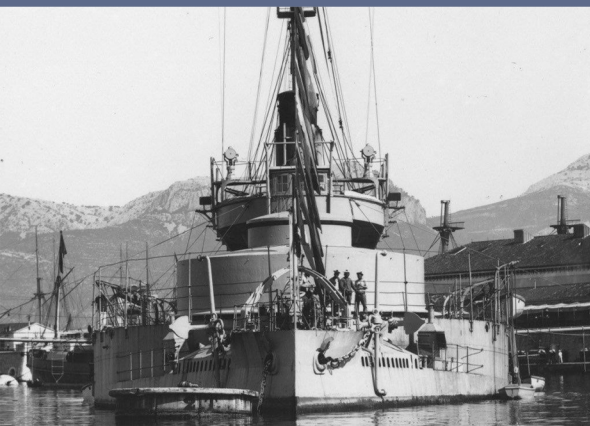


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# WARSHIP 2016

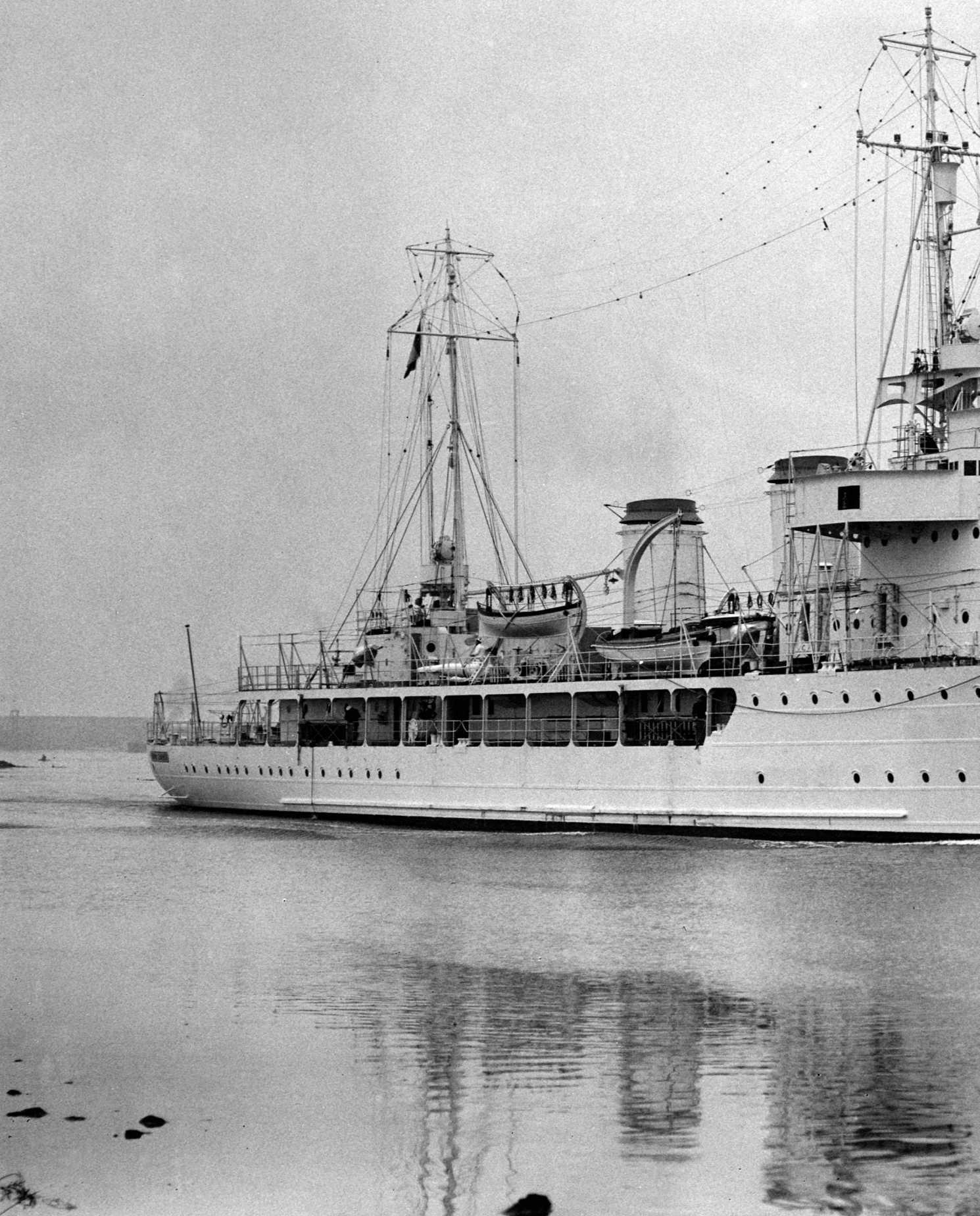
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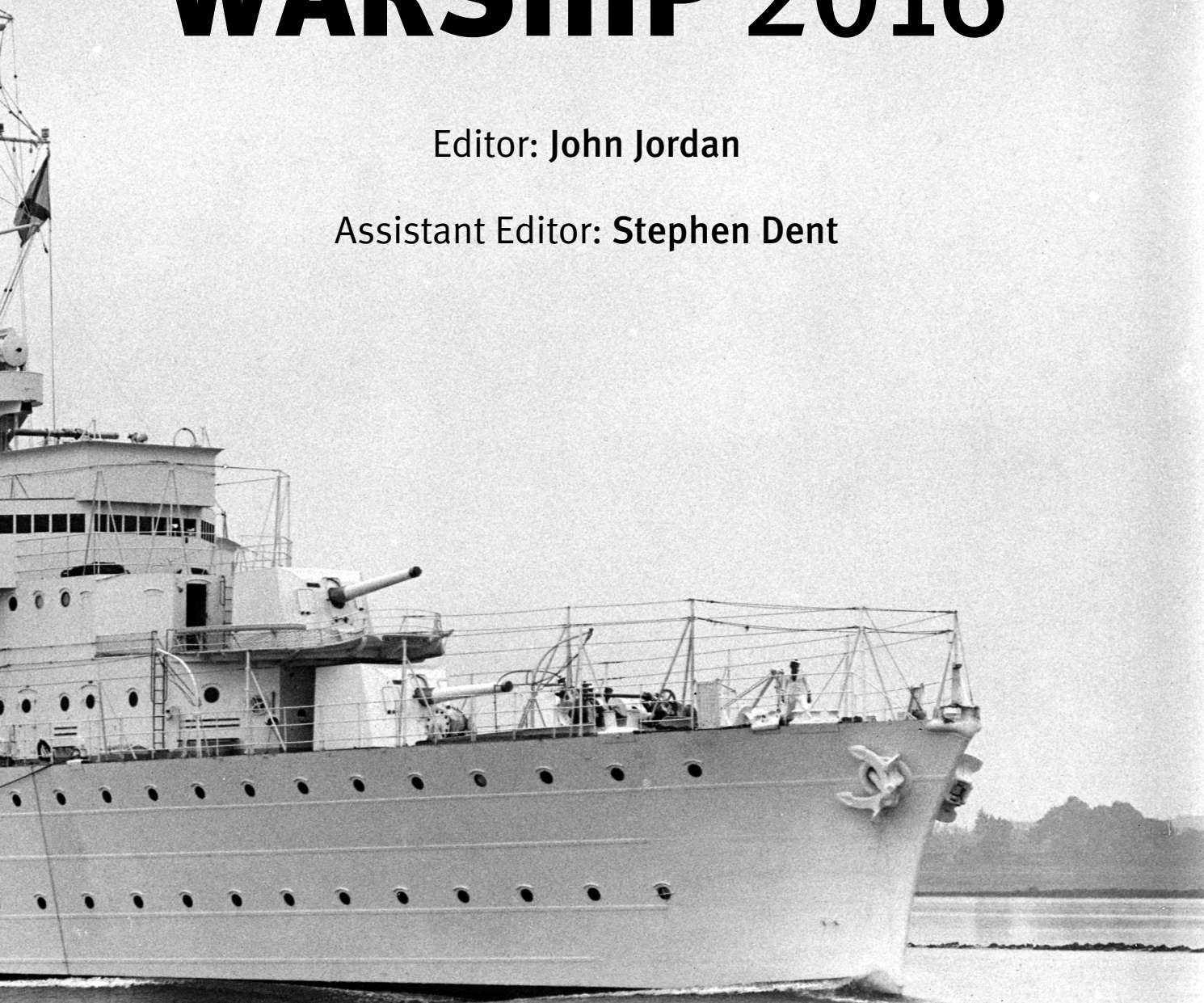
# **WARSHIP 2016**



# WARSHIP 2016

Editor: John Jordan

Assistant Editor: Stephen Dent



**C**

**CONWAY**

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*Title pages:* The French colonial sloop *Amiral Charner* arriving in Melbourne, Australia, on 4 November 1934 for the Centenary Celebrations. *Amiral Charner* and her sisters are the subject of an article by the Editor published on p.8 of this year's annual. (Allan C Green collection, State Library of Victoria)

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# EDITORIAL

Readers will notice a number of changes in the look of the annual this year. For some years our Assistant Editor, Stephen Dent, has been looking to improve the appearance of the internal pages by adopting more modern typefaces and more attractive, flexible layouts. Conway's new parent company, Bloomsbury Publishing, has given us every encouragement and support, and has provided a new cover to complement the internal redesign. The changes have already attracted favourable comment from our contributors, who particularly liked the new table format, and we hope that they will be equally well received by the readership. Throughout the redesign process our primary concern has been to ensure that the high quality of writing and presentation which readers have come to associate with the annual is not adversely affected; we think it is actually enhanced.

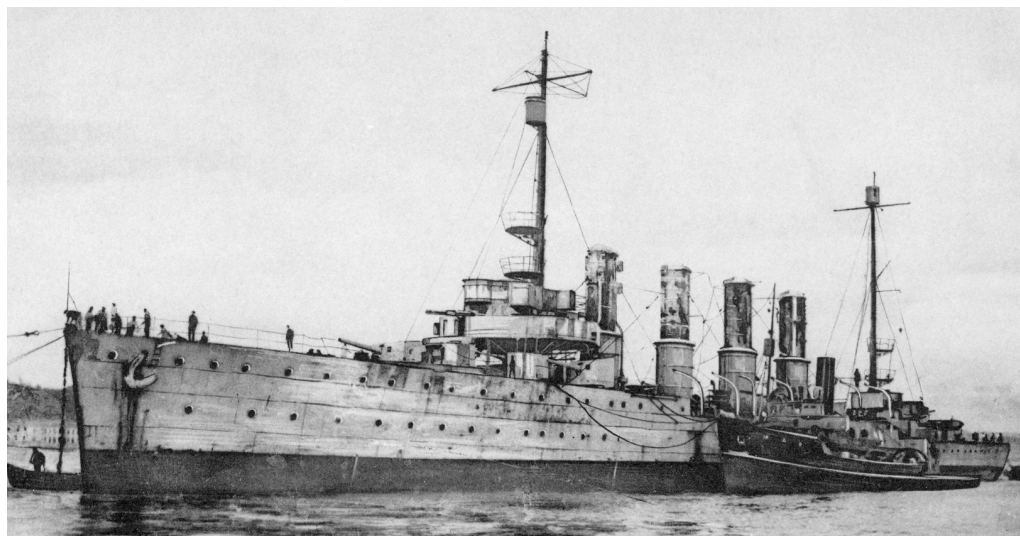
The evolution of *Warship* has been underpinned by continuity in the editorial team, who have been together now for twelve years. Some of the established contributors remain, while many new contributors have been introduced during that period. Stephen Dent, who has often contributed Warship Notes and edited the Warship Gallery in the past, has this year contributed his first feature article, on the little-known employment of the old French battleship *Courbet* for trials of a British secret weapon during the Second World War. The article sheds light on the often fraught wartime relationship between the Royal Navy and the Free French naval forces (FNFL), which came to a head in this particular episode over which flag (or flags!) she should fly during her unorthodox mission. We also welcome on board A D Baker III, former editor of the authoritative *Combat Fleets*, with whom many readers will also be familiar due to his work as an illustrator for the books of Norman Friedman. This year sees the publication of the first of what we hope will be a series of contributions centred around the artist's superb line drawings, based on the official plans of the ships. This year's contribution, on HMS *Colossus*, is the subject of our Warship Gallery.

Readers cannot have failed to notice the anticipation already building for the centenary of the Battle of Jutland, which took place on 31 May 1916. Besides a major exhibition featuring the largest collection of artefacts, photographs and personal testimonies ever assembled which will open in the Spring at the National Museum of the Royal Navy in Portsmouth, a number of new studies are scheduled for publication during the early part of next year, the most significant of which will be reviewed in *Warship 2017*. In the past, much of the criticism directed at the C-in-C Grand Fleet, Admiral John Jellicoe, for his failure to inflict a crushing defeat on the German High Seas Fleet has focused on his predilection for an over-rigid centralisation of command. As a follow-up to his ground-breaking article on Jellicoe's

deployment at Jutland published in *Warship 2010*, it was suggested to Stephen McLaughlin that he might like to consider an article on the alternative 'divisional' tactics considered and developed by the Royal Navy before the Great War and subsequently championed by some of Jellicoe's critics as an alternative path to decisive victory in a battle involving large and inherently unwieldy battlefleets. Happily Stephen agreed, and the results are published in this year's annual.

Our coverage of the Great War is completed by the concluding part of 'War in the Adriatic' by Enrico Cernuschi and Vincent O'Hara, which focuses on the period 1916–18. Besides filling a pronounced gap in the history of naval operations during the period in question, the article raises some fundamental questions about the use of seapower in confined waters. Neither the Austro-Hungarian Navy's overall strategy nor the tactics it employed using the resources at its disposal emerge with much credit from this analysis.

With the scale of the battlefleets much reduced following the Washington Naval Arms Limitation Treaty of 6 February 1922 and the institution of a ten-year 'battleship holiday', the attention of those major powers with world-wide interests to defend turned to 'trade protection' cruisers, long-range submarines capable of operating from overseas bases, and small (but capable) surface units for overseas deployment which could remain on station either permanently or for extended periods of time, and which could undertake local sea control and policing duties. The 'trade' cruisers have received extensive coverage in English-language sources; in contrast, the 'colonial sloops' built by Britain, France and Italy from the late 1920s have been almost entirely neglected because of their marginal contribution to 'fleet-on-fleet' action and to oceanic antisubmarine warfare during the Second World War. Yet during the interwar period considerable resources were invested in these ships, particularly by France which, despite the need to police a world-wide empire second only to that of Britain, had only a small force of cruisers compared to the Royal Navy. The French colonial sloops of the *Bougainville* class, laid down from 1929, were powerful, well-armed ships which incorporated features specifically intended for independent operation in tropical and equatorial climates. The design not only influenced the characteristics of the 'treaty-exempt' category defined by the London Treaty of 1930, but inspired similar ships built or designed by the Italian Regia Marina to police its newly-acquired empire in East Africa and the Red Sea. This year's annual begins with a detailed study by the Editor of the French *Bougainville* class, which is followed by an article by Michele Cosentino on the Italian *Eritrea*; both of these articles include much previously unpublished material.



The former German light cruiser *Stralsund* at Cherbourg in 1920; she subsequently became the French *Mulhouse*. *Stralsund* and the other German light cruisers which survived the First World War will be the subject of a major feature article in *Warship 2017*. (Jean Moulin collection)

Our third feature article on warships of the interwar period is Hans Lengerer's study of the IJN destroyers of the *Asashio* class. The *Asashio* represented a return to the 'super-destroyers' of the 'Special Type' following the constraints on destroyer displacement imposed by the London Treaty of 1930. However, the introduction of a new intermediate-pressure turbine proved problematic, with a number of instances of blade failure due to vibration and other stresses. Building on the research of Japanese author Hori Motoyoshi, Hans Lengerer gives a detailed account of the lengthy and involved process of investigating and remedying these defects. The *Asashio* was also the first IJN destroyer to feature the fully-developed torpedo fire control and reloading apparatus and procedures which set the standard for the later *Kagero* and *Yugumo* classes, and which made a considerable impression on the US Naval Technical Mission to Japan in 1945–46; these features are fully documented in the article.

Coverage of the interwar period is concluded by an article on the Soviet minesweepers of the *Fugas* class by regular contributors Richard Worth and Vladimir Yakubov. These were the first minesweepers designed and built for the Soviet Navy; no fewer than 42 ships were completed between November 1936 and April 1941, and the original design was subject to several upgrades in configuration and capability. Although the primary role of the *Fugas* class was minesweeping, once war broke out these ships were employed as maids of all work, taking part in escort and fire support missions, landings and evacuations; many suffered serious damage or loss. The article provides a full listing of their wartime activities.

The period from 1870 to the Great War is represented by two feature articles: Philippe Caresse's study of the French coast defence battleship *Tempête* exposes the technical and tactical limitations of this type of ship, while Richard Wright, author of the seminal book *The Chinese Steel Navy*, returns after a lengthy absence to probe the mystery surrounding the movements of the protected cruiser *Hai Chi* during the period 1911–12,

when a pre-planned world cruise effectively removed her from Chinese waters in the build-up to the Revolution of October 1911.

Conrad Waters' regular feature on modern warship developments focuses this year on the craft specially developed by a number of Western navies for littoral warfare. These vary from the frigate-sized Littoral Combat Ships (LCS) currently being built in two parallel variants for the US Navy to the Swedish *Visby* and the Norwegian *Skjold* classes of fast patrol boat. All these types feature low-visibility features such as camouflage and hull-forms and superstructures designed to minimise radar signature; composite materials, modular payloads and waterjet propulsion are also key features of many of the designs. The article demonstrates how concepts of naval warfare are evolving, with shallow-water operations becoming as important as ocean warfare.

In this year's Warship Notes Aidan Dobson provides an account of the twilight career of the German battlecruiser *Derfflinger*, Ian Johnston contributes an eye-witness account of the sinking of the submarine *K13* while conducting diving trials on the Clyde in January 1917, and Henk Visser looks at the design of the first class of destroyer built post-war for the Royal Netherlands Navy, the Type 47A.

Next year's annual is already in preparation and will have the customary range of subjects, navies and historical periods. Major feature articles will include a study of the first Japanese all-big-gun battleships, *Kawachi* and *Settsu*, by Kathrin Milanovich, a detailed account of the service careers and fate of the ex-German cruisers which served with the *Reichsmarine* or with foreign navies after 1918 by Aidan Dodson, an article by David Murfin on the treaty cruiser designs drawn up by the Royal Navy during the late 1920s, and an account of the Australian Navy's ill-fated attempt to design and build a modern 'light destroyer' (DDL) during the early 1970s by Mark Briggs.

John Jordan  
April 2016

# THE COLONIAL SLOOP OF THE *BOUGAINVILLE* CLASS

The interwar period saw the construction by the major imperial powers of vessels specifically intended for the policing of their overseas possessions. **John Jordan** looks at the French *Bougainville* class, the characteristics of which set the standard for the ‘treaty exempt’ category at the London Conference of 1930.

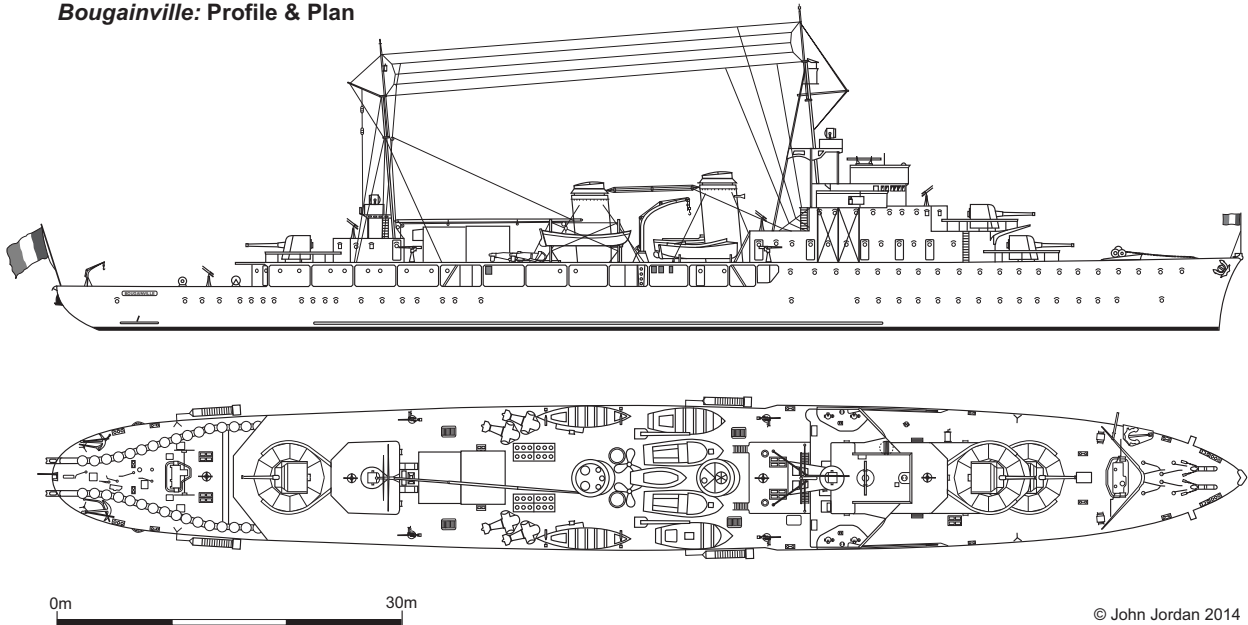
**O**f the five major powers which attended the Washington Naval Conference of 1921–22 only two, Britain and France, had major empires which extended around the globe. The United States had inherited a number of former Spanish colonies in the Caribbean and the Western Pacific, and Italy and Japan had ambitions to create new empires of their own for reasons of national prestige; however, none of these countries could be said to carry the weight of ‘imperial burden’ to the same extent as Britain and France, and none maintained substantial naval squadrons overseas. These differences in perceived national security requirements were to result in serious problems for the naval arms limitation process both during the Washington conference negotiations and for the fifteen years

(1922–36) during which the treaty system was in force.

When France was presented with a *fait accompli* at Washington with regard to her allocated capital ship tonnage, the French delegation made it clear that this derisory figure could be accepted only on condition that no attempt was made to extend the 5:3:1.75 ratio to ‘auxiliary’ vessels or to abolish the submarine. France needed cruisers and submarines not only for its battle fleet but to protect its widely-separated possessions overseas. Similar considerations were at the root of the Anglo-US dispute over cruiser numbers which threatened to wreck the treaty system during the late 1920s, and which was resolved only when the British Prime Minister Ramsay MacDonald was prepared to make substantial concessions in the lead-up to the 1930 London



An aerial view of the nameship of the class, *Bougainville* (A1), at Majunga on the northwest coast of Madagascar, during her first deployment to the Indian Ocean. She has yet to be embark a reconnaissance aircraft or the planned minesweeping paravanes amidships, so the after part of the shelter deck is unusually uncluttered. Note the wooden planking on the forecastle and shelter decks, and the canvas awnings over the quarterdeck and the bridge decks. (Forces Aériennes Françaises de Madagascar, courtesy of Jean Moulin)

**Bougainville: Profile & Plan**

Conference in the interests of world peace. The British, like the French, ideally would have liked to establish a theoretical division between cruisers for the fleet and cruisers for trade protection, with only the former being counted under the quantitative limits proposed. However, the Americans rejected this proposal out of hand, arguing that cruisers designed for trade protection could still be used to supplement 'the fleet' in the event of conflict between nations and possibly tip the balance.

One of the ways out of this potential *impasse* was to develop a class of warship specifically for policing duties overseas which, while having substantial defensive capabilities, would be poorly suited to operation with the fleet. Clearly there would need to be limits on size and firepower (ie gun calibre and number); the hull of a small cruiser or a large destroyer would suffice. More importantly, offensive qualities such as high speed and the ability to launch torpedoes were out of the question, with endurance (for lengthy transits in the Indian Ocean and the Pacific) and habitability (for the hot, humid climates of the tropics) being more important considerations. A key attraction for all the major powers was that there was no compelling reason why such a vessel should be counted within quantitative treaty limits, as it was purely defensive in nature and posed no aggressive threat to any other power.

Traditionally the French Navy had used older sloops and cruisers for overseas policing duties. However, in the wake of the Washington Treaty, the French 1922 Programme envisaged ten ships specifically designed to serve on foreign stations and to be able to operate in extreme climates. The initial classification of these ships was *aviso pour campagnes lointaines* (sloop for overseas deployments); later the term *aviso colonial* (colonial sloop) was frequently used. The massive investment in terms of funding and resources necessary to rebuild the

fleet following the Great War resulted in a five-year delay in the ordering of these ships, which allowed a lot of thought to go into the design.

In the lead-up to the Geneva Conference of 1927, which was to focus on resolving the Anglo-US cruiser issue, Britain formally proposed a new type of 'treaty exempt' vessel for the overseas policing role. The qualitative limits of these ships were to be as follows:

- maximum displacement: 2000 tons (2032mt) standard
- maximum gun calibre: 5-inch (127mm)
- maximum speed: 18 knots
- no torpedo tubes

The proposals were favourably received, and during the 'Coolidge negotiations' between the British, American and Japanese delegations – the French and the Italians declined to attend the conference – an increase in gun calibre to 6.1-inch (155mm) and a maximum number of four guns above 4-inch (102mm) was agreed. However, the failure to resolve the cruiser issue meant that the proposed 'treaty-exempt' category was effectively put on the back-burner until the London Conference of 1930, by which time the British had embarked on a replacement programme for the 'Flower' class sloops, which were often used as station ships overseas, and the French had embarked on the sloops of the *Bougainville* class.

The British sloops of the *Bridgwater* class – they would be followed by the similar *Hastings* and *Shoreham* classes – were relatively small ships of 1045 tons, armed with two 4-inch guns and with a maximum speed of 16.5 knots. The French *Bougainvilles*, on the other hand, were more substantial ships which corresponded closely to the maximum characteristics of the 1927 'treaty-exempt' proposals; they had a standard displacement of 2000 tons, a designed maximum speed of 16 knots,

**Bougainville class Colonial Sloops**

Estimates	Number	Name	Shipyard	Laid down	Launched	In service
1927	A1	<i>Bougainville</i>	FC Gironde, Bordeaux	25 Nov 1929	21 Apr 1931	15 Feb 1933
	A2	<i>Dumont d'Urville</i> [S]	AC Maritime du Sud-Ouest	19 Nov 1929	21 Mar 1931	4 June 1932
1929	A3	<i>Savorgnan de Brazza</i> [S]	AC Maritime du Sud-Ouest	6 Dec 1929	18 Jun 1931	21 Feb 1933
	A4	<i>D'Entrecasteaux</i>	AC de Provence, Port-de-Bouc	29 Jan 1930	21 Jun 1931 <sup>1</sup>	6 May 1933
1930	A5	<i>Rigault de Genouilly</i>	FC Gironde, Bordeaux	7 Jul 1931	18 Sep 1932	14 Mar 1934
	A6	<i>Amiral Charner</i>	AC Maritime du Sud-Ouest	27 May 1931	1 Oct 1932	20 Apr 1934
1931	A7	<i>D'Iberville</i> [S]	AC de Provence, Port-de-Bouc	13 June 1932	23 Sep 1934	22 Sep 1935
1937	A8	<i>Ville d'Ys (La Grandière)</i>	AC de Provence, Port-de-Bouc	23 Feb 1938	22 Jun 1939	20 Jun 1940
	A9	<i>Beautemps-Beaupré</i> <sup>2</sup>	FC Gironde, Bordeaux	3 May 1938	20 Jun 1939	–
1938bis	A10	<i>La Pérouse</i> <sup>2</sup>	FC Gironde, Bordeaux	[suspended Apr 1940, cancelled Jun 1940]		

**Notes:**

1. Aborted launch 07.06.31
2. Redesigned with 2 x twin 100mm, enhanced AA, single funnel and modern-style pole mast

**Characteristics**

<b>Displacement:</b>	1969 tons standard; 2126 tonnes normal; 2600 tonnes full load
<b>Dimensions:</b>	length pp 98.0m; length oa 103.7m; beam 12.7m; draught 4.15m max.
<b>Propulsion:</b>	two Sulzer [S] or Burmeister & Wain diesels on two shafts; 3200bhp = 15.5 knots (designed)
<b>Fuel:</b>	diesel 220 tonnes; oil fuel 60 tonnes
<b>Endurance:</b>	9000nm at 14 knots
<b>Armament:</b>	three 138.6/40 Mle 1927 (3 x I) four 37/50 Mle 1925 (4 x I) six 13.2/60 Mle 1929 MG (3 x II) 50 mines GL.832 recce floatplane
<b>Complement:</b>	14 officers + 121 men (peacetime)

**Weights**

<b>Hull:</b>	856t
<b>Protection:</b>	21t
<b>Propulsion:</b>	460t
<b>Guns:</b>	174t
<b>Aviation:</b>	10t
<b>Weight proportional to displacement:</b>	321t
<b>Weight proportional to 2/3 power:</b>	316t
<b>Special installations (W/T, boats, nav):</b>	42t
<b>Reserve:</b>	6.4t
<b>Washington displacement:</b>	2206.4t
<b>Normal load</b>	
Heavy oil	30t
Diesel	110t
RFW	10t
<b>Normal displacement:</b>	2356.4t
<b>Deep load</b>	
Heavy oil	30t
Diesel	110t
RFW	10t
Exercise rounds	10.8t
Various	22t
<b>Deep load displacement:</b>	2539.3t

and an armament of three 138.6mm (5.4-inch) guns.

The characteristics of the new French ships served to concentrate minds at the London Conference, and qualitative limits for the 'treaty-exempt' category were finally agreed as follows:

- maximum displacement: 2000 tons (2032mt)
- maximum gun calibre: 6.1-inch (155mm)
- maximum no. of guns above 3-inch (75mm): four
- maximum speed: 20 knots (increase proposed by the Japanese)
- no torpedo tubes

Alternatively, each of the contracting powers could build ships below 600 tons in which neither armament nor speed was limited; this led to a series of small torpedo-boat designs in France, Italy and Japan, and the *Kingfisher* class coastal sloop in Britain.

**The *Bougainville* Design**

When the characteristics of the new French sloops were first discussed, the principal staff requirements were established as:

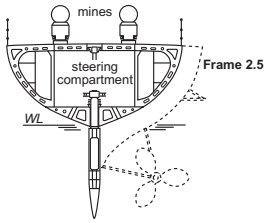
- 25 days sailing at 10 knots;
- an endurance of 10,000nm;
- the ship to be capable of being maintained and repaired at (limited) overseas facilities;
- the hull to be accommodated in existing overseas docks (both French and foreign);
- a high level of comfort for the crew;
- the ability to accommodate new weapons;
- the ability to embark an admiral and his staff for a lengthy transit.

Subsequent discussions centred on:

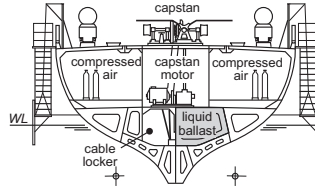


## Bougainville: Sections

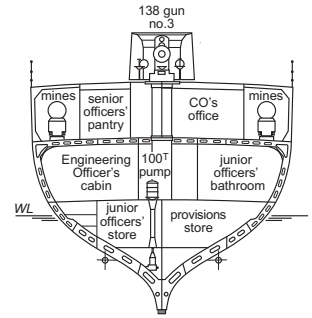
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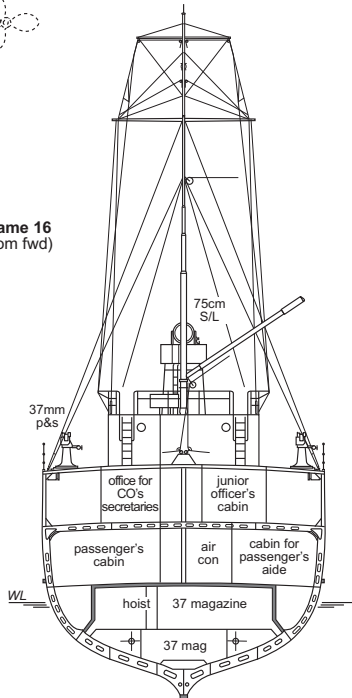
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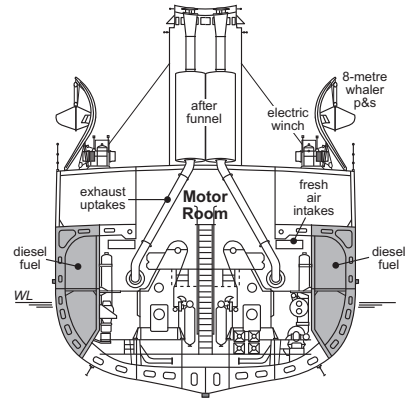
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Frame 25  
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(© John Jordan 2014)

- the type of machinery (diesels were considered for the first time);
- whether aircraft would be embarked (a catapult was not considered feasible for a ship of this size because of the topweight/stability implications);
- the main armament.

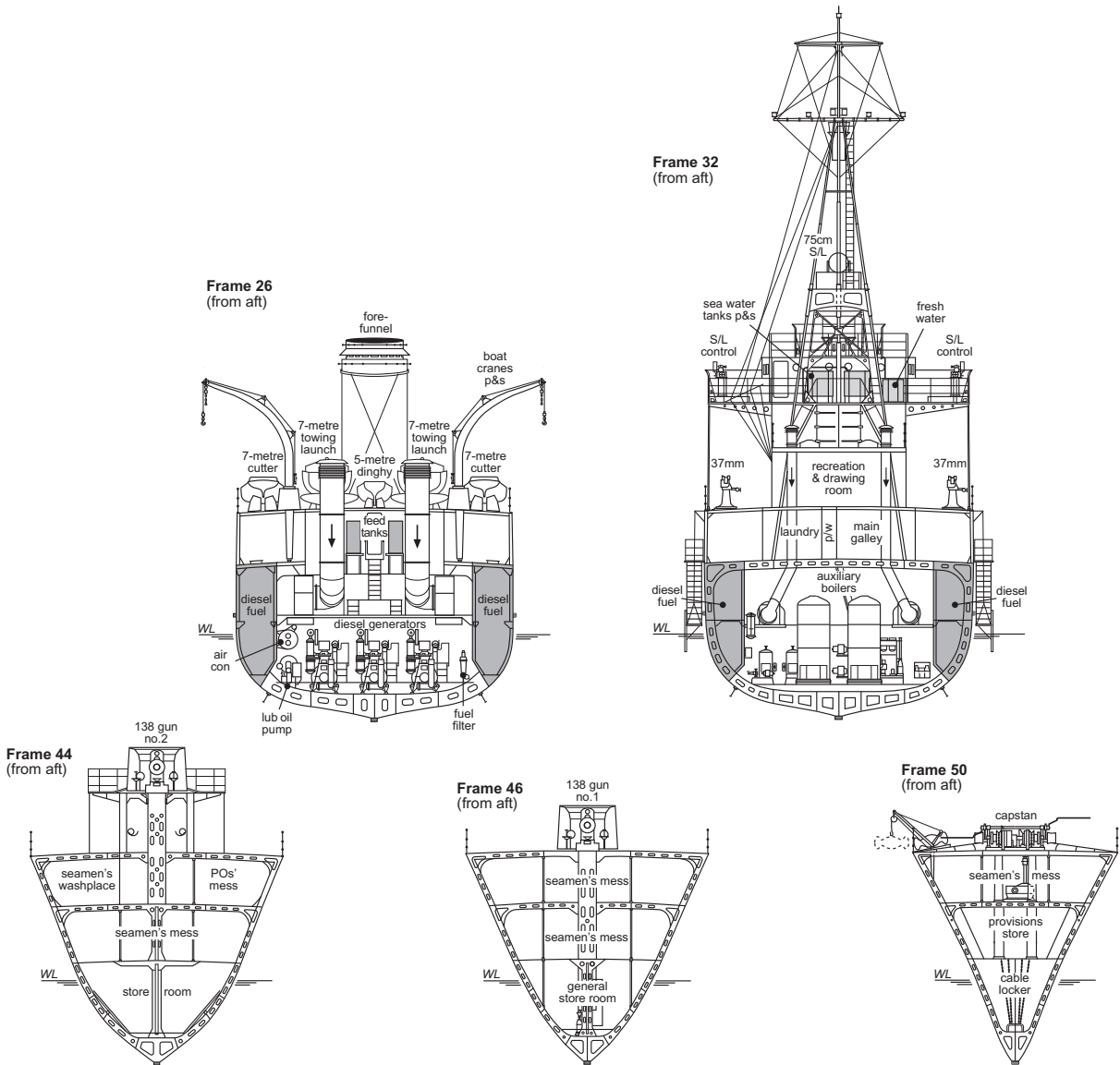
It was envisaged that the ships would generally be on station, interrupted by brief port visits to 'show the flag' and periods of maintenance. High speed was considered unimportant for the representative mission, but endurance was crucial. Diesel propulsion was therefore particularly attractive; diesel engines had good availability and a rapid start-up (20–40 minutes) compared to steam machinery, made fewer demands on hull volume, and had greater fuel economy. However, French industry could only build diesels under licence, and these generally had an unfavourable weight/horsepower ratio (60kg/ch vs 34kg/ch for the latest German cruisers).

Given the vast ocean areas which the sloops might have to patrol, it was decided that a small reconnaissance aircraft would be useful. By the time the first units of the class were laid down, a lightweight aircraft was under

development for the light cruisers of the *Duguay-Trouin* class, which would likewise spend much of their service lives on foreign stations. A lightweight telescopic hangar would also be a feature of the initial design, to protect the aircraft from the elements.

Although the sloops were slightly shorter than the new destroyers of the *Bourrasque* and *L'Adroit* classes, they had significantly greater beam, thereby enabling them to accommodate the heavier 138.6/40 gun of the latest *contre-torpilleurs*. Three main guns were to be fitted, two forward and one aft, and the light anti-aircraft armament (see below) was powerful for its time.

The architecture of the ships was inspired by the training cruiser *Jeanne d'Arc* of the 1926 programme, which because of her annual round-the-world cruises was designed to operate in the tropics. The design featured relatively spacious mess decks and officer accommodation, with air conditioning throughout and insulation around the accommodation spaces. There was a raised forecastle for good sea-keeping, and the shelter deck amidships was extended to the sides to form a covered way over the upper deck to port and to starboard; these were called *passavents*, the same term used for the prom-



enade decks on ocean liners. A complete set of canvas awnings was also provided; these were normally stowed in a store on the starboard side of the hold aft.

The shelter deck rested on three broad centre-line deckhouses, and there were thirteen pillars per side. The three deckhouses accommodated:

- the ship's 'services' (emergency electro-generators, main galley, laundry);
- the machinery access trunking and officers' galleys (after end);
- the senior officers' accommodation and wardroom, with offices at the forward end.

### Orders and Construction

The French naval dockyards of the period were fully occupied with other work, so it was decided that orders for the new sloops would be shared between three private

shipyards: Forges et Chantiers de la Gironde (Bordeaux), which was to build A1, A5 and A9; Ateliers et Chantiers du Sud-Ouest & Bacalan Réunis (also Bordeaux), with which the orders for A2, A3 and A6 were placed; and Ateliers et Chantiers de Provence (Port de Bouc – west of Marseille), which built A4, A7 and A8.

The first two ships (A1/2) were authorised under the 1927 Estimates, a further four under the 1929 (A3/4) and 1930 (A5/6) Estimates, and a seventh (A7) under the 1931 Estimates. The French naval budget then came under serious pressure with the construction of the two battleships of the *Dunkerque* class and the six 7600-ton cruisers of the *La Galissonnière* class, and it would be 1937 before the next pair of sloops (A8/9) was authorised. A9 would be sabotaged at Bordeaux when 70% complete in June 1940 – she had yet to be fitted with her machinery, and A10, authorised on 12 April 1939 under the 1938 *bis* supplementary estimates and allocated to A C Gironde, would never be laid down. These last two

ships were to have been built to a revised design as survey ships, with a modified armament of two twin 100mm guns. On 1 April 1940 *Ville d'Ys* (A8) was renamed *La Grandière*.

Unlike their smaller British counterparts, which were built to provide numbers at the lowest possible cost, the French colonial sloops were relatively sophisticated ships. The contract price for the 1931 ship was 36.5m FF, a figure not far short of the contemporary *contre-torpilleurs* of the *Aigle* class, which cost c.46m FF.

## Hull and Fittings

The hulls of French warships of the period were generally constructed of 50kg mild steel. The *avisos* of the *Bougainville* class were unusual in having the lower part of the hull and keel of 50kg steel but the upper plating of high-tensile 60kg steel (similar to the 'D' steel used in British ships of the period). Bullet-proof special steel of chrome-cobalt-molybdenum (designated *qualité masque* or 'gunshield quality') was used not only for the gunshields, but also for the bridge block, the walls of the three main deckhouses and the lower part of the after funnel, which housed the uptakes for the main diesels. The decks were also of 60kg steel, with a thickness of 6mm over the bridge and the ammunition lobbies and

5mm elsewhere. These figures were comparable to those of French destroyers, but the use of HT and special steels for the upperworks gave greater protection against machine gun fire, as their overseas policing role meant that they could be taken under fire from land.

Although the naval dockyards were beginning to experiment with electric welding, for the *avisos* traditional riveted construction was retained throughout. There were 'double walls' outboard of the mess-decks and officer cabins on the lower and main decks with inert rockwool insulation between.

Subdivision was on a par with contemporary destroyers. Frame spacing was 1.8 metres, and the hull was subdivided into eleven watertight compartments designated A–K by bulkheads which extended from the keel to the main deck. The greater beam of the *avisos* made it possible to work in fuel tanks outboard of the machinery spaces amidships (see General Arrangement plans).

Due to the need to operate in tropical climates, it was decided to fit wooden planking of 40–50mm Siam teak to the upper deck and upper bridge. (This was a feature normally confined to cruisers and capital ships.) There was a special dark grey non-slip paint on the ammunition lobbies and the bridge, while the internal decks were lined with the standard red-brown linoleum secured with brass battens.



A fine study of *Rigault de Genouilly* (A5) entering Melbourne on 16 January 1937. Ships deployed to the French Pacific Naval Station, which embraced New Caledonia and French Polynesia, regularly visited the east coast of Australia during the 1930s. By this time a GL.832 floatplane, visible abaft the second funnel, was regularly embarked. (Allan C Green collection, State Library of Victoria)

## Machinery

The two main propulsion diesels were located at the after end of a large motor room amidships, and their exhausts were led up into the second funnel. They were of two different types:

- Burmeister & Wain Type 655 MTF 90 4-stroke, 6-cylinder under licence to Schneider and built by Penhoët; nominal horsepower was 2191CV for 1600/1800bhp; the weight/power ratio was 80kg/CV.
- Sulzer SRK4 2-stroke, 6-cylinder built under licence by A C Loire (St Denis) and F C Méditerranée (Le Havre); nominal horsepower was 1660/2100CV for 1250/1600bhp; the weight/power ratio was c.90kg/CV.

Six of the nine ships were fitted with the Burmeister & Wain 4-stroke diesel, while A2, A3 and A7 had the Sulzer 2-stroke model.

On two diesels the ships had a designed speed of 15.5 knots (16.4 knots max.); on a single engine they were capable of 9.7 knots (10.9 knots max.). It was estimated that maximum speed would decline by 0.75 knots after three months in the tropics.

On trials in July 1932, at a displacement of 2193 tonnes, *Bougainville* attained 17.5 knots on two shafts and 12.5 knots on a single shaft. Comparable figures were achieved in September: 17.3 knots on two shafts and 14.7 knots on a single shaft, with shaft revolutions of 170–200rpm; some vibration was experienced between 120rpm and 140rpm. The time to get underway was 20 minutes when warm, 40 minutes if the engines had been stopped for more than 24 hours. The diesels could be maintained by the crew on station without returning to France.

The two main diesels drove two shafts with 2.8m-diameter three-bladed propellers (3.15m-diameter three-bladed propellers in the Sulzer ships). The original propeller guards were found to be inadequate and had to be reinforced. There was a single balanced rudder with a surface area of 13.33m<sup>2</sup>; it could be turned through a maximum angle of 32° (20–25° normal); and was powered by two Sautter-Harlé servo-motors. The ships proved very stable, and had a low angle of heel when turning.

The three main generators were housed in an extension of the motor room forward and also exhausted through the second funnel. The B&W ships had three MAN 6 GVU 33 Ricardo 4-stroke diesel-generators from Schneider rated at 85kW (120V, 700A); the three Sulzer ships had Sulzer 5 RKH 25 2-stroke diesel-generators rated at 120kW (118V, 1017A). The principal disadvantage of this arrangement was that it resulted in a large machinery space 21m by 9m which was vulnerable to flooding.

To provide ship's services when underway and alongside there were two Riley vertical boilers rated at 10kg/cm<sup>2</sup> built by A C Loire. These were housed in a separate compartment forward of the motor room and exhausted through the forward funnel.

The two Bettus-Loire 4-cylinder diesel-powered electro-generators for emergency use were located in the forward deckhouse on the main deck (see GA plans), their exhausts being led up into the after part of the fore-funnel. They were supplied by A C Loire and Schneider and fuelled by lamp oil. Each could deliver 22kW (46kW max.) at 115/118V (188/225A).

The two air conditioning units were housed in a separate compartment abaft the auxiliary boilers. There were refrigeration/cooling units for the magazines (two: fore and aft), the diesels (two) and the cold rooms (two), plus eleven ventilators.

In contrast, emergency pumping capabilities were less complete than in fleet French flotilla craft of the period. There were just five pumps with a capacity of 100 tonnes/hour (the destroyers of the *Bourrasque* class had nine, plus two smaller): two for the magazine compartments (fore and aft), two for the motor room, and one for the boiler room. It was considered that these ships would be more likely to face attack from the surface or from the air, but *Rigault de Genouilly* would be torpedoed by the British submarine *Pandora* off Oran on 4 July 1940, and sank with the loss of twelve men.

## Liquids & Coal

Outboard of the main machinery spaces there were side tanks capable of holding 260 tonnes of diesel (*gas-oil*) for the engines and the main generators. Forward of these, separated by void compartments, were bunkers with 5 tonnes of coal for the galleys and tanks holding 60 tonnes of furnace fuel oil (*mazout*) for the auxiliary boilers. Range was estimated on trials as 12,700nm maximum, 9700nm at 10 knots on a single shaft.

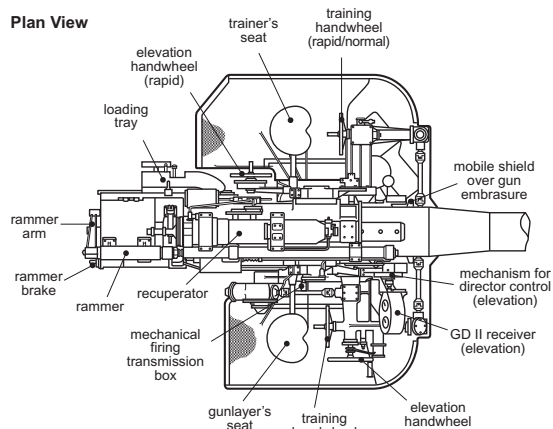
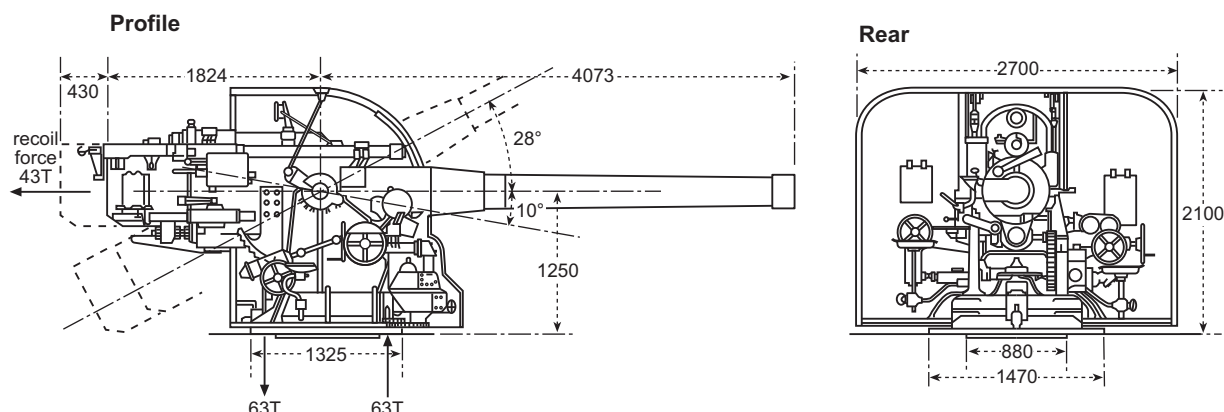
All combustible fuels were stowed in cylindrical tanks on the accommodation deck aft. The lamp oil for the Bettus-Loire emergency generators was carried in a single 900kg cylindrical tank to starboard, and in the same compartment were two 450kg cylindrical tanks which held the petrol for the boats. The aviation fuel for the single reconnaissance aircraft was stowed in two cylindrical tanks, the larger of which had a capacity of 1000kg, in a separate compartment to port. Both of these compartments were lined with insulating material and equipped with a CO<sup>2</sup> fire containment system.

Lubrication oil was carried in tanks in a compartment abaft the machinery spaces; normally 7650kg of MT1 oil (10,000kg at deep load) and 1660kg of MT2 were carried. Other liquids included 20 tonnes of reserve feed water (RFW) for the auxiliary boilers, 30 tonnes of fresh water for the crew, and 10 tonnes of drinking water.

## Armament

The main gun selected for the *avisos coloniaux* was the 138.6mm Mle 1927 fitted in the latest *contre-torpilleurs* of the *Aigle* class. A 40-calibre weapon, it was the first French destroyer gun with a German-style sliding breech, which was much faster in operation than the Welin inter-

### 138.6mm/40 Mle 1927



(© John Jordan 2013)

### 138.6mm/40 Mle 1927

#### Gun Data

Construction	monobloc autofretted barrel
Weight of gun	4.8 tonnes
Breech mechanism	horizontal sliding block
Ammunition type	separate
Projectiles	OPFA Mle 1924 (39.9kg) OEA Mle 1928 (40.2kg)
Propellant	9kg BM7 in cartridge Mle 1910
Muzzle velocity	700m/s
Range at 28°	16,600m

#### Gun Mounting

Designation	Mle 1927
Protection	3mm shield
Weight of mounting	13.0 tonnes
Elevation	-10° / +28°
Loading angle	any angle
Firing cycle	8-12rpm

#### Notes:

Mle	<i>Modèle</i>	Model
OPFA	<i>Qbus de Perforation en Fonte Acierée</i>	Semi-Armour Piercing (SAP)
OEA	<i>Qbus Explosif en Acier</i>	High Explosive (HE)

rupted screw breech of earlier guns. The theoretical firing cycle was up to twelve rounds per minute – twice that of its predecessor, the Mle 1923 – although 4-5 rounds per minute was more commonly achieved in practice.

A further modification compared to the earlier Mle 1923 was the lowering of the trunnions from 1.34m to 1.25m, making the gun easier to load at low angles of elevation. In order to achieve this it was necessary to sacrifice range: the maximum elevation of the Mle 1927 was only 28 degrees (*vice* 35 degrees), and maximum range, using the same SAP ammunition as the Mle 1923, was only 16,600m (*vice* 18,200m). However, early trials with ships equipped with the basic 3-metre coincidence rangefinder had shown that effective fire control was only possible to 12-13,000 metres. The relatively short barrel of these guns also meant that dispersion was excessive, particularly at longer ranges: 400m at 12,000m and 200m at 7000m. In terms of response times, it took some eight minutes to get the mounting into action in daytime, and ten minutes at night.

The three 138.6mm gun mountings on the *Bougainville* class were fitted with a modified shield which had a squarer, more angular profile than that of the *contre-torpilleurs*, and provided greater protection for the gun crew; each mounting weighed around 13 tonnes complete.

As in the latest *contre-torpilleurs* there were four single 37mm Mle 1925 anti-aircraft guns, which were disposed at the four corners of the shelter deck. The 37mm/50 Mle 1925 was a reliable, if unspectacular gun, which could elevate to 80° and deliver 30 rounds per minute – a creditable enough figure against the slow biplanes of the 1920s, but one which would prove totally inadequate against the high-performance monoplanes of the late 1930s.

For self-defence against strafing aircraft there were to be eight 8mm Hotchkiss MG Mle 1914 in twin mountings Mle 1926. The machine guns were normally stowed below-decks, and when required were affixed to pedestal mountings. The official plans show all four pedestals on the centreline: one atop the forward ammunition lobby, one abaft the bridge, one atop the after ammunition

lobby, and a fourth on the quarterdeck. The pedestal abaft the bridge seems never to have been fitted, and some ships later had paired pedestals atop the forward ammunition lobby.

**Fire control**

For control of the main guns there was a single OPL 3-metre stereo rangefinder Mle 1932 atop the bridge, and a transmitting station equipped with a computer *type aviso*; tangent angle and deflection were calculated mechanically, while a graphical plot supplied range and bearing.

For night firing there were two 75cm BBT Mle 1933 searchlight projectors, mounted fore and aft as in the latest French destroyers. The Mle 1933 had a nominal power of 190,000W and an effective range out to 4500m. As in the *contre-torpilleurs*, the searchlights were remotely controlled from consoles in the bridge wings: there were two consoles per side, the forward consoles (port & starboard) to control the forward searchlight and the remaining pair the after searchlight.

Two smaller OPL 0.8-metre or 1-metre rangefinders were provided for HA fire; the official plans show them mounted on projecting platforms to port and starboard at the after end of the upper bridge. These were not fitted in the earliest ships to be completed.

**Ammunition**

There were paired projectile and cartridge hoists for the 138.6mm guns fore and aft; these emerged behind no.2 and no.3 gun mountings, with intermediate positions behind no.1 gun. Like the *contre-torpilleurs* of the period

the *Bougainvilles* were designed with ‘partial’ ammunition chutes, fed from the ammunition lobbies, which emerged from the lobbies on either side of main guns. They were generally mounted only when action was in prospect and rarely feature in early photographs of the ships; each of the chutes was in four sections which could be stowed below when not in use. Of the later ships, only *La Grandière* had a completely circular chute (no.2 gun).

The ammunition for the 37mm guns, in six-round magazines, was handled by separate hoists fore and aft which emerged at forecastle deck level close to the mountings.

The magazines were grouped fore and aft. The forward group comprised the shell room and magazine for the forward 138.6mm guns and the magazine for the forward 37mm AA guns; the after group the shell room and magazine for the single after gun, the magazine for the after 37mm guns, and the black powder and small arms magazines. Starshell (for the forward guns only) was in a separate magazine forward (see GA plans). There was sufficient capacity in the main magazines for 709 combat rounds (c.235 rounds per gun) and 76 exercise rounds. Ammunition provision for the 37mm AA guns was c.350 rounds per gun, of which approximately 500 were piercing and a similar number tracer.

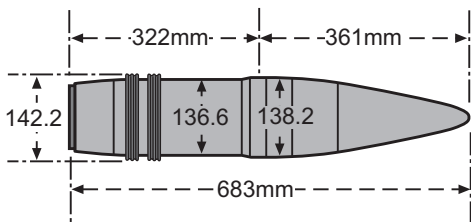
**Underwater weapons**

The ability to lay mines to protect ports and harbours was an important requirement, and was a factor in the decision to locate no.3 gun at the higher level, which effectively cleared the quarterdeck. There were rails for 25 mines per side, as in the latest *contre-torpilleurs* of the

**Standard Ammunition for the 138.6mm Mle 1927**

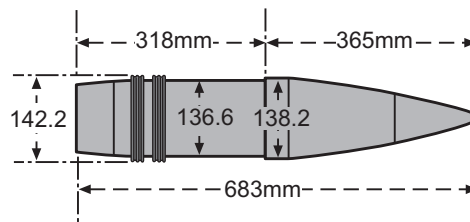
**138.6mm OPFA Mle 1924**

Shell weight: 39.91kg  
Burstier: 2.30kg Mélinite



**138.6mm OEA Mle 1928**

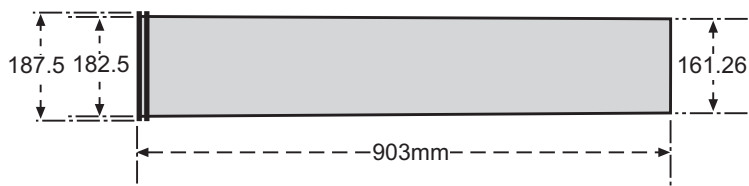
Shell weight: 40.20kg  
Burstier: 3.45kg Mélinite



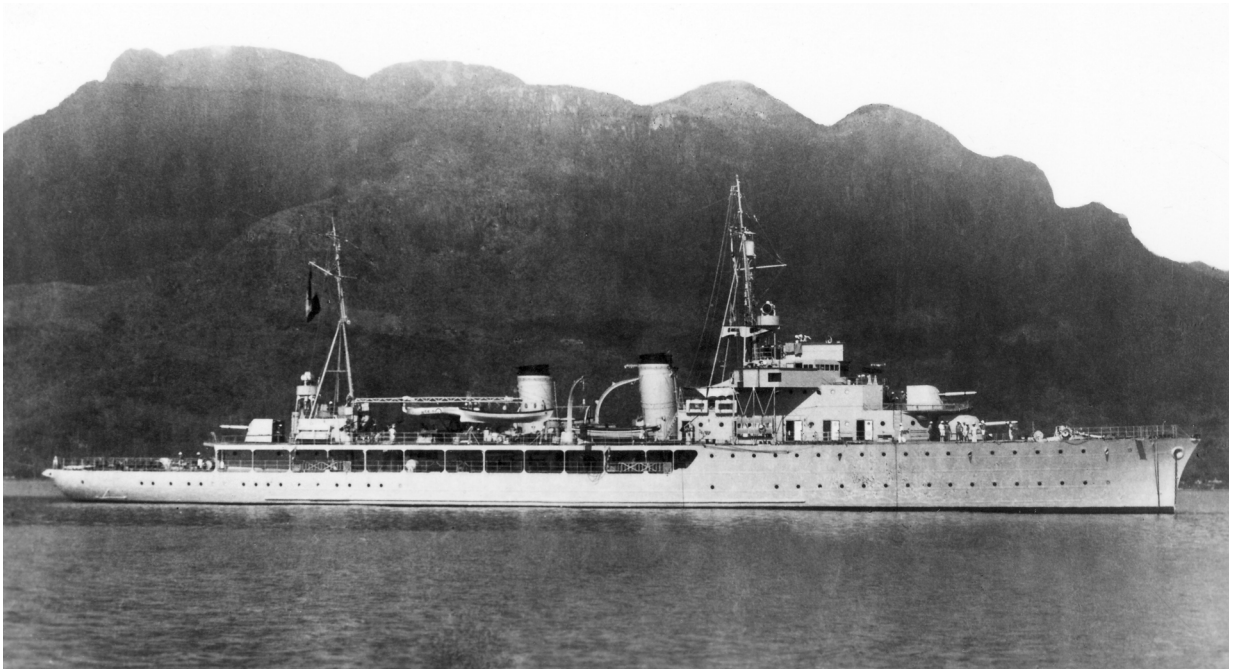
**Note:** The nose of the OPFA Mle 1924 was subsequently modified to incorporate a dye bag and fuze (*dispositif K*). The modified shells were redesignated OPfK Mle 1924, and were slightly heavier (40.60kg). As these shells were primarily intended for formation firing by divisions of *contre-torpilleurs* it is unlikely they were embarked in the *avisos coloniaux*, which retained the OPf Mle 1924 in its original form.

**Cartridge for 138.6mm Mle 1910, 1923, 1924 & 1927**

Weight empty: 12.95kg  
Weight incl. BM7 charge: 22.00kg



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A later view of the *Rigault de Genouilly*, again with a GL.832 reconnaissance aircraft embarked. The aircraft handling derrick is of the modified braced type and the mainmast has received reinforcing stays; Brest-type life rafts have also been fitted. It is possible that this photo was taken in North Africa shortly before her loss. Note the two twin 8mm Hotchkiss MG mountings forward of the bridge. (Courtesy of Jean Moulin)

*Vauquelin* class. It was envisaged that the Breguet B4 mine (535kg, 60kg charge, 300m cable) would be embarked, but the larger Harlé H4 (1100kg, 200kg charge, 200m cable) could also be accommodated in smaller numbers. The ships were rarely used for minelaying until 1942.

Another important requirement was the ability to sweep enemy mines. Four Mle 1935 paravanes were carried on the shelter deck amidships (see plan drawing) and handled by the boat crane. They were towed at 20–25m on either beam at around 10 knots.

There were no stern chutes for depth charges; instead the minelaying rails could be used to launch the 200kg Guiraud depth charge. The latter were moved to the stern on trolleys; eight could be embarked per side. Depth charges were not generally embarked until the outbreak of war in September 1939.

As regards underwater detection, in the original design there was provision for the Walser underwater passive detection apparatus and for an ultrasonic active ‘pinger’, but there is no evidence that either of these was fitted. There was, however, a CET Mle 1931 ultrasonic depth sounder, and a Warluzel echo sounder, which was lowered over the side of ship, was located in the after bridge wings to port. The CET Mle 1931 could register depths up to 2000m in fresh water, and would have been particularly useful in uncharted waters.

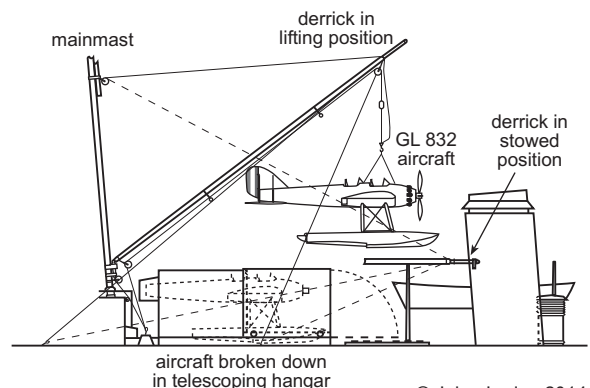
### Aviation

The floatplane initially embarked was the Gourdou-Leseurre GL.832 two-seat float monoplane, a smaller

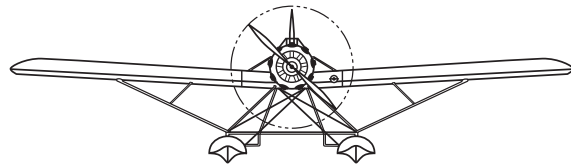
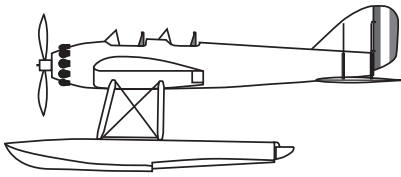
version of the GL.810/811/812 series which equipped the 10,000-ton cruisers. It entered service in 1934, and was first embarked in a ship of this class in 1935. Like most floatplanes of the period, it could take off and land only in the most favourable sea conditions, but it could be launched from a sheltered anchorage in the tropical climates where these ships saw service. Endurance was approximately 550km at cruising speed. During the late 1930s some ships operated the Potez 452, a high-wing seaplane with a similar 13-metre wingspan and a slightly greater cruising radius.

Originally the aircraft was to have been stowed broken down in a telescoping hangar located on the shelter deck behind the second funnel, as in the contemporary cruiser *Emile Bertin* (see Aviation drawing). However, it was

### *Bougainville*: Aviation Arrangements as designed



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**Gourdou-Leseurre GL.832****Characteristics**

Year: in service 1935  
 Mission: reconnaissance & observation  
 Construction: wood, metal & fabric  
 No. built: 30  
 Crew: two

**Dimensions**

Wingspan: 13.00m  
 Length: 8.75m  
 Height: 2.78m

**Engine**

Type: Hispano-Suiza 9Qb/a radial  
 Power: 230/250hp

**Performance**

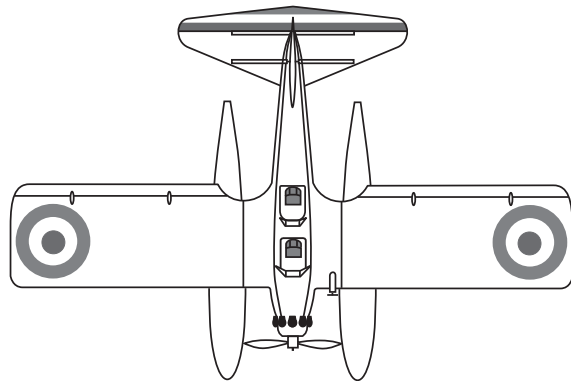
Max. speed: 180km/h  
 Ceiling: 4800m  
 Endurance: 550km @ cruise speed

**Weight**

Empty: 1108kg  
 Max. load: 1698kg

**Armament**

Machine guns: one 7.7mm MG



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found more practical to stow the aircraft on deck with wings deployed – the aircraft was angled at 45 degrees so that the wing-tips did not overlap the sides of the ship – and to use a specially-designed canvas ‘tent’ to protect it from the elements.

The aircraft was lowered onto the water and lifted on board by a tubular derrick hinged to the mainmast. This proved too lightly-designed to support the weight of the aircraft; the tubular derrick was replaced by a braced model, and stays were added to the mainmast, which eventually became a light tripod.

When the aircraft was embarked, it was accompanied by a maintenance group of seven men commanded by a lieutenant or a sub-lieutenant.

## Boats

Deployment to overseas stations would necessarily entail the use of open anchorages in undeveloped French colonial ports. The design of the *avisos pour campagnes lointaines* therefore featured a comparatively large complement of boats, all of which were carried on the shelter deck forward.

On crutches, and handled by twin free-standing boat cranes, there were:

- two 7-metre motor boats (abeam first funnel)
- one 7-metre motor launch (outboard, to std)
- one 7-metre pulling cutter (outboard, to port)
- one 5-metre dinghy with 3-metre punt inside (centreline)

Outboard of the second funnel, two 8-metre whalers were suspended from davits.

The motor boats were for use by an embarked admiral, the ship’s CO and senior officers, the other boats were for ferrying members of the crew ashore (*service de rade*) or, in the case of the whalers on davits, for rescue at sea (*sauvetage*).

The distinctive free-standing ‘goose-neck’ boat cranes were 6 metres high with a 2-metre reach over the side; each could lift 3.55 tonnes. Two hinged 7-metre boat booms were fitted on the forecastle abeam the bridge for handling the boats when alongside.

## Accommodation & Stores

In peacetime the ships of the *Bougainville* class were designed for 35–90 days endurance with a crew of 130. Independent operations on moderately-equipped overseas stations required a greater quantity and variety of stores to be stowed on board, and full advantage was taken of the comparatively broad beam of the ships and the compact machinery spaces (26 metres – only 26% of length between perpendiculars as compared with 40% in contemporary French destroyers) to provide capacious store rooms between the main machinery bulkheads and the forward and after magazines (see GA plans).

Accommodation was unusually spacious, air-conditioned and lined with insulation throughout. The commanding officer, who had the rank of *Capitaine de frégate* (RN: Commander), and the executive officer (*Capitaine de corvette* – Lt.-Commander) both had day