CTL

COLONY CLASS (in chronological order)

Wins:

HMS *Ascension*	25 November 1944	Sank *U-482*
HMS *Nyasaland*	17 December 1944 4 February 1945	Sank *U-772* Sank *U-1014* with HMS *Loch Scavaig and* HMS *Papua*
HMS *Papua*	4 February 1945	Sank *U-1014* with HMS *Loch Scavaig* and HMS *Nyasaland*
HMS *Labuan*	5 February 1945	Sank *U-327* with HMS *Loch Fada* and HMS *Wild Goose*
HMS *Anguilla*	29 April 1945	Sank *U-286* with HMS *Cotton &* HMS *Loch Insh.*

Losses:

No Colony Class frigates were lost in action

General Note: There are some discrepancies in the records as to U-boat sinkings. Where questioned, I have relied on the records of www.u-boat.net as I believe these are the most accurate.

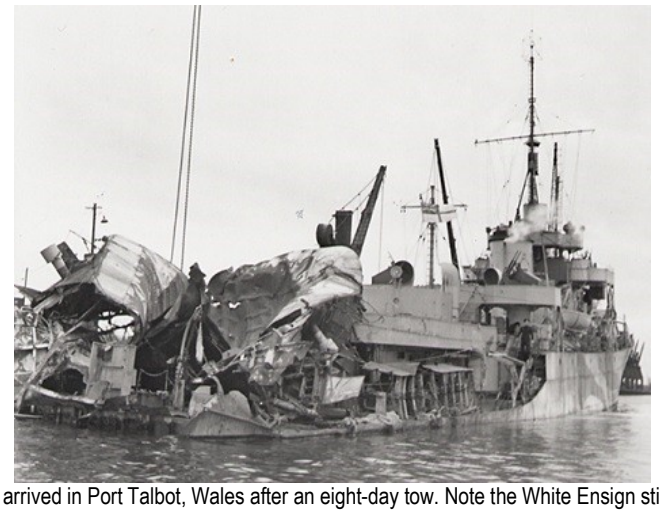
WINS & LOSSES TABLE

Class	Number Built	Number Lost	% Lost	U-Boats Destroyed	Kill Ratio
RIVER (exludes RAN ships)	127	10	7.8	22	5.77:1
LOCH	28	0	0	13*	2.15:1
CAPTAIN	78	17	21.8	28	2.78:1
COLONY	21	0	0	5	4.2:1
	254	27	10.6	68	3.74:1

*Includes one forced to surface and surrender

On this basis, the Loch Class was the most successful but it should be remembered that they had the double Squid. The Captain Class owed their success probably to the fact that they were able to operate in homogenous Escort Groups. Conversely, their high loss ratio was due almost exclusively to the GNAT.

HMCS *Chebogue* after being torpedoed by a GNAT fired from U-1227 on 4 October 1944, 800 miles west of Britain. [forpositerityssake.ca]



HMCS *Chebogue* , probably after having arrived in Port Talbot, Wales after an eight-day tow. Note the White Ensign still flying and she still has boilers operating. [forpositerityssake.ca]

Damage to the port side of HMCS *Chebogue*. [forpositerityssake.ca]

CHAPTER 11 SUMMARY AND CONCLUSIONS

Considering how superior the River Class and their derivatives were to the Flower Class – as sea-boats and as weapons platforms - the immediate conclusion one would come to is that these should have been built instead of the Flower Class. Hindsight's a wonderful thing. Twenty-twenty vision. It's always infallible. That they were too little, too late is undeniable and unfortunate. One can only ponder what might have been the result had the Admiralty been more attuned to the need for this type of anti-submarine ship a few years earlier and put them in production at the same time and in place of the Flower Class. Without wishing in any way to diminish the fine record and contribution that the Flowers did make to the Battle of the Atlantic, and beyond for that matter, some statistical evidence bears inspection. Brown makes the following observation: *"The Rivers were much more successful 'killers' than the Flowers but they used twice as many resources without scoring twice as many kills."* [1] His table on the previous page of his book attributes 38 kills to Flowers and 5 to their larger replacements, the Castles. [2] Against this total of 43 (all single-engined corvettes) he lists 22 to Rivers, 12 to Lochs, 28 to Captains and 5 to Colonies for a total of 67. (The Loch total does not seem to include U-1024 forced to the surface and surrender). These results must be seen in the light of the fact that most of the frigates were progressively commissioned and introduced into service after being worked up after the May 1943 peak when the Battle of the Atlantic turned in the Allies' favour.

What these figures do not tell us is how many more kills the Rivers and their derivatives might have made, as compared with the Flowers, had they been available at the same time and in place of the Flowers. Would their better range, their higher speed – although by no means considered fast - their better sea-keeping, their better armament, have made up that difference that Brown alludes to? My own opinion – and it is only that – is that they would have out-scored the Flowers. It's the old battle of technology versus quantity. Which wins? Sometimes one, sometimes the other. The Russian T 34 tank like the American M4 Sherman tank was available in far greater numbers than the technically superior German Panzer V Panther and Panzer VI Tiger tanks but had to suffer a higher loss ratio to achieve success. Critics of this opinion will say it does not take into account the fact that two Flowers operating together – as compared to one River working alone – may have been more effective in keeping a U-boat submerged or, indeed, in finally neutralising it. But, how often did a convoy have the luxury of allowing two such escorts to pursue one contact and for any length of time, given their slow speed to regain the convoy? The superior qualities of the River - its ability to continue the fight in rough weather, its large depth charge load, its higher turn of speed and its far greater range – were sufficient to make the difference in justifying the extra resources *vis a vis* the lower technology Flower Class.

But, of course, the Rivers led to the superior Lochs – superior in that they were meant to be quicker and simpler to build; something that did not in fact materialise to the extent that was hoped for. But they were certainly considerably superior insofar as their antisubmarine outfit was concerned. The twin Squids were a quantum leap over the Hedgehog which had its teething problems due to being rushed into service with insufficient training and incurring unfair scepticism. Had the German XXI (118 built) and XXIII (63 built) submarines come into full production with their high underwater speed and greater endurance, the Lochs would have been found seriously wanting – indeed, only the 24-knot American Buckley or Rudderow type DEs would have been any match, and only then if fitted with twin Squids in place of the "B" mount 3-inch/50 cal. It is interesting to contemplate just why the superior performance of the Squid – a 60% kill rate ultimately - was not immediately embraced by the USN. One could argue that by the time Squid was up and fully operational and proving itself the USN was predominately involved in the Pacific war which was, essentially, an anti-aircraft rather than an anti-submarine war. Hedgehog and depth charges were more than sufficient to deal with the relatively limited threat posed by an ineffective Japanese submarine force that never adopted German tactics, particularly the wolf-pack. Also, USN training and doctrine on the use and application of the Hedgehog was not jaundiced like the RN's approach had been in the early stages when Hedgehog was regarded as some sort of new-fangled gimmick and the old methods of dropping lots of depth charges was still regarded as being the best tactic. Squid was tried in USS *Asheville,* one of the two Canadian-built River Class frigates transferred to the USN in a strange twist of was tantamount to a reverse Lend Lease, in 1944. Even if the results may have not been encouraging enough to equip USN ships then, ten years later USS *Dealey* mounted two Squids. *Dealey* was the lead ship in the class of thirteen destroyer escorts which replaced the war-time-built DEs and it seems a little odd that the USN would think of introducing Squid to a new class of warship with a weapon they had effectively rejected ten years earlier, especially so when Squid's replacement, the more effective Limbo (A/S Mk 10), was about to come into service. *Dealey* was the only ship equipped with Squid - the other twelve of the class mounted a Mark 108 Weapon Able/Alpha firing a RUR-4A anti-submarine rocket. This weapon remained in service into the late 1960s.

In May 1943 the tide turned in the Battle of the Atlantic – just as the number of escorts becoming available was increasing from a relative trickle of slow Flower corvettes to an increasing flow of twin-screw frigate types. But, through September 1939 to May 1943 – over two-and-a-half years – it had been the Flowers, the converted trawlers, the pre-war sloops, the V & W destroyers that had borne the brunt of the Battle of the Atlantic. It is to them that so much credit is due.

But one can't simply look at the number of U-boats lost in the respective months as a barometer. To do so ignores the fact that as U-boat production increased, so did anti-U-boat production increase and, with it, the technology to defeat the U-boat. That more U-boats were lost after May 1943 does not in any way belittle the contribution made as I describe, above.

This sounds like I am defending corvettes *et al* and attacking frigates. I am not. The River Class frigate was an inspiration. It was just too late an inspiration. It was typical of the Admiralty to have its head in the sand and not have given sufficient attention to the possibility of the World War I Atlantic scenario repeating itself. I emphasise sufficient attention because the Admiralty did give it some attention. The Black Swan Class sloops were a masterpiece: great sea-boats, well-armed – just too expensive and slow to build, particularly in time of war. The Kingfisher Class and derivatives were too small for ocean work. The Flower Class were meant for coastal work but ended up being trans-Atlantic escorts. The venerable V & W Class destroyers from late World War I and early post-war were converted to escort destroyers of varying types. But how is it the Admiralty did not think further ahead? Why did it take until a conference on 27th November 1940 for someone to extract the proverbial digit? If this had instead been 27th November 1938 – two months after Prime Minister Neville Chamberlain's *"Peace in or time"* Munich Agreement – then things would have worked out a lot differently. The Battle of the Atlantic may have been fought with a lesser number of escorts – on the basis that they used twice as many resources as Flowers - but it would have been fought with ships that were more efficient, manned by crews that were less fatigued by the pitching and rolling of the Flowers, by ships that carried a bigger load of depth charges on a faster and steadier platform, with far greater range and generally better armament.

The River Class design was not perfect, but neither was the Loch Class – just better. Brown doesn't hold back. He says they were one of the all-time great designs. [3] But the River Class was good enough for ten of them to be ordered from Canadian shipyards for the USN and for two of them (*Asheville* and *Natchez*) to be commissioned into the USN – the remaining eight transferred under Lend-Lease to the RN. Also, it was good enough for the large New York firm of naval architects, Gibbs & Cox, to take the basic design and adapt it to welded construction and for the American shipyards to turn out 96 of them as the Tacoma Class of which the USN commissioned 75 and 21 were transferred to the RN as the Colony Class. And forty-four of the Tacoma Class were used as weather ships. What do those facts say about the River Class credentials? Yes, they had antiquated machinery, something from a by-gone era in many ways. But they were tough. They survived storms. They plugged on when others might have turned back. And they did their job – what was expected of them, and more.

So, where does this place the Captain Class in the panoply of World War II's frigates? Being last to arrive – in that they were designed last as distinct from, say, the Lochs and Bays which while generally contemporaneous were developments of an earlier design - they should have incorporated all the lessons learnt, but didn't. Their failings started on the drawing board (stability), continued into their delays in eventually getting into production, only the turbo-electric version delivered a respectable speed and they never mounted a credible armament – that is, no Squid and the ineffective 3-inch guns. Their saving grace was that they were quickly available, and in numbers, albeit too late to make a difference in a battle that was largely won by the time the Captains were in service. That they collectively sank 28 U-boats is a much-under-rated contribution. Admittedly most of these were in the company of other frigates, particularly sister-ships because they operated as homogenous escort groups. But this tended to be the trend by the time they were operational. Tactics changed as more dedicated anti-submarine vessels became available. The one-on-one battles of 1939-1942 had passed, and so had the experienced U-boat skippers. Just as Germany was losing experienced men, the Allies were gaining more and more.

The fact that the proposed conversions of Captain Class frigates to dedicated ASW and Fighter Direction versions never took place was due to their not being needed as a result of a change of circumstances, not any deficiencies in their capabilities. On the face of it, both would probably made serviceable contributions.

The Colony Class played their part too. It's hard to see them in any light other than slightly differently armed but better electronically equipped versions of the River Class which, by the time the Colonies were fully in service, were heading for or had already gone to serve in the Persian Gulf and Indian Ocean.

Whatever their misgivings, good bad or indifferent, the frigates that were essentially the creation of Battle of the Atlantic were essential to winning that battle. Could it have been won without them? No, I don't think so. Mathematically it was not possible. The issue was a simple one. Stop U-boats sinking merchant ships faster than they can be replaced and sink U-boats faster than they can be replaced. To address both, more escorts were needed – and they had to be effective over the whole of the North Atlantic and in all weathers. To simply build more Flower Class corvettes, or more Castle Class corvette replacements, was not going to properly address the problem. Only the long-range, all-weather "depth charge platforms" offered by the frigates - whatever their breed – was going to achieve this.

That the Rivers, Lochs, Bays, Captains and Colonies didn't linger in service as anti-submarine frigates after the war ended was due to the progress made in the war's closing stages in submarine design by way of higher submerged speeds and the war-built frigates' inability to cope with this new threat. Newer, faster ships were needed to replace them – and quickly as the Soviet submarine threat intensified. This saw conversions of war-built destroyers and a new breed of frigates. A new race for frigates was on again.

I'll end this book with the quote I commenced it with for it is just so appropriate when Rear Admiral Sir Horatio Nelson wrote to Earl Spencer (First Lord of the Admiralty) six days after the Battle of the Nile ended:

My Lord, Mouth of the Nile, 9th August, 1798.

Was I to die this moment, 'Want of Frigates' would be found stamped on my heart. No words of mine can express what I have, and am suffering for want of them.

I wonder how many times those words were re-quoted in Britain or on the Atlantic in World War II?

1. David K Brown, *Atlantic Escorts: Ships, Weapons & Tactics in World War II*, p.157
2. Ibid, p.156

GLOSSARY

3-inch 50 cal Mk 20-22 — The American 3-inch naval guns dated back to World War I and were considered to be dual-purpose (anti-surface/anti-aircraft) they were of limited effectiveness in either role. While the projectile was 13 lbs, the bursting charge was only 0.3-0.74 lbs, depending on type. (See Appendix I)

4"/50 cal — This low-angle gun was used in the United States Navy's World War I emergency-build destroyers – the "four pipers" or "flush deckers" as they became known, fifty of which were transferred to Britain in September 1940 in the Destroyers For Bases Agreement. Since many of these guns were removed to reduce topweight they found their way on to Defensively Equipped Merchant Ships (DEMS).

5"/38 cal — This dual-purposes, high angle-low angle (HA/LA) gun was the main gun on United States Navy destroyers, most aircraft carriers, anti-aircraft cruisers and the secondary armament on most battleships and cruisers. It was extremely versatile, capable of a high rate of fire despite the projectile and charge being separate and was probably the best gun of its size at the time.

AA — Anti-Aircraft

"A" POSITION etc. — In British ships, main armament positions – almost invariably on the centreline of the ship - were given alphabetical designations starting with "A" and "B" at the bow and finishing with "X" and "Y" at the stern. Midships turrets usually had something like a "Q" designation. The reason the designations did not follow the alphabet was to ensure that when giving orders, the names sounded sufficiently distinct so they would not be confused.

ASDIC — This was the primary device for detecting submarines via echo-location. Called Sonar by the USN. The most common types used by the RN's frigates during World War II were:

Type 127	This was designed for convoy sloop and was the first type to be fitted with a bearing plotter.
Type 128	This was the next development and had a range recorder.
Type 141	This was exclusive to the Town Class destroyers from America.
Type 144	This was in use from mid-1942 and had a visual bearing recorder which provided a memory of the bearing of echoes received. It was the first set specifically intended for the ahead-throwing weapons like Hedgehog.
Type 144Q	This was a variation of Type 144. With Type 147B the ultimate war-time ASDIC
Type 147	This had a steerable beam which was broad in the horizontal plane but vertically shallow and was designed to work with Squid.
Type 147B	This was a variation of Type 147. Also referred to as Sword due to the shape of the transducer which was placed ahead of the Type 147 transducer.
Q Attachment	In use from 1943, the opposite of Sword in that the beam was very narrow – again about 3-degrees – but the wedge shape was in the long fore and aft plane. It could be retro-fitted to Types 127, 128 and 144.

ATW — Ahead Throwing Weapon (such as Hedgehog or Squid) designed to project anti-submarine missiles ahead of an attacking ship's path.

AW — Air Warning – as in Air Warning radar. Air-Search was another term used.

Cal/cal	Abbreviation for calibre, being either the ratio of the bore of the barrel of a gun to the length of the barrel (as in the USN 4"/50 cal meaning the barrel length was 50 times 4-inches or 200-inches) or, as in the case of the .50 cal Browning HMG, the bore, or calibre, was ½-inch.
Carley Float	A life-raft made from a steel or copper inner tube, divided into watertight sections and covered in a buoyancy material such as cork in turn covered in painted canvas with a floor of webbing or slatted wood. They came in various sizes and shapes.
Commissioning	The act or ceremony of placing a warship into active service.
CTL	Constructive Total Loss: the cost of repair of a damaged ship is more than the value of the ship.
Bofors	The Swedish armaments manufacturer whose name was simply used to describe its famous 40mm anti-aircraft gun that was made under licence. The first models were simple single-barrelled air-cooled models but were developed by the licensees into two and four-barrelled water-cooled versions.
DC	Depth Charge, a drum-shaped canister filled with high explosive detonated via a hydrostatic valve set at pre-determined depths.
DCT	Depth Charge Thrower, hydraulic or explosively detonated projector to launch a depth charge clear of a ship. Called a Depth Charge Projector in USN ships.
Decommissioning	The act or ceremony of taking a warship out of active service. Sometimes referred to as Paid Off.
Depth Charge Chute	A simple way of stowing one or two depth charges for dropping over the stern.
Depth Charge Rail	A frame for stowing a series of depth charges so that they can be released as and when required over the stern. In USN these were termed a Depth Charge Rack.
DF	Direction Finder (more particularly MFDF or MF/DF for Medium Frequency Direction Finder to distinguish it from the later, HF/DF High Frequency Direction Finder) an electronic device for homing in on and thereby obtaining the bearing of a radio source. Sometimes called RDF or Radio Direction Finding/Finder. The square-shaped aerial was Type FM 12 or Outfit FM 12.
Displacement	By the Archimedes' Principle: the weight of the water displaced by the vessel when floating.
Flag Superior	The letter that prefixes a pennant/pendant number indicating a flotilla or class or type of ship.
Flag Inferior	The letter that follows a pennant/pendant number indicating a flotilla or class or type of ship, usually of a minor nature.
Foxer	A decoy device consisting of two parallel pipes towed behind a ship to produce a noise sufficient to distract a GNAT torpedo from homing in on the noise created by the ship's propellers.
Full Load	That is, Full Load Displacement, the weight of the water displaced by the vessel when floating at its greatest allowable draft.
GNAT	An anacronym for German Nany Acoustic Torpedo (more particularly the G7es T5 *Zaunkönig* or Wren) – a particularly deadly torpedo devised in service from 1943 that homed in on the noise created by a ship's propellers.
HA	High Angle, anti-aircraft capable only.
HA/LA	High Angle/Low Angle, capable of both surface and anti-aircraft action.
Hedgehog	A 24-spigot anti-submarine mortar firing 7" diameter contact-fused projectiles with a 35lb charge. Spigots were arranged to give a 40 yd diameter circle at approximately 200 yards ahead of the ship.

HF/DF	High Frequency Direction Finder – "Huff Duff" – which was able to obtain the bearing of even very short transmissions. A "game-changer" in the Battle of the Atlantic allowing escorts to home in on U-boats transmitting to base or each other. FM 3 was introduced in 1942, FM 4 in 1943 with a cathode ray display.
HMG	Heavy Machine Gun, such as the .50 cal Browning or .5-inch Vickers.
IHP	Indicated Horsepower; applies, primarily, to VTE engines and is not to be confused with SHP.
IFF	Identification Friend or Foe; an electronic system to establish via interrogation signals the identity of aircraft, ships etc.
LA	Low Angle, surface action capable only.
Laid Down	The term applied to the keel being laid down which was traditionally the first and major structural item on which the rest of the framework of the ship was constructed.
Launched	Ships are seldom launched in a completed state – that is, fully fitted out. The slipways are needed for the next ship so ships are launched when they are substantially complete and moved to fitting-out berths.
LBP	Length Between Perpendiculars. (See P.P., below)
LOA	Length Overall.
LWL	Length on Waterline.
MF/DF	See DF.
MG	Machine-Gun.
mm	Millimetre, in this case the calibre, the bore, of the weapon.
Montagu Whaler	The standard rowing/sailing ships' boat in service for seventy years, 27-feet long, highly seaworthy, double-ended and clinker construction.
Oerlikon	A Swiss armament manufacturer but the name more commonly used to describe their high-velocity 20-mm cannon made under licence in large numbers in Britain and the USA primarily as a light, short-range, anti-aircraft weapon. (See Appendix J)
P.P.	Length Between Perpendiculars, is the length of a ship along the waterline from the forward surface of the stem, or main bow perpendicular member, to the after surface of the sternpost, or main stern perpendicular member. Also referred as LBP or BP.
PPI	Plan & Position Indicator; Introduced in 1942 and what we think of as normal today by way of a circular radar screen showing the targets – that is, coastline, other ships, navigational marks, etc. – "painted" as glowing marks on the screen. Prior to this invention, radar signals had to be interpreted on a cathode ray tube as blips in a straight line – an "A" trace (or "*grass*" as it was called) running across the tube.
Paid/Paying Off	The process leading up to decommissioning when the ship is de-stored and the crew is "paid off".
Pendant Number	Pronounced Pennant Number; the numbers or letters or combinations of numbers and letters used to identify individual ships.
Pom-pom	The name is derived from the sound the Vickers 40mm QF 2-pounder Mk II made when fired. It was, in effect, an oversized Maxim machine gun. The later Mk VIII model was made in single, quad and eight-barrel mountings and capable of a high rate of fire.
Proximity Fuse	A miniature radar-like device embedded in the nose of a shell causing it to explode in the vicinity of aircraft, mainly, but could be used in bombardment for air-bursts.

Q Attachment	This was an additional ASDIC set from 1943 which enabled contact to be maintained with deep targets at short ranges and also minimized the dead zone via a narrow fan-shaped beam.
QF	Quick Firing uses fixed ammunition where the projectile and propellant are in one piece offering a higher rate of fire as distinct from Breach Loading (BL) where the projectile and propellant are separate and slower to load.
QF 12-pounder 12 cwt	This weapon dated back to 1894. Twelve pounds (12-pdr) was the weight of the projectile and 12 hundredweight (12cwt) the weight of the barrel and breech. It was not a Quick Firing gun in the true sense of the word in that the projectile and propellant were separate but they were loaded together on a special tray although it did achieve 15 rounds per minute. The gun stayed in production throughout World War 2 with improvements, such was demand.
QF 2-pounder Mk VIII	A single-barreled, manually-operated and updated version of the QF 2-pounder Mk II commonly referred to as a pom-pom from the noise it made when firing. Usually replaced by 20mm Oerlikon or, later, 40mm *Bofor*s.
Radar	Originally called RDF - Range and Direction Finding – but the acronym came from RAdio Detection And Ranging. It is an object-detection system that uses radio waves to determine the range, angle, or velocity of objects via a transmitter producing electromagnetic waves through an emitting antenna and a receiving antenna to capture any returns from objects in the path of the emitted signal plus a receiver and processor to determine the properties of the object.
RCN	Royal Canadian Navy
RDF	Radio Direction Finder
RN	Royal Navy
RNR	Royal Naval Reserve; at the time of WW II, it was a volunteer reserve force formed mainly from professional merchant seaman officers.
RNVR	Royal Naval Volunteer Reserve; this was a “hostilities only” volunteer force of officers formed mainly from volunteers with some form of seagoing experience, however slight.
R/T	Radio Telephony.
SA	A type of USN Air-Search/Air-Warning radar.
SC	A type of USN Air-Search/Air-Warning radar.
SG	A type of USN Surface-Warning radar. The antenna was a revolving compact, dished rectangular plate
Shark	A specially developed anti-submarine projectile fired from 4-inch guns and designed to enter the water short of the submarine. The trajectory was maintained by special spoiler rings. A hardened nose-cone could pierce the submarine’s pressure hull and allow the 24-pounds of Torpex to explode internally.
SHP	Shaft Horsepower: is the power delivered to the propeller shafts of a steamship This measure is not commonly used in the automobile industry, because in that context drive train losses can become significant.
Signal Projector	Signalling lamp, usually 6-inch or 10-inch diameter for signalling by light using Morse but the larger ones (20-inch, 24-inch) were primarily used as searchlights.
SL	A type of USN Surface-Search radar. The antenna was contained in a compact saucepan-shaped dome of about 4-feet diameter.
Splinter Matting	A protection of limited value consisting, mainly, of a canvas envelope containing compressed coir (or similar material) designed to stop the penetration of shell splinters. Used to protect exposed gun positions, navigation bridges etc.

Squid	A three-barrelled anti-submarine mortar developed as a replacement to the Hedgehog. Squid fired three much heavier depth charges (390 pounds) about 275 -300 yards ahead of the ship and landed in a triangular pattern. The charges could be set to explode at a required depth, moments before firing with input direct from the ship's ASDIC, a Type 147.
Standard	That is, Standard Displacement, the weight of the water displaced by the vessel complete, fully manned, engined, and equipped ready for sea, including all armament and ammunition, equipment, outfit, provisions and fresh water for crew, miscellaneous stores, and implements of every description that are intended to be carried in war, but without fuel or reserve boiler feed water on board.
SW	Surface Warning – as in Surface Warning radar.
SW1C/SW2C	A Canadian radar with an antenna characterised by a "Y"-shaped antenna with a horizontal bar projecting forward over the top. Developed at the same time in ignorance of the parallel development of centimetric Type 271.
Sword	Another name for Type 147B ASDIC. (See earlier)
TBS	Talk Between Ships; low-powered, line-of-sight VHF radio system.
Tumblehome	A term used to describe a ship's hull where the actual beam of the hull is wider than the deck in such a way that the sides of the hull slope inwards towards the deck. In the days of timber construction, it provided greater strength.
Type 242	An IFF aerial, sometimes called Outfit ASB Type 242. (See IFF) Often seen on top of the Type 271 radar lanterns.
Type 253	An IFF aerial, sometimes called Outfit 252, a distinctive egg-timer shape.
Type 271	The original naval centimetric target indication radar British design Surface-Warning radar made possible by the invention of the cavity magnetron, its antenna readily recognisable in a drum-shaped, teak-framed "lantern".
Type 272	Improved versions of Type 271, mainly allowing the antenna and the radar "office" to be separated as wave guides improved. The first Royal Navy radars to use a PPI – Plan Position Indicator. These versions were identified by the antenna being in a slightly smaller, simpler lantern or perspex drum.
Type 277	A further step in the evolution of centimetric surface-warning radar with a parabolic dish antenna that could be steered and tilted for height-finding. Type 277P had a circular antenna and Type 277Q had a tall, spherical paraboloid antenna with clipped sides.
Type 282	Decimetric fire control radar for 40mm Bofors or quad "pom-pom" mounts.
Type 285	Fire control radar fitted to rangefinder-directors with six element Yagi antennae with separate transmit and receive.
Type A286	An Australian-derived air-search radar with an antenna that could be mistaken for the American SC, it was derived from the LW/AW (Light Weight/Air -Warning) system with a special antenna designed by the NSW Government Railways.
Type 286	Metric target indication radar based upon RAF ASV (Air to Surface Vessel) Mark II set. Type 286M had fixed antennas, with a central transmitting and a receiving on either side to give some indication of contact bearing. The antennas were fixed and it received echoes from a target over an arc covering about 60 degrees on each side of the bow and also over a similar arc astern at considerably shorter ranges (back echoes), effective scanning being achieved by conning the ship resulting in a weaving course. The aerial had to be very high above the surface of the sea before any considerable range could be obtained on small objects. This limited the effectiveness against U-boats of early radar sets on ships but was more effective against aircraft and was officially regarded as an Air Warning (AW) radar. It was useful for escorts regaining a convoy and for station-keeping in convoys. Type 286P was manually rotated.

Type 291	A derivative of Type 286 radar, small-ship search radar. The original Type 291 had a hand-steered antenna, replaced by Type 291M with power training and plan position indicator, PPI.
Type 293	Centimetric Target indication radar. The cheese-shaped antenna was 6-feet diameter for Type 293, 8-feet diameter for Type 293P and 12-feet diameter for Type 293Q.
USCG	United States Coast Guard
USN	United States Navy
Wheezers & Dodgers	The Department of Miscellaneous Weapons Development, developers of, amongst other things, the Hedgehog.
W/T	Wireless Telegraphy

BIBLIOGRAPHY

PUBLISHED SOURCES:

PUBLISHED SOURCES:

Boniface, Patrick — *Loch Class Frigates,* Maritime Books, Cornwall, 2013

Brown, David K. — *Atlantic Escorts: Ships, Weapons & Tactics in World War II*, Pen & Sword Books, Barnsley, North Yorkshire 2007

Brown, David K. — Nelson to Vanguard: Warship Design and Development 1923-1945, Pen & Sword Books, Barnsley, North Yorkshire 2000

Concannon, J.A. — *Shipbuilding at Walkers Limited, Maryborough, Qld, Australia, 1877-1974*, Maryborough District Family Historical Society Inc., 2009

Friedman, Norman — *British Destroyers & Frigates: The Second World War and After*, Pen & Sword Books, Barnsley, North Yorkshire 2006

Friedman, Norman — *Naval Anti-Aircraft Guns & Gunnery*, Pen & Sword Books, Barnsley, North Yorkshire 2013

Friedman, Norman — *Naval Radar*, Conway Marine Press, London, 1991

Friedman, Norman — *U.S. Destroyers; An Illustrated Design History*, Pen & Sword Books, Barnsley, North Yorkshire 2004

Harding, Richard, (Editor) — *The Royal Navy 1930-1990: Innovation and Defence*, Frank Cass, Oxford, 2005

Hendrickson, David — *The Patrol Frigate Story, The Tacoma-class frigates in World War II and the Korean War 1943-53,* Fortis Publishing, Virginia, 2011,

Henshaw, John — *Town Class Destroyers: A Critical Assessment*, Crowood Press, Marlborough, 2018

Lavery, Brian — *River-class Frigates and the Battle of the Atlantic: A Technical and Social History,* National Maritime Museum, London, 2006

Lenton H.T. & Colledge J.J. — *Warships of World War II.* Ian Allan, London 1964

Macintyre, Captain Donald

U-Boat Killer, Weidenfeld and Nicolson, London 1956

Macpherson, Ken — *Frigates of the Royal Canadian Navy 1943–1974,* Lewiston, New York, Vanwell Publishing, 1989

Pawle, Gerald — *The Secret War 1939-45*, George G Harrap, London, 1956

Preston, Antony, (Consultant Editor) — *Fighting Ships of the World, An Illustrated Encyclopedia of Modern Sea Power*, Phoebus Publishing Company, London, 1980

Roskill, S.W. — *The War At Sea, 1939-1945, Volume 2, The period of Balance,* His Majesty's Stationery Office, 1956

Ross, Al. — *Anatomy of the Ship, The Destroyer Escort England*, Conway Maritime Press Ltd., London, 1985

Sternhell, Charles M & Thorndike, Alan M, — *Operations Evaluation Group Report No. 51, ASW In World War 2,* Office of Chief of Naval Operations, Washington, DC, 1946

Terraine, John — *Business in Great Waters: The U-Boat Wars 1916-1945*, Mandarin Paperbacks, London 1989

Tucker, G. N. — *The Naval Service of Canada; Its Official History Vol II Activities On-Shore During WW2*.

Ward, John R. — *The Little Ships that Could*, Invention and Technology, Fall 1999

Wright, Malcolm — *British and Commonwealth Warship Camouflage of WWII; Destroyers, Frigates, Escorts, Minesweepers, Coastal Warfare Craft, Submarines & Auxiliaries*, Pen & Sword Books, Barnsley, North Yorkshire 2014

ELECTRONIC SOURCES:

www.captainclassfrigates.co.uk

www.desausa.org

www.forposterityssake.ca

www.hazegray.org

iwm.org.uk/collections

www.rnmuseumradarandcommunications2006.org.uk

www.naval-history.net

www.navsource.org

www.uboat.net

www.worldnavalships.com

APPENDICES

APPENDIX A

FRIGATE CLASSES DATA COMPARISONS TABLE

	Admiralty Nov 1940	River Class	Loch Class	Bay Class	Captain Class (short-hull)	Captain Class (long-hull)	Colony Class
LOA	n/a	301'3"	307'3"	307'3"	289'6"	306'	304'
LBP	283'	n/a	n/a	n/a	n/a	n/a	285'6"
Beam	36'	36'6"'	38'6"'	38'6"	35'	37'	37'6"
Draft	10'6"	13' (deep)	13'3" (deep)	13'3" (deep)	10'9"	12'6"	13'3" (deep)
IHP	2 x 5,500	2 x 5,500	2 x 5,500	2 x 5,500	n/a	12,000	2 x 5,500
SHP	n/a	n/a	2 x 6,500*	n/a	6,000 x 2**	n/a	n/a
Disp	1,600 (std)	1,370 (std)	1,435 (std)	1,435 (std)	1,150 (std)	1,300 (std)	1,509 (std)
		1,855 (deep)	2,260 (deep)	2,260 (deep)	1,450 (deep)	1,840 (deep)	2,238 (deep)
Speed	20 knots	19.5 knots	20/20.5 **knots	20 knots	20 knots	24 knots	20 knots
Range	n/a	5,000 @ 15	7,000 @ 15	7,000 @ 15	4,670 @ 14	3,870 @ 14	6,400 @ 14
Guns***	1 x 4"	2 x 4"	1 x 4"	4 x 4"	3 x 3"	3 x 3"	3 x 3"
	2 x 2-pdr	2 x 2-pdr	4 x 2-pdr	4 x 40mm	2 x 40mm	2 x 40mm	4 x 40mm
	2 x .303"	2 x 20mm	6 x 20mm	4 x 20mm	9 X 20mm	8 X 20mm	9 x 20mm
DCT	4	8	2	4	4	4	4
ATW	nil	Hedgehog	Squid x 2	Hedgehog	Hedgehog	Hedgehog	Hedgehog
Crew****	n/a	114-151	114-151	157	198	200	220

*Turbine-engined
** Diesel-electric engined
*** Designed armament, actual varied
****Complements varied as armaments and electronics increased

APPENDIX B

RIVER CLASS FRIGATES
By Laid Down Dates

SHIP	PEN NO.	BUILDER	LAID DOWN	LAUNCHED	COMPL	DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
ROYAL NAVY									
HMS Exe	K92	Fleming & Ferguson Ltd., Paisley	16/05/1941	19/03/1942	06/08/1942	307	140	447	Sold for scrap, 20 Sept 1956
HMS Rother	K224	Smiths Dock Co., South Bank-on-Tees	26/06/1941	20/11/1941	03/04/1942	147	134	281	Scrapped 22 Apr 1955
HMS Itchen	K227	Fleming & Ferguson Ltd., Paisley	14/07/1941	29/07/1942	28/12/1942	380	152	532	Torpedoed and sunk by U-666, 23 Sept 1943
HMS Spey	K246	Smiths Dock Co., South Bank-on-Tees	18/07/1941	18/12/1941	19/05/1942	153	152	305	Transferred to Egypt, 1948, scrapped 1990
HMS Test	K239	Hall, Russell & Company, Aberdeen	15/08/1941	30/05/1942	12/10/1942	288	135	423	Transferred to India 1947, returned 1955, scra
HMS Swale	K217	Smiths Dock Co., South Bank-on-Tees	19/08/1941	16/01/1942	24/06/1942	150	159	309	Transferred to South Africa 1945, returned 19
HMS Ness	K219	Henry Robb Ltd., Leith	03/09/1941	30/07/1942	22/12/1942	330	145	475	Scrapped Sept 1956
HMS Nith	K215	Henry Robb Ltd., Leith	05/09/1941	25/09/1942	16/02/1943	385	144	529	Transferred to Egypt 1948, sunk 31 Oct 1956
HMS Dart	K21	Blyth Shipbuilding & Drydock, Blyth	08/09/1941	10/10/1942	15/05/1943	397	217	614	Scrapped 1957
HMS Tay	K232	Smiths Dock Co., South Bank-on-Tees	10/09/1941	18/03/1942	05/08/1942	189	140	329	Scrapped 28 Sept 1956
HMS Kale	K241	A. & J. Inglis Ltd., Glasgow	22/09/1941	24/06/1942	04/12/1942	275	163	438	Scrapped 1957
HMS Jed	K235	Charles Hill & Sons Ltd., Bristol	27/09/1941	30/07/1942	30/11/1942	306	123	429	Scrapped 25 May 1957
HMS Teviot	K222	Hall, Russell & Company, Aberdeen	04/10/1941	12/10/1942	30/01/1943	373	110	483	Transferred to South Africa 1945, returned 19
HMS Waveney	K248	Smiths Dock Co., South Bank-on-Tees	08/10/1941	30/04/1942	16/09/1942	204	139	343	Scrapped Dec 1957
HMS Wear	K230	Smiths Dock Co., South Bank-on-Tees	16/10/1941	01/06/1942	24/10/1942	228	145	373	Scrapped 29 Dec 1957
HMS Balinderry	K255	Blyth Shipbuilding & Drydock, Blyth	06/11/1941	07/12/1942	02/09/1943	396	269	665	Transferred to Norway 1946, scrapped 7 July
HMS Chelmer	K221	George Brown & Co., Greenock	29/12/1941	27/03/1943	29/09/1943	453	186	639	Scrapped Aug 1957
HMS Ettrick	K254	John Crown & Sons Ltd., Sunderland	31/12/1941	05/02/1943	11/07/1943	401	156	557	Transferred to Canada 1944, returned 1945, s
HMS Tweed	K250	A. & J. Inglis Ltd., Glasgow	31/12/1941	24/11/1942	28/04/1943	328	155	483	Torpedoed and sunk by U-305, 7 Jan 1944.
HMS Trent	K243	Charles Hill & Sons Ltd., Bristol	31/01/1942	10/10/1942	27/02/1943	252	140	392	Transferred to India, Apr 1946, scrapped 197
HMS Derg	K257	Henry Robb Ltd., Leith	16/04/1942	07/01/1943	10/06/1943	266	154	420	Scrapped Sept 1960
HMS Bann	K256	Charles Hill & Sons Ltd., Bristol	18/06/1942	29/12/1942	07/05/1943	194	129	323	Transferred to India, Dec 1945, scrapped 197
HMS Ribble	K251	W. Simons & Co., Renfrew	29/12/1942	23/04/1943	25/06/1943	115	63	178	Transferred to Netherlands 1943, scrapped 1
					TOTALS	**6517**	**3450**	**9967**	
					AVERAGES	**283**	**150**	**433**	

ROYAL NAVY & ROYAL CANADIAN NAVY						DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
HMS Lagan	K259	Smiths Dock Co., South Bank-on-Tees	07/01/1942	28/07/1942	21/12/1942	202	146	348	Torpedoed and damaged 20 Sep 1943 by U-2
HMS Moyola	K260	Smiths Dock Co., South Bank-on-Tees	09/02/1942	27/08/1942	15/01/1943	199	141	340	Transferred to France 15 Oct 1944, scrapped
HMS Adur	K296	Canadian Vickers, Montreal	10/03/1942	22/08/1942	01/12/1942	165	101	266	Transferred to USN as USS *Asheville*, com stricken 1973
HMS Annan	K297	Canadian Vickers, Montreal	16/03/1942	12/09/1942	16/12/1942	180	95	275	Transferred to USN as USS *Natchez*, commis scrapped 1959
HMS Mourne	K261	Smiths Dock Co., South Bank-on-Tees	21/03/1942	24/09/1942	30/04/1943	187	218	405	Torpedoed and sunk by U-767, 15 June 1944
HMS Deveron	K265	Smiths Dock Co., South Bank-on-Tees	16/04/1942	12/10/1942	02/03/1943	179	141	320	Transferred to India 1945, to Pakistan 1947, c
HMS Barle	K298	Canadian Vickers, Montreal	29/04/1942	26/09/1942	30/04/1943	150	216	366	Returned to US 27 Feb 1946, scrapped, date
HMS Cuckmere	K299	Canadian Vickers, Montreal	11/05/1942	24/10/1942	14/05/1943	166	202	368	Torpedoed and damaged 11 Dec 1943 by U-2
HMS Fal	K266	Smiths Dock Co., South Bank-on-Tees	20/05/1942	09/11/1942	02/07/1943	173	235	408	Transferred to Burma 29 Aug 1948, decommi
HMS Evenlode	K300	Canadian Vickers, Montreal	28/05/1942	09/11/1942	04/06/1943	165	207	372	Returned to US 5 March 1946, scrapped, date
HMS Frome	K267	Blyth Shipbuilding & Drydock, Blyth	30/05/1942	01/06/1943	03/03/1944	367	276	643	Transferred to France 3 March 1944, decomis
HMS Aire	K262	Fleming & Ferguson Ltd., Paisley	12/06/1942	22/04/1943	28/07/1943	314	97	411	Transferred to India 1945, to Pakistan 1947, c
HMS Nene	K270	Smiths Dock Co., South Bank-on-Tees	20/06/1942	09/12/1942	08/04/1943	172	120	292	Transferred to Canada 4 June 1944, returned
HMS Helford	K252	Hall, Russell & Company, Aberdeen	27/06/1942	06/02/1943	26/06/1943	224	140	364	Scrapped 29 June 1956
HMS Cam	K264	George Brown & Co., Greenock	30/06/1942	31/07/1943	31/01/1944	396	184	580	Damaged by own depth charges and explod returned to US, scrapped July 1945
HMS Plym	K271	Smiths Dock Co., South Bank-on-Tees	01/08/1942	04/02/1943	16/05/1943	187	101	288	Destroyed in atomic tests, Montebello Islands
HMS Helmsdale	K253	A. & J. Inglis Ltd., Glasgow	13/08/1942	05/06/1943	15/10/1943	296	132	428	Scrapped 14 Nov 1947
HMS Findhorn	K301	Canadian Vickers, Montreal	25/08/1942	05/12/1942	25/06/1943	102	202	304	Returned to US 20 March 1946, scrapped, da
HMS Towy	K294	Smiths Dock Co., South Bank-on-Tees	03/09/1942	04/03/1943	10/06/1943	182	98	280	Scrapped 27 July 1956
HMS Inver	K302	Canadian Vickers, Montreal	14/09/1942	12/12/1942	19/07/1943	89	219	308	Returned to US 4 March 1946, scrapped, date
HMS Lossie	K303	Canadian Vickers, Montreal	02/10/1942	30/04/1943	14/08/1943	210	106	316	Returned to US 26 Jan 1946, sold, wrecked 1
HMS Usk	K295	Smiths Dock Co., South Bank-on-Tees	06/10/1942	03/04/1943	14/07/1943	179	102	281	Transferred to Egypt 1948, sunk as a blocksh
HMS Tavy	K272	Charles Hill & Sons Ltd., Bristol	17/10/1942	03/04/1943	03/07/1943	168	91	259	Scrapped 28 Sept 1956
HMS Torridge	K292	Blyth Shipbuilding & Drydock, Blyth	17/10/1942	16/08/1943	06/06/1944	303	295	598	Transferred to France 6 June 1944, to Moroc
HMS Tees	K293	Hall, Russell & Company, Aberdeen	21/10/1942	20/05/1943	28/08/1943	211	100	311	Scrapped 16 July 1956
HMS Parret	K304	Canadian Vickers, Montreal	06/11/1942	30/05/1943	31/08/1943	205	93	298	Returned to US 5 Feb 1946, scrapped, date u

HMS Odzani	K356	Smiths Dock Co., South Bank-on-Tees	18/11/1942	19/05/1943	02/09/1943	182	106	288	Scrapped June 1957
HMS Windrush	K370	Henry Robb Ltd., Leith	18/11/1942	18/06/1943	03/11/1943	212	138	350	Transferred to France Feb 1944, used as fire
HMS Wye	K371	Henry Robb Ltd., Leith	18/11/1942	16/08/1943	09/02/1944	271	177	448	Scrapped 22 Feb 1955
HMS Braid	K263	W. Simons & Co., Renfrew	01/12/1942	30/11/1943	21/01/1944	364	52	416	Transferred to France 21 January 1944, scrap
HMS Meon	K269	A. & J. Inglis Ltd., Glasgow	31/12/1942	04/08/1943	07/02/1944	216	187	403	Transferred to Canada, returned 23 Apr 1945
HMS Ribble	K525	Blyth Shipbuilding & Drydock, Blyth	31/12/1942	10/11/1943	04/08/1944	314	268	582	Transferred to Canada 24 July 1944, returne
HMS Avon	K97	Charles Hill & Sons Ltd., Bristol	08/01/1943	19/06/1943	19/09/1943	162	92	254	Transferred to Portugal 1949, scrapped 197
HMS Lochy	K365	Hall, Russell & Company, Aberdeen	23/02/1943	30/10/1943	08/02/1944	249	101	350	Scrapped 29 June 1956
HMS Glenarm	K258	Henry Robb Ltd., Leith	08/03/1943	30/07/1943	25/09/1944	144	423	567	Transferred to France 25 Sept 1944, scrappe
HMS Nadder	K392	Smiths Dock Co., South Bank-on-Tees	11/03/1943	15/09/1943	20/01/1944	188	127	315	Transferred to India 1945, to Pakistan 1947, s
HMS Dovey	K523	Fleming & Ferguson Ltd., Paisley	23/03/1943	14/10/1943	25/02/1944	205	134	339	Scrapped 2 Nov 1955
HMS Taff	K637	Charles Hill & Sons Ltd., Bristol	14/05/1943	11/09/1943	07/01/1944	120	118	238	Scrapped June 1957
HMS Teme	K458	Smiths Dock Co., South Bank-on-Tees	25/05/1943	11/11/1943	16/03/1944	170	126	296	Transferred to Canada 28 Feb 1944, torpedoe and declared CTL, scrapped 8 Dec 1945
HMS Shiel	K305	Canadian Vickers, Montreal	15/11/1942	26/05/1943	30/09/1943	192	127	319	Returned to US 4 March 1946, scrapped, dat
HMS Awe	K526	Fleming & Ferguson Ltd., Paisley	27/05/1943	28/12/1943	21/01/1944	215	24	239	Transferred to Portugal 1949, possibly scrapp
HMS Annan	K404	Hall, Russell & Company, Aberdeen	10/06/1943	29/12/1943	13/01/1944	202	15	217	Transferred to Canada, returned 20 June 194
HMS Halladale	K417	A. & J. Inglis Ltd., Glasgow	25/06/1943	28/01/1944	11/05/1944	217	104	321	Sold to Towsend Brothers 1 Apr 1949, resold
HMS Monnow	K441	Charles Hill & Sons Ltd., Bristol	28/09/1943	04/12/1943	11/05/1944	67	159	226	Transferred to Canada 3 Aug 1944, returned 1959

Note: the ships notated "returned to US" were part of Lend Lease

TOTALS	**4756**	**3159**	**7915**
AVERAGES	**108**	**72**	**180**

ROYAL AUSTRALIAN NAVY - RIVER CLASS			**LAID DOWN**	**LAUNCHED**	**COMPLETED**	**DAYS TO LAUNCH**	**DAYS TO FIT OUT**	**DAYS TO COMPLETE**	**FATE**
HMAS Gascoyne	K354	Morts Dock & Engineering Co. Ltd., Sydney	03/07/1942	20/02/1943	18/11/1943	232	271	503	Sold for scrapping 15 Feb 1955
HMAS Hawkesbury	K363	Morts Dock & Engineering Co. Ltd., Sydney	24/08/1942	24/07/1943	05/07/1944	334	347	681	Sold for scrapping 15 Feb 1955
HMAS Barcoo	K375	Cockatoo Docks & Engineering Co., Sydney	21/10/1942	26/08/1943	17/01/1944	309	144	453	Sold for scrapping 15 Feb 1972
MAS Lachlan	K364	Morts Dock & Engineering Co. Ltd., Sydney	22/03/1943	25/03/1944	14/02/1945	369	326	695	Transferred to New Zealand, sold for scrappir
HMAS Diamantina	K377	Walkers Ltd., Maryborough	12/04/1943	06/04/1944	27/04/1945	360	386	746	Preserved as museum ship, Queensland Mar
HMAS Barwon	K406	Cockatoo Docks & Engineering Co., Sydney	31/05/1943	03/08/1943	12/01/1946	64	893	957	Sold for scrapping 17 August 1962

HMAS Burdekin	K376	Walkers Ltd., Maryborough	17/01/1942	30/06/1943	27/06/1944	529	363	892	Sold for scrapping 21 Sept 1961
HMAS Macquarie	K532	Morts Dock & Engineering Co. Ltd., Sydney	03/12/1943	03/03/1945	07/12/1945	456	279	735	Sold for scrapping 5 July 1972
					TOTALS	**2653**	**3009**	**5662**	
					AVERAGES	**332**	**376**	**708**	

ROYAL AUSTRALIAN NAVY - MODIFIED RIVER CLASS*						**DAYS TO LAUNCH**	**DAYS TO FIT OUT**	**DAYS TO COMPLETE**	**FATE**
HMAS Culgoa	K408	Naval Dockyard Williamstown, Williamstown	15/07/1943	22/09/1944	01/04/1947	435	921	1356	Sold for scrapping 15 Feb 1972
MAS Condamine	K698	New South Wales State Dockyard, Newcastle	30/10/1943	04/11/1944	22/02/1946	371	475	846	Sold for scrapping Sept 1961
HMAS Shoalhaven	K535	Walkers Ltd., Maryborough	18/12/1943	14/12/1944	02/05/1946	362	504	866	Sold for scrapping Jan 1962
HMAS Murchison	K442	Evans Deakin Ltd., Brisbane	03/06/1943	03/03/1945	07/12/1945	639	279	918	Sold for scrapping 5 July 1972

* These frigates were River Class but with Bay Class armament

TOTALS	**1807**	**2179**	**3986**
AVERAGES	**452**	**545**	**997**

ROYAL CANADIAN NAVY			**LAID DOWN**	**LAUNCHED**	**COMPLETED**	**DAYS TO LAUNCH**	**DAYS TO FIT OUT**	**DAYS TO COMPLETE**	**FATE**
HMCS Antigonish	K661	Yarrows Ltd., Esquimalt	02/10/1943	10/02/1944	04/07/1944	131	145	276	Paid off Nov 1966, sold 1967
HMCS Beacon Hill	K407	Yarrows Ltd., Esquimalt	16/07/1943	06/11/1943	16/05/1944	113	192	305	Paid off Sept 1967, sold 1968
HMCS Buckingham	K685	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	11/11/1943	28/04/1944	02/11/1944	169	188	357	Paid off March 1965, scrapped 1966
HMCS Cap de la Madeleine	K663	Morton Engineering & Dry Dock Co., Quebec City	05/11/1943	13/05/1944	30/09/1944	190	140	330	Paid off May 1965, scrapped 1966
HMCS Cape Breton	K350	Morton Engineering & Dry Dock Co., Quebec City	05/05/1942	24/11/1942	25/10/1943	203	335	538	Paid off Jan 1946, scuttled as breakwater194
HMCS Capilano	K409	Yarrows Ltd., Esquimalt	18/11/1943	08/04/1944	25/08/1944	142	139	281	Paid off 24 Nov 1945, sold mercantile 1947, f
HMCS Carlplace	K664	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	30/11/1943	06/07/1944	13/12/1944	219	160	379	Paid off 13 Nov 1945, transferred to Dominica
HMCS Charlottetown	K244	G T Davie, Lauzon	26/01/1943	16/09/1943	28/04/1944	233	225	458	Paid off March 1947, scuttled as breakwater
HMCS Chebogue	K317	Yarrows Ltd., Esquimalt	19/03/1943	17/08/1943	22/02/1944	151	189	340	Torpedoed on 4 Oct 1944, by U-1227 towed t
HMCS Coaticook	K410	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	14/06/1943	26/11/1943	25/07/1944	165	242	407	Paid off Nov 1945, sold 1947

HMCS Dunver	K03	Morton Engineering & Dry Dock Co., Quebec City	03/05/1942	10/11/1942	11/09/1943	191	305	496	Paid off Jan 1946, scuttled as breakwater194
HMCS Eastview	K665	Canadian Vickers, Montreal	26/08/1943	17/11/1943	03/06/1944	83	199	282	Paid off Jan 1946, scuttled as breakwater 194
HMCS Fort Erie	K670	G T Davie, Lauzon	03/11/1943	27/05/1944	27/10/1944	206	153	359	Paid off March 1965, scrapped 1966
HMCS Glace Bay	K414	G T Davie, Lauzon	23/09/1943	26/04/1944	02/09/1944	216	129	345	Paid off 7 Nov1945, transferred to Chile 1946
HMCS Grou	K518	Canadian Vickers, Montreal	01/05/1943	07/08/1943	04/12/1943	98	119	217	Paid off Feb 1946, scrapped 1948
HMCS Hallowell	K666	Canadian Vickers, Montreal	22/11/1943	28/03/1944	08/08/1944	127	133	260	Paid ofo 7 Dec 1945, sold 1946 to Uraguay, s
HMCS Inch Arran	K667	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	25/10/1943	06/06/1944	18/11/1944	225	165	390	Paid off June 1965, sold 1966
HMCS Joliette	K418	Morton Engineering & Dry Dock Co., Quebec City	19/07/1943	12/11/1943	14/06/1944	116	215	331	Paid off Nov 1945, transferred to Chile 1946,
HMCS Jonquiere	K318	G T Davie, Lauzon	26/01/1943	28/10/1943	10/05/1944	275	195	470	Paid off Sep 1966, sold 1967
HMCS Kirkland Lake	K337	Morton Engineering & Dry Dock Co., Quebec City	16/11/1943	27/04/1944	21/08/1944	163	116	279	Paid off Dec 1945, scrapped 1947
HMCS Kokanee	K419	Yarrows Ltd., Esquimalt	25/08/1943	27/11/1943	06/06/1944	94	192	286	Paid off 21 Dec 1945, sold to India 1948 as pi
HMCS La Hulloise	K668	Canadian Vickers, Montreal	10/08/1943	29/10/1943	20/05/1944	80	204	284	Paid off July 1965, scrapped 1966
HMCS Lanark	K669	Canadian Vickers, Montreal	25/09/1943	10/12/1943	06/07/1944	76	209	285	Paid off March 1965, scrapped 1966
HMCS Lasalle	K519	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	04/06/1943	11/12/1943	29/06/1944	190	201	391	Paid off Dec 1945, scuttled as breakwater 194
HMCS Lauzon	K371	G T Davie, Lauzon	02/07/1943	10/06/1944	30/08/1944	344	81	425	Paid off May 1963, sold 1963
HMCS Levis	K400	G T Davie, Lauzon	25/02/1943	26/11/1943	21/07/1944	274	238	512	Paid off Feb 1946, scuttled as breakwater 194
HMCS Longueuil	K672	Canadian Vickers, Montreal	17/07/1943	30/10/1943	18/05/1944	105	201	306	Paid off Dec 1945, scrapped 1948
HMCS Magog	K673	Canadian Vickers, Montreal	16/06/1943	22/09/1943	07/05/1944	98	228	326	Torpedoed on 14 Oct 1944 by U-1223, towed
HMCS Matane	K444	Canadian Vickers, Montreal	23/12/1942	29/05/1943	22/10/1943	157	146	303	Paid off November 1946, scuttled as breakwa
HMCS Montreal	K319	Canadian Vickers, Montreal	23/12/1942	12/06/1943	12/11/1943	171	153	324	Paid off Oct 1945,scrapped 1948
HMCS New Glasgow	K320	Yarrows Ltd., Esquimalt	02/12/1942	23/06/1943	23/12/1943	203	183	386	Paid off Jan 1967, scrapped 1967
HMCS New Waterford	K321	Yarrows Ltd., Esquimalt	17/12/1942	03/07/1943	21/01/1944	198	202	400	Paid off Dec 1966, scrapped 1967
HMCS Orkney	K448	Yarrows Ltd., Esquimalt	19/05/1943	18/09/1943	18/04/1944	122	213	335	Paid off Jan 1946, sold mercantile 1947, to Is
HMCS Outremont	K322	Morton Engineering & Dry Dock Co., Quebec City	18/11/1942	03/07/1943	27/11/1943	227	147	374	Paid off Jun 1965, scrapped 1966
HMCS Penetang	K676	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	22/09/1943	06/07/1944	19/10/1944	288	105	393	Paid off 10 Nov 1945, transferred to Norway 1
HMCS Port Colborne	K326	Yarrows Ltd., Esquimalt	16/12/1942	21/04/1943	05/12/1943	126	228	354	Paid off Nov 1945, scrapped 1948
HMCS Poundmaker	K675	Canadian Vickers, Montreal	29/01/1944	21/04/1944	17/09/1944	83	149	232	Paid off 25 Nov 1945, transferred to Peru 194

HMCS Prestonian	K662	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	20/07/1943	22/06/1944	13/09/1944	338	83	421	Paid off 6 Nov 1945, transferred to Norway 24
HMCS Prince Rupert	K324	Yarrows Ltd., Esquimalt	01/08/1942	03/02/1943	30/08/1943	186	208	394	Paid off Jan 1946, scuttled as breakwater194
HMCS Royal Mount	K677	Canadian Vickers, Montreal	07/01/1944	15/04/1944	25/08/1944	99	132	231	Paid off Nov 1945, scrapped 1947
HMCS Runnymede	K678	Canadian Vickers, Montreal	11/09/1943	27/11/1943	14/06/1944	77	200	277	Paid off Jan 1946, scrapped 1948
HMCS Saint John	K456	Canadian Vickers, Montreal	28/05/1943	25/08/1943	13/12/1943	89	110	199	Paid off Nov 1945, scrapped 1948
HMCS Sea Cliff	K344	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	20/07/1943	07/08/1944	26/09/1944	384	50	434	Paid off 28 Nov 1945, transferred to Chile 30
HMCS Springhill	K323	Yarrows Ltd., Esquimalt	05/05/1943	07/09/1943	21/03/1944	125	196	321	Paid off Dec 1945, scrapped 1948
HMCS St. Catharines	K325	Yarrows Ltd., Esquimalt	02/05/1942	12/06/1942	01/07/1943	41	384	425	Meteorological vessel 1950, scrapped 1968
HMCS St. Pierre	K680	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	30/06/1943	01/12/1943	28/08/1944	154	271	425	Paid off Nov 1945, ransferred to Peru 1947, s
HMCS St. Stephen	K454	Yarrows Ltd., Esquimalt	05/10/1943	06/02/1944	28/07/1944	124	173	297	Paid off 30 Jan 1946, meteorological vessel 2
HMCS Ste. Therese	K366	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	18/05/1943	16/10/1943	28/05/1944	151	225	376	Paid off Jan 1967, sold 1967
HMCS Stettler	K681	Canadian Vickers, Montreal	31/05/1942	09/10/1942	07/05/1944	131	576	707	Paid off Aug 1966, sold 1967
HMCS Stone Town	K531	Canadian Vickers, Montreal	17/11/1943	28/03/1944	21/07/1944	132	115	247	Paid off 13 Nov 1945, meteorological vessel
HMCS Stormont	K327	Canadian Vickers, Montreal	23/12/1942	14/07/1943	27/11/1943	203	136	339	Paid off Nov 1945, sold mercantile 1947, yacl
HMCS Strathadam	K682	Yarrows Ltd., Esquimalt	06/12/1943	20/03/1944	29/09/1944	105	193	298	Paid off 7 Nov 1945, sold 1947 to Uraguay 19
HMCS Sussexvale	K683	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	15/11/1943	12/07/1944	29/11/1944	240	140	380	Paid off Nov 1966, sold 1967
HMCS Swansea	K328	Yarrows Ltd., Esquimalt	15/07/1942	19/12/1942	04/10/1943	157	289	446	Paid off Oct 1966, scrapped Aug 1967
HMCS Thetford Mines	K459	Morton Engineering & Dry Dock Co., Quebec City	07/07/1943	30/10/1943	24/05/1944	115	207	322	Paid off Nov 1945, sold mercantile 1946, fate
HMCS Toronto	K538	Davie Shipbuilding & Repairing Co. Ltd., Lauzon	10/05/1943	18/09/1943	06/05/1944	131	231	362	Paid off 27 Nov 1945, transferred to Norway
HMCS Valleyfield	K329	Morton Engineering & Dry Dock Co., Quebec City	30/11/1942	17/07/1943	07/12/1943	229	143	372	Torpedoed and sunk 7 May 1944 by U-548
HMCS Victoriaville	K684	G T Davie, Lauzon	02/12/1943	23/06/1944	11/11/1944	204	141	345	Paid off 17 November 1945, sold then reaquir then as diving tender, scrapped 1974
HMCS Waskesiu	K330	Yarrows Ltd., Esquimalt	02/05/1942	03/04/1943	16/06/1943	336	74	410	Paid off Jan 1946, transferred to India 1947,
HMCS Wentworth	K331	Yarrows Ltd., Esquimalt	11/11/1942	06/03/1943	07/12/1943	115	276	391	Paid off 10 Oct 1945, sold for scrapping 1947

TOTALS	**10118**	**11317**	**21435**
AVERAGES	**169**	**189**	**357**

APPENDIX C

LOCH CLASS FRIGATES

By Laid Down Date

SHIP	PEN NO.	BUILDER	LAID DOWN	LAUNCHED	COMPL	DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
Loch Fada	K390	John Brown & Company, Clydebank	8/06/1943	14/12/1943	10/04/1944	189	118	307	Commissioned unknown date Apr 1944, decommissioned into Reserve Apr 1952, 21 Jun 1955, 11 Oct paid off Portsmouth and used for trials of Seawolf missile, s 1970
Loch KIllin	K391	Burntisland Shipbuilding Company, Fife	27/06/1943	29/11/1943	12/04/1944	155	135	290	Commissioned unknown date Apr 1944, paid off into Reserve 7 Nove 1945, unknown date but sometime in 1949 and in Reserve Jun 1956, for Disposal 12 A scrapping
Loch Morlich	K517	Swan Hunter, Wallsend	15/07/1943	20/01/1944	2/08/1944	189	195	384	Commissioned RCN 17 Jul 1944, returned 8 May 1945 and in Reserve, sold to N commissioned HMNZS Tutira 19 Apr 1949, decommissioned Sep 1951, scrappe
Loch Alvie	K428	Barclay, Curle & Co, Whiteinch	31/08/1943	14/04/1944	21/08/1944	227	129	356	Commissioned RCN 10 Aug 1944, returned to RN and decommission recommissioned RN Apr 1950, decommissioned and into Reserve April 1952, Jan 1954, decommsiioned Jan 1963, sold for scrapping 20 Sep 1965
Loch Shin	K421	Swan Hunter, Wallsend	6/09/1943	23/02/1944	10/10/1944	170	230	400	Commissioned unknown date Oct 1944, paid off into Reserve Jun 1947, 1948 sold and commissioned HMNZS Taupo 13 Sep 1948, paid off into Reserve 26 Jan 195 1961
Loch Achanalt	K424	Henry Robb Ltd., Leith	14/09/1943	23/03/1944	11/08/1944	191	141	332	Commissioned RCN 31 Jul 1944, returned to RN 20 Jun 1945 and decommissio Jul 1945, sold to New Zealand and commissioned HMNZS Pukaki 13 Sep 1 Reserve 3 Dec 1950, recommissioned Dec 1952, paid off into Reserve 5 Jan 1965
Loch Dunvegan	K425	Charles Hill & Sons Ltd., Bristol	29/09/1943	25/03/1944	30/06/1944	178	97	275	Commissioned unknown date Jun 1944, decommissioned into Reserve Apr 1947, 1 May 1950, decommissioned into Reserve Oct 1952, for Disposal 1956, sold a Aug 1960
Loch Cree	K430	Swan Hunter, Wallsend	18/10/1943	19/06/1944	8/03/1945	245	262	507	Commissioned HMSAS Natal 1 Mar 1945, reduced to care and maintenance survey vessel 1955-7, decommissioned 15 Mar 1972, sunk as target 19 Sep 197

Loch Eck	K422	Smiths Dock Co., South Bank-on-Tees	25/10/1943	25/04/1944	7/11/1944	183	196	379	Commissioned 7 Nov 1944, decommissioned and into Reserve 13 Aug 1946, sold 1948 and commissioned HMNZS Hawea 1 Oct 1948, decommissioned and in 1957, sold for scrapping Sep 1965
Loch Boisdale	K432	Blyth Shipbuilding & Drydock, Blyth	8/11/1943	5/07/1944	1/12/1944	240	149	389	Commissioned 9 Nov 1944 HMSAS Good Hope, in Reserve Nov 1948, recom 1954, paid off into Reserve Oct 1964, scuttled 12 Dec 1978
Loch Insh	K433	Henry Robb Ltd., Leith	17/11/1943	10/05/1944	20/10/1944	175	163	338	Commissioned unknown date Oct 1944, decommissioned and into Rese recommissioned July 1950, decommissioned Jan 1952, recommissioned decommissioned 22 Jun 1962, sold to Malaysia 1963 and commissioned in the Navy as KD Hang Tuah 2 Oct 1964, withdrawn from service 1971, scrapped 197
Loch Tarbert	K431	Ailsa Shipbuilding Company, Troon	30/11/1943	19/10/1944	22/02/1945	324	126	450	Commissioned unknown date Feb 1945, paid of ito Reserve 12 May 1946, sold for
Loch Quoich	K434	Blyth Shipbuilding & Drydock, Blyth	3/12/1943	2/09/1944	11/01/1945	274	131	405	Commissioned unknown date Jan 1945, paid off into Reserve June 1954, for scrapped 13 Nov 1967
Loch Lomond	K437	Caledon Shipbuilding & Engineering Company Limited, Dundee	7/12/1943	19/06/1944	6/11/1944	195	140	335	Commissioned unknown date Nov 1944, decommissioned Jul 1946 and recommissioned 22 Sep 1950, decommissioned 18 Dec 1964, for Disposal Fe scrapping 1967
Loch Fyne	K429	Burntisland Shipbuilding Company, Fife	8/12/1943	24/05/1944	9/11/1944	168	169	337	Commissioned unknown date Nov 1944, decommissioned Apr 1946 and reduce 1946, recommissioned Jan 1951, decommissioned Mar 1952, recommissioned 1 off 6 May1963, sold, scrapped 20 Aug 1979
Loch Achray	K426	Smiths Dock Co., South Bank-on-Tees	13/12/1943	7/07/1944	1/02/1945	207	209	416	Commissioned 1 Feb 1945, Decommissioned and into Reserve July 1946, 19 Zealand and commissioned HMNZS Kaniere 27 Sep 1948, paid off into Res recommissioned Nov 1952, decommissioned 1961, sold and scrapped Hong Kor
Loch Katrine	K625	Henry Robb Ltd., Leith	31/12/1943	21/08/1944	29/12/1944	234	130	364	Commissioned unknown date December 1944 or Jan 1945, paid off reduced 1946, sold to New Zealand 1948, 7 May 1949 commissioned as HMNZS Rotoiti 3 off into Reserve Apr 1953, recommissioned 31 Mar 1957, paid off into Rserve A scrapping in Hong Kong 1967
Loch Craggie	K609	Harland & Wolff, Belfast	28/12/1943	23/05/1944	23/10/1944	147	153	300	Commissioned 23 Oct 1944 (?) ,decommissioned and into Reserve Jul 1946, rec Dec 1950, paid off into Reserve 28 May 1953, sold for scrapping 8 Jul 1963.
Loch Gorm	K620	Harland & Wolff, Belfast	28/12/1943	8/06/1944	18/12/1944	163	193	356	Commissioned unknown date Dec 1944, decommissioned into Reserve Apr 194 Sept 1961 converted to ferry Orion
Loch Killisport	K628	Harland & Wolff, Belfast	28/12/1943	6/07/1944	9/07/1945	191	368	559	Commissioned unknown date Jul 1945, decommissioned Apr 1946, recommss decommsioned Apr 1952, recommissioned Apr 1955, decommissioned 4 Au scrapping 20 Feb 1970

Loch Ruthven	K645	Charles Hill & Sons Ltd., Bristol	4/01/1944	3/06/1944	8/10/1944	151	127	278	Commissioned unknown date Oct 1944, decommissioned and into Reserve M recommissioned 24 Apr 1952, paid off into Reserve late 1955, recommissioned Mar 1963, for Disposal May 1963, sold for scrapping Nov 1966
Loch More	K639	Caledon Shipbuilding & Engineering Company Limited, Dundee	16/03/1944	3/10/1944	24/02/1945	201	144	345	Commissioned unknown date Feb/Mar 1945, decommissioned and into Res recommissioned unknown date 1950/51, paid off into Rseerve Feb 1953, briefly in 1956 before going back into Reserve, for Disposal May 1961, sold for scrappir
Loch Veyatie	K658	Ailsa Shipbuilding Company, Troon	30/03/1944	8/10/1945	13/07/1946	557	278	835	Commissioned unknown date Jul 1946, paid of into Reserve late 1955, sold fo Aug 1965 and scrapped 12 Aug 1965
Loch Scavaig	K648	Charles Hill & Sons Ltd., Bristol	31/03/1944	9/09/1944	22/12/1944	162	104	266	Commissioned unknown date Dec 1944, decommissioned into Reserve recommissioned 8 May 1950, paid off into Reserve 15 Sep 1952, for Disposal 1 Sep 1959 Genoa, Italy
Loch Ard	K602	Harland & Wolff, Belfast	21/04/1944	2/08/1944	21/05/1945	103	292	395	Commissioned HMSAS Transvaal 22 May 1945, paid off into Reserve Jun 1950, Sep 1950, refit 1957-1960, recommissioned, decommissioned and in Reserve Disposal 1978, sunk as target by gunfire 8 Aug 1978
Loch Glendhu	K619	Burntisland Shipbuilding Company, Fife	29/05/1944	18/10/1944	23/02/1945	142	128	270	Commissioned 23 Feb 1945 (?), 7 Dec 1953 paid off to Reserve Fleet, on Dispos 19 Nov 1957
Loch Tralaig	K655	Caledon Shipbuilding & Engineering Company Limited, Dundee	26/06/1944	12/02/1945	4/07/1945	231	142	373	Commissioned 4 Jul 1945, paid off into Reserve 1953, HQ and accommodation s sold, scrapped 8 Aug 1964
Loch Arkaig	K603	Caledon Shipbuilding & Engineering Company Limited, Dundee	1/11/1944	7/06/1945	17/11/1945	218	163	381	Commissioned 1 Nov 1945, decommissioned 1952 and in Reserve, sold for scrapped 1960
					TOTAL DAYS	**5810**	**4812**	**10622**	
					AVERAGE	**208**	**172**	**379**	

(Sources: Lavery, naval-history.net, uboat.net)

Note: Commisioning dates are, for some reason, largely unknown and may be earlier than completion dates, the latter being when trials were completed.

APPENDIX D

BAY CLASS FRIGATES

By Laid Down Dates

SHIP	PEN NO.	BUILDER	LAID DOWN	LAUNCHED	COMPLETED	DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
Largo Bay	K423	W Pickersgill & Sons Limited, Sunderland	8/02/1944	3/10/1944	26/01/1946	238	480	718	Decommissioned 1946, scrapped 1959
Cardigan Bay	K630	Henry Robb Ltd., Leith	14/04/1944	28/12/1944	25/06/1945	258	179	437	Decommissioned 1961, sold for scrapping 1962
Cawsand Bay	K644	Blyth Shipbuilding & Drydock, Blyth	24/04/1944	26/02/1945	13/11/1945	308	260	568	Decommissioned 1946, sold for scrapping in 1959
Widemouth Bay	K615	Harland & Wolff, Belfast	26/04/1944	19/10/1944	13/04/1945	176	176	352	Decommissioned 1953, sold for scrapping 1957
Morecambe Bay	K624	W Pickersgill & Sons Limited, Sunderland	30/04/1944	1/11/1944	11/03/1946	185	495	680	Decommissioned 1956, sold to Portugal 3 August 1961, scrapped 1970
Enard Bay	K435	Smiths Dock Co., South Bank-on-Tees	27/05/1944	31/10/1944	4/01/1946	157	430	587	Decommissioned January 1947, sold for scrapping 1957
St. Brides Bay	K600	Harland & Wolff, Belfast	30/05/1944	16/01/1945	15/06/1945	231	150	381	Decommissioned 16 December 1961, sold for scrapping 1962
Bigbury Bay	K606	Hall, Russell & Company Limited, Aberdeen	30/05/1944	16/11/1944	10/07/1945	170	236	406	Sold 12 May 1959 to Portugal, scrapped 5 July 1970
St. Austell Bay	K634	Harland & Wolff, Belfast	30/05/1944	8/11/1944	29/05/1945	162	202	364	Decommissioned August 1956,sold for scrapping 1959
Carnarvon Bay	K636	Henry Robb Ltd., Leith	8/06/1944	15/03/1945	20/09/1945	280	189	469	Decommissioned May 1946, sold for scrapping 1959
Veryan Bay	K651	Charles Hill & Sons Ltd., Bristol	8/06/1944	11/11/1944	13/05/1945	156	183	339	Decommissioned 12 March 1957, sold for scrapping 1959
Whitesand Bay	K633	Harland & Wolff, Belfast	8/08/1944	16/12/1944	30/07/1945	130	226	356	Decommissioned December 1954, sold for scrapping 1955
Start Bay	K604	Harland & Wolff, Belfast	31/08/1944	15/02/1945	6/09/1945	168	203	371	Decommissioned November 1946, sold for scrapping 1958
Tremadoc Bay	K605	Harland & Wolff, Belfast	31/08/1944	29/03/1945	11/10/1945	210	196	406	Decommissioned April 1951, sold for scrapping 1959
Burghead Bay	K622	Charles Hill & Sons Ltd., Bristol	21/09/1944	3/03/1945	20/09/1945	163	201	364	Decommisssioned August 1958, sold May 1959 to Portugal, scrapped after 23 June 1971
Padstow Bay	K608	Henry Robb Ltd., Leith	25/09/1944	24/08/1945	11/03/1946	333	199	532	Decommissioned November 1947, sold for scrapping 1959
Mounts Bay	K627	W Pickersgill & Sons Limited, Sunderland	23/10/1944	8/06/1945	11/08/1949	228	1525	1753	Decommisssioned May 1960, sold 1961 to Portugal, scrapped 1971
Wigtown Bay	K616	Harland & Wolff, Belfast	24/10/1944	26/04/1945	19/01/1946	184	268	452	Decommissioned May 1947, sold for scrapping in October 1958
Porlock Bay	K650	Charles Hill & Sons Ltd., Bristol	22/11/1944	14/06/1945	8/03/1946	204	267	471	Decommissioned January 1949, sold t9 March 1962 to Finland, scrapped September 1975
					TOTAL DAYS	**3941**	**6065**	**10006**	
(Source: Lavery)					**AVERAGE**	**207**	**319**	**527**	

APPENDIX E

CAPTAIN CLASS FRIGATES **Short Hull Type (Evarts)**

By Laid Down Date

SHIP	PEN NO.	US HULL NO.	BUILDER	LAID DOWN	LAUNCHED	COMPLETED	DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
Drury	K316	BDE46	Philadelphia Navy Yard	12/02/1942	24/07/1942	12/04/1943	162	262	424	Returned to USN 20 Aug 1945. Decommissioned 22 Oct 1945, struck off 16 Nov 1945, scrapped Jun 1946 Philadelphia
Bayntun	K310	BDE 1	Boston Navy Yard	5/04/1942	27/06/1942	13/02/1943	83	231	314	Returned to USN 22 Aug 1945. Decommissioned 19 Oct 1945, struck off 1 Nov 1945, sold for scrapping 17 Jun 1947
Bazely	K311	BDE2	Boston Navy Yard	5/04/1942	27/06/1942	18/02/1943	83	236	319	Returned to USN 20 Aug 1945. Decommissioned 22 Oct 1945, struck off 16 Nov 1945, scrapped 28 May 1946 Philadelphia
Gould	K478	DE272	Boston Navy Yard	23/04/1942	4/06/1943	18/09/1943	407	106	513	Torpedoed and sunk 1 Mar 1944 by U-358 north of the Azore Islands
Grindall	K477	DE273	Boston Navy Yard	23/04/1942	4/06/1943	23/09/1943	407	111	518	Returned to USN 20 Aug 1945. Decommissioned 19 Oct 1945, struck off 1 Nov 1945, scrapped 28 May 1946 Philadelphia
Berry	K312	BDE3	Boston Navy Yard	22/09/1942	23/11/1942	15/02/1943	62	84	146	Returned to USN 2 Feb 1946. decommissioned 19 Oct 1945 (?) , struck off 12 Mar 1946, sold for scrapping 9 Nov 1946, scrapping complete 4 Nov 1948
Blackwood	K313	BDE4	Boston Navy Yard	22/09/1942	23/11/1942	27/03/1943	62	124	186	Torpedoed 15 Jun 1944 by U-764 in English Channel, sank 16 Jun 1944
Burges	K347	BDE12	Boston Navy Yard	8/12/1942	28/01/1943	2/06/1943	51	125	176	Returned to USN 17 Feb 1945. struck off 28 Mar 1946 and sold for scrapping, 31 July 1947 scrapping complete
Capel	K470	DE286	Boston Navy Yard	11/03/1943	22/04/1943	16/08/1943	42	116	158	Torpedoed and sunk 26 Dec 1944 by U-486 off Cherbourg France
Cooke	K471	DE267	Boston Navy Yard	11/03/1943	22/04/1943	30/08/1943	42	130	172	Returned to USN 5 Mar 1946, sold for scrapping 10 Jun 1947
Dacres	K472	DE268	Boston Navy Yard	7/04/1943	19/05/1943	28/08/1943	42	101	143	Returned to USN 14 Dec 1946 struck off and sold for scrapping
Domett	K473	DE269	Boston Navy Yard	7/04/1943	19/05/1943	3/09/1943	42	107	149	Returned to USN 5 March 1946, struck off and sold for scrapping 3 Jun 1947
Foley	K474	DE270	Boston Navy Yard	7/04/1943	19/05/1943	8/09/1943	42	112	154	Returned to USN 22 Aug 1945. Decommissioned 19 Oct 1945, struck off 1 Nov 1945, sold for scrapping 19 Jun 1946

Garlies	K475	DE271	Boston Navy Yard	7/04/1943	19/05/1943	13/09/1943	42	117	159	Returned to USN 20 Aug 1945. Decommissioned 10 Oct 1945, struck off 1 Nov 1945, sold for scrapping 18 Jul 1947
Gardiner	K478	DE274	Boston Navy Yard	20/05/1943	8/07/1943	28/09/1943	49	82	131	Returned to USN 12 Feb 1946, scrapped 1947
Goodall	K479	DE275	Boston Navy Yard	20/05/1943	8/07/1943	4/10/1943	49	88	137	Torpedoed 29 Apr 1945 by U-968 off Kola Inlet, sunk by gunfire30 Apr 1945 from HMS Anguilla
Goodson	K480	DE276	Boston Navy Yard	20/05/1943	8/07/1943	9/10/1943	49	93	142	Torpedoed 25 June 1945 by U-984 off Cherbourg France, written off as constructive total loss and scrapped 1947
Gore	K481	DE277	Boston Navy Yard	20/05/1943	8/07/1943	14/10/1943	49	98	147	Returned to USN 2 May 1946, scrapped 19 Nov 1946
Keats	K482	DE278	Boston Navy Yard	5/06/1943	17/07/1943	19/10/1943	42	94	136	Returned to USN 27 Feb 1946, scrapped 19 Nov 1946
Kempthorne	K483	DE279	Boston Navy Yard	5/06/1943	17/07/1943	23/10/1943	42	98	140	Returned to USN 20 Aug 1945. Decommissioned 17 Oct 1945, struck off 1 Nov 1945, scrapped 28 May 1946
Kingsmill	K484	DE280	Boston Navy Yard	9/07/1943	13/08/1943	23/10/1943	35	71	106	Returned to USN 26 Aug 1945. Decommissioned 26 Oct 1945, struck off 16 Nov 1945, sold for scrapping 17 Feb 1947
Lawford	K514	DE516	Boston Navy Yard	9/07/1943	13/08/1943	3/11/1943	35	82	117	Sunk by German aircraft 8 Jun 1944 off Juno Beach, Normandy, France
Louis	K515	DE517	Boston Navy Yard	9/07/1943	13/08/1943	9/11/1943	35	88	123	Returned to USN 20 Mar 1946, sold to State of Pennsylvania 17 June 1946
Lawson	K516	DE518	Boston Navy Yard	15/07/1943	13/08/1943	25/11/1943	29	104	133	Returned to USN 20 Mar 1946, scrapped 31 Jan 1947
Loring	K565	DE520	Boston Navy Yard	18/07/1943	13/08/1943	15/11/1943	26	94	120	Returned to USN 7 Jan 1947, sold for scrapping 25 Mar 1947
Pasley	K564	DE519	Boston Navy Yard	18/07/1943	30/08/1943	15/11/1943	43	77	120	Returned to USN 20 Aug 1945. Decommissioned 26 Oct 1945, struck off 16 Nov 1945, sold for scrapping 8 Nov 1946 (?)
Hoste	K566	DE521	Boston Navy Yard	14/08/1943	24/09/1943	3/12/1943	41	70	111	Returned to USN 22 Aug 1945. Decommissioned 23 Oct 1945, struck off 16 Nov 1945, scrapped 7 May 1946
Manners	K568	DE523	Boston Navy Yard	14/08/1943	24/09/1943	16/12/1943	41	83	124	Stern blown off 6 Jan 1945 while attacking U-1051 in the Irish Sea, towed to England, decommissioned 27 Jan 1945, returned to USN 8 Nov 1945, struck off 19 Dec 1945, Sold for scrapping 3 Dec 1946
Moorsom	K567	DE522	Boston Navy Yard	14/08/1943	24/09/1943	10/12/1943	41	90	131	Returned to USN 25 Oct 1945, struck off 5 Dec 1945, sold for scrapping July 1946
Mounsey	K569	DE524	Boston Navy Yard	14/08/1943	24/09/1943	23/12/1943	41	110	151	Returned to USN 20 Mar 1946, sold for scrapping Sep 1947
Inglis	K570	DE525	Boston Navy Yard	25/09/1943	2/11/1943	12/01/1944	38	71	109	Returned to USN 25 Feb 1946, sold for scrapping 8 Nov 1946
Inman	K571	DE526	Boston Navy Yard	25/09/1943	2/11/1943	13/01/1944	38	72	110	Returned to USN 1 Mar 1946, sold for scrapping Nov 1946
						TOTAL DAYS	**2292**	**3527**	**5819**	

Source: navsource.com

							AVERAGE	**72**	**110**	**182**	

CAPTAIN CLASS FRIGATES **Long Hull Type (Buckley)**

By Laid Down Dates

SHIP	**PENNANT NUMBER**	**US HULL NUMBER**	**BUILDER**	**LAID DOWN**	**LAUNCHED**	**COMPLETED**	**DAYS TO LAUNCH**	**DAYS TO FIT OUT**	**DAYS TO COMPLETE**	**FATE**
Bentinck	K314	DE52	Bethlehem Corporation Shipbuilding	29/06/1942	3/02/1943	19/05/1943	219	105	324	Returned to USN 7 Feb 1946, struck off Jun 1946, sold for scrapping
Byard	K315	DE55	ditto	15/10/1942	6/03/1943	18/06/1943	142	104	246	Returned to USN 12 Dec 1945, struck off 7 Feb 1946, sold for scrapping 5 Nov 1946, resold for scrapping 8 Dec 1946
Calder	K349	DE58	ditto	11/12/1942	27/03/1943	15/07/1943	106	110	216	Returned to USN 9 Oct 1945, struck off 5 Dec 1945, sold for scrapping 15 Jan 1948
Duckworth	K351	DE61	ditto	16/01/1943	1/05/1943	4/08/1943	105	95	200	Returned to USN 17 Dec 1945, struck off 21 Jan 1946, sold for scrapping 29 May 1946
Duff	K352	DE64	ditto	22/02/1943	22/05/1943	23/08/1943	89	93	182	Struck mine 30 Nov 1944 off Dutch coast, written off as total constructive loss, struck off 17 Sep 1945, sold for scrapping May 1947
Essington	K353	DE67	ditto	15/03/1943	19/06/1943	7/09/1943	96	80	176	Returned to USN 19 Oct 1945, struck off 5 Dec 1945, sold for scrapping 22 Dec 1947
Affleck	K462	DE71	ditto	5/04/1943	30/06/1943	29/09/1943	86	91	177	Torpedoed 26 Dec 1944 by U-486 off Cherbourg, France, struck off as total constructive loss 15 Sep 1945 and returned to USN, sold into merchant service 24 Jan 1947 as Nostra Senora De La Luz, ultimate fate unknown
Aylmer	K463	DE72	ditto	12/04/1943	10/07/1943	30/09/1943	89	82	171	Returned to USN 5 Nov 1945, struck off 19 Dec 1945, sold for scrapping 20 June 1945, scrapped Feb 1948
Balfour	K464	DE73	ditto	19/04/1943	10/07/1943	7/10/1943	82	89	171	Returned to USN 25 Oct 1045, struck off 5 Dec 1945, sold 28 Oct 1946 to State of NY for NY Maritime Academy for $1
Bentley	K465	DE74	ditto	26/04/1943	17/07/1943	14/10/1943	82	89	171	Returned to USN 5 Nov 1945, struck off 15 Dec 1945, sold for scrapping 17 June 1947
Bickerton	K466	DE75	ditto	3/05/1943	24/07/1943	17/10/1943	82	85	167	Torpedoed 22 Aug 1944 by U-354 in the Barents Sea and later sunk by friendly gunfire
Bligh	K467	DE76	ditto	10/05/1943	31/07/1943	22/10/1943	82	83	165	Returned to USN 12 Nov 1945, struck off 17 Apr 1946, sold for scrap 13 Jun 1948

Braithwaite	K468	DE77	ditto	10/05/1943	31/07/1943	13/11/1943	82	105	187	Returned to USN 13 Nov 1945, struck off 21 Jan 1946, sold for scrap June 1948
Bullen	K469	DE78	ditto	17/05/1943	7/08/1943	25/10/1943	82	79	161	Torpedoed and sunk 6 Dec 1944 by U-775 northwest of Scotland
Byron	K508	DE79	ditto	25/05/1943	14/08/1943	30/10/1943	81	77	158	Returned to USN 24 Nov 1945, struck off 3 Jan 1946, sold for scrapping 25 Oct 1947
Conn	K509	DE80	ditto	2/06/1943	21/08/1943	31/10/1943	80	71	151	Returned to USN 26 Nov 1945, struck off 3 Jan 1946, sold for scrapping 21 Jan 1948
Cotton	K510	DE81	ditto	2/06/1943	21/08/1943	8/11/1943	80	79	159	Returned to USN 5 Nov 1945, struck off 3 Jan 1946, sold for scrapping date unknown
Cranstoun	K511	DE82	ditto	9/06/1943	28/08/1943	13/11/1943	80	77	157	Returned to USN 3 Dec 1945, struck off 7 Feb 1946, sold for scrapping 20 Nov 1947
Cubitt	K512	DE83	ditto	9/06/1943	11/09/1943	17/11/1943	94	67	161	Returned to USN 4 Mar 1946, struck off 12 Apr 1946, sold for scrapping 7 Mar 1947
Curzon	K513	DE84	ditto	23/06/1943	18/09/1943	20/11/1943	87	63	150	Returned to USN 27 Mar 1946, struck off 1 May 1946, sold for scrapping 4 Nov1946
Dakins	K550	DE85	ditto	23/06/1943	18/09/1943	23/11/1943	87	66	153	Struck mine 24 Dec 1944 off Ostend, Belgium, declared total constructive loss, sold for scrapping 9 Jan 1947
Deane	K551	DE86	ditto	30/06/1943	29/09/1943	26/11/1943	91	58	149	Returned to USN 4 Mar 1946, struck off 12 Apr 1946, sold for scrapping 7 Nov 1946
Ekins	K552	DE87	ditto	5/07/1943	2/10/1943	29/11/1943	89	58	147	Struck mine off Ostend, Belgium 16 Apr 1945, declared total constructive loss, struck off 25 June 1945, sold for scrapping Mar 1947
Redmill	K554	DE89	ditto	14/07/1943	2/10/1943	30/11/1943	80	59	139	Torpedoed 27 Apr 1945 by U-1105 west of Ireland, towed to port, declared total constructive loss, returned to USN 20 Jan 1947, sold for srapping 4 Feb 1947
Retalick	K555	DE90	ditto	21/07/1943	9/10/1943	8/12/1943	80	60	140	Returned to USN 25 Oct 1945, struck off 19 Dec 1945, sold for scrapping 7 May1946
Halsted	K556	DE91	ditto	28/07/1943	14/10/1943	3/11/1943	78	20	98	Torpedoed 11 June 1944 by German destroyers Jaguar & Mowe off Cherbourg, France, declared total constructive loss, sold for scrapping 28 March 1947
Riou	K557	DE92	ditto	4/08/1943	23/10/1943	14/12/1943	80	52	132	Returned to USN 25 Feb 1946, struck off 28 Mar 1946, sold for scrapping 21 Apr 1947
Rutherford	K558	DE93	ditto	4/08/1943	23/10/1943	16/12/1943	80	54	134	Returned to USN 25 Oct 1945, struck off 19 Dec 1945, sold for scrapping May 1946
Cosby	K559	DE94	ditto	11/08/1943	20/10/1943	20/12/1943	70	61	131	Returned to USN 4 Mar 1946, struck off 13 Nov 1946, sold for scrapping 5 Nov 1946
Rowlay	K560	DE95	ditto	18/08/1943	30/10/1943	22/12/1943	73	53	126	Returned to USN 12 Nov 1945, struck off 8 Jan 1946, sold for scrap 14 Jun 1946

Fitzroy	K553	DE88	ditto	24/08/1943	1/09/1943	16/10/1943	8	45	53	Returned to USN 5 Jan 1946, struck off 7 Feb 1946, sold for scrapping 23 May 1946
Rupert	K561	DE96	ditto	25/08/1943	31/10/1943	24/12/1943	67	54	121	Returned to USN 20 Mar 1946, struck off 17 Apr 1946, sold for scrapping 17 Jun 1946
Stockham	K562	DE97	ditto	25/08/1943	31/10/1943	28/12/1943	67	58	125	Returned to USN 31 Jan 1946, struck off 12 Mar 1946, scrapped 15 June 1948
Seymour	K563	DE98	ditto	1/09/1943	1/11/1943	23/12/1943	61	52	113	Returned to USN 5 Jan 1946, struck off 25 Feb 1946, sold for scrapping 10 Dec 1946
Spragge	K572	DE563	ditto	15/09/1943	16/10/1943	14/01/1944	31	90	121	Returned to USN 28 Feb 1946, sold for scrapping 18 Nov 1947
Stayner	K573	DE564	ditto	22/09/1943	6/11/1943	30/01/1944	45	85	130	Returned to USN 24 Nov 1945, sold for scrapping 14 Nov 1947
Thornborough	K574	DE565	ditto	22/09/1943	13/11/1943	31/12/1943	52	48	100	Returned to USN 4 Jan 1947, struck off 7 Feb 1947, sold for scrapping 24 Apr 1947
Torrington	K577	DE568	ditto	22/09/1943	27/11/1943	18/01/1944	66	52	118	Returned to USN 11 June 1946, struck off 15 Oct 1946, sold for scrapping 26 Sep 1946
Trollope	K575	DE566	ditto	29/09/1943	20/11/1943	10/01/1944	52	51	103	Ran aground near Arromanches, France 6 July 1944, declared total constructive loss, returned to USN 14 Oct 1944, struck off 13 Nov 1944, sold for scrapping 9 Jan 1947, scrapped 1951
Narborough	K578	DE569	ditto	6/10/1943	27/11/1943	21/01/1944	52	55	107	Returned to USN 4 Feb 1946, sold for scrapping 14 Dec 1946
Tyler	K576	DE567	ditto	6/10/1943	20/11/1943	14/01/1944	45	55	100	Returned to USN 12 Nov 1945, struck off 8 Jan 1946, sold for scrap 23 May 1946
Waldegrave	K579	DE570	ditto	16/10/1943	4/12/1943	28/01/1944	49	55	104	Returned to USN 3 Dec 1945, struck off 21 Jan 1946, sold for scrapping 8 Dec 1946
Whitaker	K580	DE571	ditto	20/10/1943	12/12/1943	28/01/1944	53	47	100	Torpedoed 1 Nov 1944 by U-483 off Malin Head, Ireland, towed to Londerry then Belfast, declared a total constructive loss, struck off 19 May 1945, returned to USN 3 Dec 1945, sold for scrapping 9 Jan 1947
Hargood	K582	DE573	ditto	27/10/1943	19/12/1943	7/02/1944	53	50	103	Returned to USN 23 Feb 1946, struck off 12 Apr 1946, sold for scrapping 1947
Holmes	K581	DE572	ditto	27/10/1943	18/12/1943	31/01/1944	52	44	96	Returned to USN 7 Feb 1946, sold for scrapping Oct 1947
Hotham	K583	DE574	ditto	5/11/1943	21/12/1943	8/02/1944	46	49	95	Returned to USN 1956, sold for scrapping 1 Nov 1956

TOTAL DAYS	**3533**	**3155**	**6688**
AVERAGE	**77**	**69**	**145**

APPENDIX F

COLONY CLASS FRIGATES

By Laid Down Date

SHIP	PEN No.	US HULL No.	BUILDER	LAID DOWN	LAUNCHED	COMPLETED	DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
Anguilla	K500	1654	Walsh-Kaiser	1/04/1943	14/07/1943	15/10/1943	104	93	197	Returned to USA 30 May 1946, scrapped 13 June 1947
Antigua	K501	1655	Walsh-Kaiser	3/04/1943	26/07/1943	4/11/1943	114	101	215	Returned to USA 2 May 1946, sold for scrapping, date unknown
Bahamas	K503	1657	Walsh-Kaiser	7/04/1943	17/08/1943	6/12/1943	132	111	243	Returned to USA 11 June 1946, sold for scrapping 16 December 1947
Caicos	K505	1659	Walsh-Kaiser	23/04/1943	6/09/1943	31/12/1943	136	116	252	Returned to USA 12 December 1945, transferred to Argentian Navy 6 July 1947, scrapped 1
Ascension	K502	1656	Walsh-Kaiser	30/04/1943	6/08/1943	24/11/1943	98	110	208	Returned to USA 31 May 1946, sold 16 Oct 1947 for scrapping
Barbados	K504	1658	Walsh-Kaiser	11/05/1943	27/08/1943	18/12/1943	108	113	221	Returned to USA 15 April 1946, sold for scrapping 30 October 1947
Cayman	K506	1660	Walsh-Kaiser	15/07/1943	6/09/1943	20/01/1944	53	136	189	Returned to USA 23 April 1946, sold for scrapping 1 July 1947
Dominica	K507	1661	Walsh-Kaiser	27/07/1943	14/09/1943	25/01/1944	49	133	182	Returned to USA 23 April 1946, sold for scrapping 24 March 1947
Labuan (ex-Gold Coast)	K584	1662	Walsh-Kaiser	7/08/1943	21/09/1943	5/02/1944	45	137	182	Returned to USA 13 May 1946, scold 9 July 1957 for scrapping
Tobago (ex-Hong Kong)	K585	1663	Walsh-Kaiser	17/08/1943	27/09/1943	12/08/1944	41	320	361	Returned to USA 13 May 1946, sold to Egypt 1950, scuttled 1956
Montserrat	K586	1664	Walsh-Kaiser	28/08/1943	27/09/1943	31/08/1944	30	339	369	Returned to USA 11 June 1946, sold for scrapping 30 November 1947
Nyasaland	K587	1665	Walsh-Kaiser	7/09/1943	6/10/1943	31/07/1944	29	299	328	Returned to USA 15 April 1946, sold for scrapping 10 November 1947
Papua	K588	1666	Walsh-Kaiser	7/09/1943	10/10/1943	25/07/1944	33	289	322	Returned to USA 13 May 1946, sold to Egypt 1950, sunk in collision 17 May 1953
Pitcairn	K589	1667	Walsh-Kaiser	14/09/1943	15/10/1943	6/07/1944	31	265	296	Returned to USA 11 June 1946, sold for scrapping 5 November 1947
St Helena	K590	1668	Walsh-Kaiser	22/09/1943	20/10/1943	19/02/1944	28	122	150	Returned to USA 8 April 1946, sold for scrapping 1 July 1947
Sarawak*	K591	1669	Walsh-Kaiser	28/09/1943	25/10/1943	18/07/1944	27	267	294	Returned to USA 31 May 1946, scrapped 1947
Seychelles*	K592	1670	Walsh-Kaiser	28/09/1943	30/10/1943	27/06/1944	32	241	273	Returned to USA June 1946, scrapped 1947

Perim (ex-Sierra Leone)	K593	1671	Walsh-Kaiser	7/10/1943	5/11/1943	16/03/1944	29	132	161	Returned to USA 22 May 1946, scrapped 1947
Somaliland	K594	1672	Walsh-Kaiser	11/10/1943	11/11/1943	24/07/1944	31	256	287	Returned to USA 22 May 1946, scrapped 1947
Tortola	K595	1673	Walsh-Kaiser	16/10/1943	16/11/1943	15/05/1944	31	181	212	Returned to USA 22 May 1946, scrapped 10 September 1947
Zanzibar	K596	1674	Walsh-Kaiser	20/10/1943	21/11/1943	21/06/1944	32	213	245	Returned to USA 21 May 1946, scrapped 17 June 1947
						TOTAL DAYS	**1213**	**3974**	**5187**	
(Source:shipbuildinghistory.com)						**AVERAGE**	**58**	**189**	**247**	

*There is some debate aboute transfer dates so the later date has been chosen in both cases.

APPENDIX G

TACOMA CLASS PATROL FRIGATES

By Laid Down Date

NAME	USN HULL NUMBER	BUILDER	LAID DOWN	LAUNCHED	COMPLETED	DAYS TO LAUNCH	DAYS TO FIT OUT	DAYS TO COMPLETE	FATE
Covington	PF-56	Globe Shipbuilding Co.	1/03/1943	15/07/1943	10/10/1944	136	453	589	To USCG 1946, to Ecuadorian Navy 1947-1972, stricken 1974
Gloucester	PF-22	Walter Butler Shipbuilding Co.	4/03/1943	12/07/1943	10/12/1943	130	151	281	To Soviet Navy 1945-49, then JSDF 1953-68, to US for disposal
Shreveport	PF-23	Walter Butler Shipbuilding Co.	8/03/1943	15/07/1943	10/12/1943	129	148	277	Scrapped 1947
Tacoma	PF-3	Kaiser Cargo Inc	10/03/1943	7/07/1943	6/11/1943	119	122	241	To Soviet Navy 1945-49, then ROKN 1951-73, preserved South
Long Beach	PF-34	Consolidated Steel Corp.	19/03/1943	5/05/1943	8/09/1943	47	126	173	To Soviet Navy 1945-49, then JSDF 1953-57, scrapped 1967
Allentown	PF-52	Froemming Brothers Inc.	23/03/1943	3/07/1943	24/03/1944	102	265	367	To Soviet Navy 1945-49, then JSDF 1953-70, to US for disposal
Belfast	PF-35	Consolidated Steel Corp.	26/03/1943	20/05/1943	24/11/1943	55	188	243	To Soviet Navy 1945-48, wrecked 1948
Glendale	PF-36	Consolidated Steel Corp.	6/04/1943	20/05/1943	1/10/1943	44	134	178	To Soviet Navy 1945-49, then Royal Thai Navy 1951-2000, prese
Sausalito	PF-4	Kaiser Cargo Inc	7/04/1943	20/07/1943	4/03/1944	104	228	332	To Soviet Navy 1945-49, then ROKN 1952-73, scrapped 1973
Hoquiam	PF-5	Kaiser Cargo Inc	10/04/1943	31/07/1943	8/05/1944	112	282	394	To Soviet Navy 1945-49, then ROKN 1952-73, scrapped 1973
Knoxville	PF-64	Leatham D Smith Shipyard	15/04/1943	10/07/1943	29/04/1944	86	294	380	To Dominican Navy 1948-1979, scrapped 1979
San Pedro	PF-37	Consolidated Steel Corp.	17/04/1943	11/06/1943	23/10/1943	55	134	189	To Soviet Navy 1945-49, then JSDF 1953-67, to US then sunk as
Sheboygan	PF-57	Globe Shipbuilding Co.	17/04/1943	31/07/1943	26/05/1944	105	300	405	To Belgian Navy 1947-57, scrapped 1959

Uniontown	PF-65	Leatham D Smith Shipyard	21/04/1943	7/08/1943	6/10/1944	108	426	534	To Argentine Navy 1947-66, fate unknown
Huron	PF-19	American Shipbuilding Co.	1/05/1943	3/07/1943	7/09/1944	63	432	495	Scrapped 1947
Gulfport	PF-20	American Shipbuilding Co.	*3/05/1943*	21/08/1943	16/09/1944	110	392	502	Scrapped 1947
Bayonne	PF-21	American Shipbuilding Co.	6/05/1943	11/09/1943	14/02/1945	128	522	650	To Soviet Navy 1945-49, then JSDF 1953-65, then sunk as targe
Coronado	PF-38	Consolidated Steel Corp.	6/05/1943	17/06/1943	17/11/1943	42	153	195	To Soviet Navy 1945-49, then JSDF 1953-69, then US for dispos
Abilene	PF-58	Globe Shipbuilding Co.	6/05/1943	21/08/1943	28/10/1944	107	434	541	To Netherlands Government 1947-69, scrapped 1969
Machias	PF-53	Froemming Brothers Inc.	8/05/1943	22/08/1943	29/03/1944	106	220	326	To Soviet Navy 1945-49, then JSDF 1953-66, sold for scrapping
Muskegon	PF-24	Walter Butler Shipbuilding Co.	11/05/1943	25/07/1943	19/02/1944	75	209	284	To USCG 1946, to French Navy 1947-late 1950s, scrapped late
Chartlottesville	PF-25	Walter Butler Shipbuilding Co.	12/05/1943	30/07/1943	10/04/1944	79	255	334	To Soviet Navy 1945-49, then JSDF 1953-69, then US for dispos
Annapolis	PF-15	American Shipbuilding Co.	20/05/1943	16/10/1943	4/12/1944	149	415	564	To Mexican navy 1947-1964, scrapped 1964
Bangor	PF-16	American Shipbuilding Co.	20/05/1943	6/11/1943	22/08/1944	170	290	460	To USCG 1946, to Mexican Navy , scrapped 1964
Ogden	PF-39	Consolidated Steel Corp.	21/05/1943	23/06/1943	20/12/1943	33	180	213	To Soviet Navy 1945-49, then JSDF 1953-76, then US for dispos
Reading	PF-66	Leatham D Smith Shipyard	23/05/1943	28/08/1943	19/08/1944	97	357	454	To Argentine Navy 1947-66, scrapped 1966
Peoria	PF-67	Leatham D Smith Shipyard	25/05/1943	2/10/1943	2/01/1945	130	458	588	To Cuban Navy 1947-75, sunk as target 1975
Poughkeepsie	PF-26	Walter Butler Shipbuilding Co.	3/06/1943	12/08/1943	6/09/1944	70	391	461	To Soviet Navy 1945-49, then JSDF 1953-69, then ROKS for par
Newport	PF-27	Walter Butler Shipbuilding Co.	5/06/1943	15/08/1943	8/09/1944	71	390	461	To Soviet Navy 1945-49, then JSDF 1953-72, then US for dispos
Eugene	PF-40	Consolidated Steel Corp.	12/06/1943	6/07/1943	15/01/1944	24	193	217	To Cuban Navy 1947-76, scrapped 1976
El Paso	PF-41	Consolidated Steel Corp.	18/06/1943	16/07/1943	1/12/1943	28	138	166	Scrapped 1947
Key West	PF-17	American Shipbuilding Co.	23/06/1943	29/12/1943	7/11/1944	189	314	503	Scrapped 1947
Alexandria	PF-18	American Shipbuilding Co.	23/06/1943	15/01/1944	11/03/1945	206	421	627	Scrapped 1947
Van Buren	PF-42	Consolidated Steel Corp.	24/06/1943	27/07/1943	17/12/1943	33	143	176	Scrapped 1947
Pasco	PF-6	Kaiser Cargo Inc	7/07/1943	17/08/1943	15/04/1944	41	242	283	To Soviet Navy 1945-49, then JSDF 1953-67, then ROKS for spa
Orange	PF-43	Consolidated Steel Corp.	7/07/1943	6/08/1943	1/01/1944	30	148	178	Scrapped 1948
Sandusky	PF-54	Froemming Brothers Inc.	8/07/1943	5/10/1943	18/04/1944	89	196	285	To Soviet Navy 1945-49, then JSDF 1953-70, to US for disposal
Emporia	PF-28	Walter Butler Shipbuilding Co.	14/07/1943	30/08/1943	12/06/1944	47	287	334	To French Navy 1947-1958, scrapped 1958

Groton	PF-29	Walter Butler Shipbuilding Co.	15/07/1943	14/09/1943	5/09/1944	61	357	418	To Colombian Navy 1947-65, stricken 1965
Brunswick	PF-68	Leatham D Smith Shipyard	16/07/1943	6/11/1943	2/10/1944	113	331	444	Scrapped 1947
Corpus Christi	PF-44	Consolidated Steel Corp.	17/07/1943	17/08/1943	29/01/1944	31	165	196	Scrapped 1947
Alberquerque	PF-7	Kaiser Cargo Inc	20/07/1943	14/09/1943	20/12/1943	56	97	153	To Soviet Navy 1945-49, then JSDF 1951-69, then US for dispos
Beaufort	PF-59	Globe Shipbuilding Co	21/07/1943	9/10/1943	28/08/1944	80	324	404	Scrapped 1947
Hingham	PF-30	Walter Butler Shipbuilding Co.	25/07/1943	27/08/1943	3/11/1944	33	434	467	Scrapped 1947
Hutchinson	PF-45	Consolidated Steel Corp.	28/07/1943	27/08/1943	3/02/1944	30	160	190	Mexican Navy 1947-64, scrapped 1964
Grand Rapids	PF-31	Walter Butler Shipbuilding Co.	30/07/1943	10/09/1943	10/10/1944	42	396	438	Scrapped 1947
Everett	PF-8	Kaiser Cargo Inc	31/07/1943	29/09/1943	22/01/1944	60	115	175	To Soviet Navy 1945-49, then JSDF 1953-75, then US for dispos
Orlando	PF-99	American Shipbuilding Co.	2/08/1943	1/12/1943	15/11/1944	121	350	471	Scrapped 1947
Charlotte	PF-60	Globe Shipbuilding Co	5/08/1943	30/10/1943	9/10/1944	86	345	431	Sold 1947, scrapped 1965
Bisbee	PF-46	Consolidated Steel Corp.	7/08/1943	7/09/1943	15/02/1944	31	161	192	To Soviet Navy 1945-49, then Columbian Navy 1952-63, scrappe
Davenport	PF-69	Leatham D Smith Shipyard	7/08/1943	8/12/1943	15/02/1945	123	435	558	Scrapped 1946
Woonsocket	PF-32	Walter Butler Shipbuilding Co.	12/08/1943	27/09/1943	1/09/1944	46	340	386	To USCG 1946, to Peruvian Navy 1948-61, scrapped date unkno
Dearborn	PF-33	Walter Butler Shipbuilding Co.	15/08/1943	27/09/1943	10/09/1944	43	349	392	Scrapped 1947
Pocatello	PF-9	Kaiser Cargo Inc	17/08/1943	17/10/1943	18/02/1944	61	124	185	Scrapped 1947
Gallup	PF-47	Consolidated Steel Corp.	18/08/1943	17/09/1943	29/02/1944	30	165	195	To Soviet Navy 1945-49, then Thai Navy 1951-2000, preserved 2
Bath	PF-55	Froemming Brothers Inc.	23/08/1943	14/11/1943	1/09/1944	83	292	375	To Soviet Navy 1945-49, then JSDF 1953-71, sold for scrapping
Manitowoc	PF-61	Globe Shipbuilding Co	26/08/1943	30/11/1943	24/10/1944	96	329	425	To USCG 1946, to French Navy 1947-58, scrapped 1958
Rockford	PF-48	Consolidated Steel Corp.	28/08/1943	27/09/1943	6/03/1944	30	161	191	To Soviet Navy 1945-49, then ROKN 1950-52, to US for disposal
Evansville	PF-70	Leatham D Smith Shipyard	28/08/1943	27/11/1943	4/12/1944	91	373	464	To Soviet Navy 1945-49, then JSDF 1953-76, to US for disposal
Brownsville	PF-10	Kaiser Cargo Inc	14/09/1943	14/11/1943	6/05/1944	61	174	235	To USCG 1946, scrapped 1947
Racine	PF-100	American Shipbuilding Co.	14/09/1943	15/03/1944	22/01/1945	183	313	496	Scrapped 1947
Muskogee	PF-49	Consolidated Steel Corp.	18/09/1943	18/10/1943	16/03/1944	30	150	180	To Soviet Navy 1945-49, then ROKN 1950, fate unknown
Carson City	PF-50	Consolidated Steel Corp.	28/09/1943	13/11/1943	24/03/1944	46	132	178	To Soviet Navy 1945-49, then JSDF 1953-71, sold for scrapping
Grand Forks	PF-11	Kaiser Cargo Inc	29/09/1943	27/11/1943	18/03/1944	59	112	171	Scrapped 1947

New Bedford	PF-71	Leatham D Smith Shipyard	2/10/1943	29/12/1943	18/11/1944	88	325	413	Scrapped 1947
Gladwyne	PF-62	Globe Shipbuilding Co	14/10/1943	7/01/1944	21/11/1944	85	319	404	To Mexican Navy 1947-65 scrapped 1965
Casper	PF-12	Kaiser Cargo Inc	17/10/1943	27/12/1943	31/03/1944	71	95	166	Scrapped 1947
Burlington	PF-51	Consolidated Steel Corp.	19/10/1943	7/12/1943	3/04/1944	49	118	167	To Soviet Navy 1945-49, then Columbian Navy 1952-68, scrappe
Greensboro	PF-101	American Shipbuilding Co.	*24/10/1943*	9/02/1944	22/01/1945	108	348	456	Scrapped 1948
Lorain	PF-93	American Shipbuilding Co.	25/10/1943	18/03/1944	15/01/1945	145	303	448	To French Navy 1947-1950, sunk by mine 1950
Moberly	PF-63	Globe Shipbuilding Co	3/11/1943	26/01/1944	11/12/1944	84	320	404	Scrapped 1947
Milledgeville	PF-94	American Shipbuilding Co.	9/11/1943	5/04/1944	18/01/1945	148	288	436	Scrapped 1948
Pueblo	PF-13	Kaiser Cargo Inc	19/11/1943	20/01/1944	27/05/1944	62	128	190	To Dominican Navy 1948-1979, scrapped 1982
Grand Island	PF-14	Kaiser Cargo Inc	27/11/1943	19/02/1944	27/05/1944	84	98	182	To Cuban Navy 1947-1970s? Fate unknown
Forsyth	PF-102	American Shipbuilding Co.	6/12/1943	20/05/1944	11/02/1945	166	267	433	To USCG 1946, to Netherlands Government 1947-63, scrapped

TOTAL DAYS	**6,265**	**19,724**	**25,989**
AVERAGES	**84**	**263**	**347**

Notes: The two launch dates in italics are assumed.
American Shipbuilding Co. had two shipyards, Lorain and Cleveland

JSDF = Japanese Self Defence Force

ROKN = Republic of Korea Navy

USCG = United States Coast Guard

APPENDIX H Ship Stability: Definition of Metracentric Height

The metacentric height (GM) is a measurement of the initial static stability of a floating body. It is calculated as the distance between the centre of gravity of a ship and its metacentre. A larger metacentric height implies greater initial stability against overturning. The metacentric height also influences the natural period of rolling of a hull, with very large metacentric heights being associated with shorter periods of roll which are uncomfortable for passengers. Hence, a sufficiently, but not excessively, high metacentric height is considered ideal for passenger ships. When a ship heels, the centre of buoyancy of the ship moves laterally. It might also move up or down with respect to the water line. The point at which a vertical line through the heeled centre of buoyancy crosses the line through the original, vertical centre of buoyancy is the metacentre. The metacentre remains directly above the centre of buoyancy by definition. Very tender boats with very slow roll periods are at risk of overturning, but are comfortable for passengers. However, vessels with a higher metacentric height are "excessively stable" with a short roll period resulting in high accelerations at the deck level. A larger metacentric height can cause a vessel to be too "stiff"; excessive stability is uncomfortable for passengers and crew. This is because the stiff vessel quickly responds to the sea as it attempts to assume the slope of the wave. An overly stiff vessel rolls with a short period and high amplitude which results in high angular acceleration. This increases the risk of damage to the ship and to cargo and may cause excessive roll in special circumstances where the frequency of the wave coincides with the frequency of the ship roll. Roll damping by bilge keels of sufficient size will reduce the hazard. In contrast, a "tender" ship lags behind the motion of the waves and tends to roll at lesser amplitudes.

APPENDIX I THE 3”/50 CAL Mk 20-22 AND 12-POUNDER 12 CWT GUNS COMPARED

It is interesting to note the frequent disparaging comments about the American 3”/50 cal, presumably the Mk 20 or 22, the difference being only minor relating to the type of barrel and its construction. fitted as standard equipment on the Captain and Colony Class frigates.

There’s the *“Everyone knows the 3-inch projectile will not put a dent in a pat of butter”* quote from the Captain of HMS *Duckworth* from Chapter 5.

Captain Donald Macintyre’s book, U-Boat Killer (page 139) contains these comments:

“The principal weakness of these ships [the Captain Class] *was the main gun armament. I cannot imagine where the Americans found the short-barrelled 3-inch blunderbusses with which they were furnished – elephant guns, I remember, we nick-named them. They fired a minute shell of, I suspect, solid steel with no explosive charge for on the only occasion we fired them in anger they were seen to bounce off the target without exploding.”*

Here’s another instance:

On 26 January 1945 four frigates, HM Ships *Aylmer, Bentinck, Calder and Manners* forced U-1051 to the surface with depth charges whereupon the submarine fired on the frigates. Lt. A.D.P. Campbell, RN of *Aylme*r, apparently being nearest, chose to successfully ram U-1051 and sink her on the common understanding that the 3”/50 cal guns had trouble penetrating the hull of a submarine and simply bounced off. Whether that was something experienced in that engagement or was simply regarded as common knowledge is not known.

The problem seems to have been hitting power, not range. The nearest comparable gun in the RN’s armoury was the venerable QF 12-pounder 12 cwt (dating from 1894) which was used as the anti-aircraft weapon of choice, for instance, in the RCN’s early River Class frigates, was fitted to many of the early Australian Bathurst Class corvettes for the RAN and all of the Bathurst Class corvettes for the Royal Indian Navy as their main weapon. It was the weapon that replaced the aft 4-inch/50 cal – a low-angle gun - on the Town Class destroyers in the Stage 1 Modifications, it was used to replace the aft bank of torpedoes in many of the pre-war RN destroyer classes – again as an anti-aircraft weapon but with use as an anti-submarine weapon too. The 12-pounder had a three-inch bore too and both guns had reasonable muzzle velocity: the 12-pounder 2,264 feet per second and the 3”/50 cal 2,700 feet per second. While the 12-pounder’s ceiling at maximum elevation was only 19,000 feet the 3”/50 cal was 74% better at 33,000 feet. Similarly, the 12-pounder was down in range: at 40 degrees elevation only 11,750 yards as compared with 14,600 yards at 43 degrees elevation – 24.25% better. However, the big difference in favour of the 12-pounder appears to

have been the bursting charge that could be delivered to the target even if it wasn't at as great a range. The British gun had 1 lb 3 oz (19-ozs) whereas the American gun only .74 lbs (11.84-ozs) - that's 60.47% more hitting power.

APPENDIX J THE 20mm OERLIKON GUN

The Royal Navy was slow to adopt the 20mm Oerlikon gun despite the urgings of, then, Commander Lord Louis Mountbatten starting in 1937 when the Austrian-designed (Anton Gazda) and Swiss-manufactured weapon came to notice. The Navy puts its faith in close-range anti-aircraft defence in two weapons: the 2-pounder "pom-pom" (in single, four and eight-barrelled versions) and the Vickers .5" multiple machine gun. Both were found wanting. The 2-pounder was heavy, low-velocity and lacked range (yet soldiered on to the end of World War II). The Vickers lacked range and hitting power. The Oerlikon offered a light mounting, high velocity and hitting power.

Mountbatten had one fitted to an experimental MTB and then got the attention of Admiral Sir Roger Backhouse, Commander-in-Chief of the Home Fleet who, as an ex-gunnery officer was able to see the advantages. He became First Sea Lord and in 1939 an order was placed for 1,500 but only 109 had been received when France fell in June 1940.

How Britain obtained the licence and the technical drawings to build the Oerlikons is a story in itself involving a perilous three-week journey to get the documents home via the Balkans, Turkey, Palestine to Egypt. Production was to have been in Brighton but that idea had to be abandoned when France fell then the ridiculous situation persisted for some months where the machine tools to build the guns had no home due to an inability of various authorities to agree on a suitable site until, perchance, Commander Charles Goodeve, in charge of the Directorate of Miscellaneous Weapons Development – the "Wheezers and Dodgers" – happened to see a shed holding Underground Railway coaches on a railway siding in Ruislip. It looked ideal. After a lot of pushing and shoving on his part the problem was solved. Despite Communist agents stirring up trouble and causing delays via shop stewards– Germany and Russia were still allies – despite a bottleneck with gun-barrel production, the first gun was finished and tested in seven months. A year later 750 guns per month per being churned out and this rose to 1,000 supported by other factories. There is some disagreement about when the first British-produced guns went into service. It seems generally accepted that it was March-April 1941 but some sources report it as late as November 1941.

The USN put its faith in the four-barrelled 1.1"/75 cal – often called the *"Chicago Piano".* While its first installation was in 1939 and it was still being fitted as late as 1942, the 20mm Oerlikon - and, later, the 40mm Bofors – replaced it because it was an ineffective weapon, prone to jamming. The Oerlikon replaced it only because the British sought alternative sources of supply for the Oerlikon should the Ruislip factory be bombed. The Americans were quicker to warm to the advantages of the Oerlikon and in a demonstration of its abilities, one man, Captain William Blandy of the Bureau of Ordinance, was able to make a decision to adopt the weapon. All the plans had to be converted from metric dimensions to imperial equivalents. Indeed, even if this was to happen today, the US fixation with the outdated Imperial measures system is laughable. The first American-made gun was test-fired on 8 June 1941. When production ended in 1945, 124,735 guns had been made in America.

There were many different models of the Oerlikon but the most common can be summed up as follows:

> Single barrelled either with a fixed pedestal mounting where elevation was achieved by the gunner stepping up or down on a series of ringed steps OR where elevation was achieved by a wheel on the left-hand side of the mount operated by another person.
>
> Twin barrelled either manual, basically as above, or power-operated.

The type of sights varied from, initially, a simple ring-and-bead type to a quite sophisticated Mk 14 gunsight which used two gyroscopes to measure vertical and lateral rates of change and calculated the lead angle to the target and then projected an off-set aiming point for the gunner. Unfortunately, it took three minutes to warm up. That's 15 miles for an aircraft at 300 mph!