THE LITTORIO CLASS

Italy's Last and Largest Battleships 1937–1948

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Drawings by Roberto Maggi, Maurizio Brescia and Angelo Brioschi

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This book is dedicated to those who designed and built these ships and to the sailors who manned them at sea and in combat

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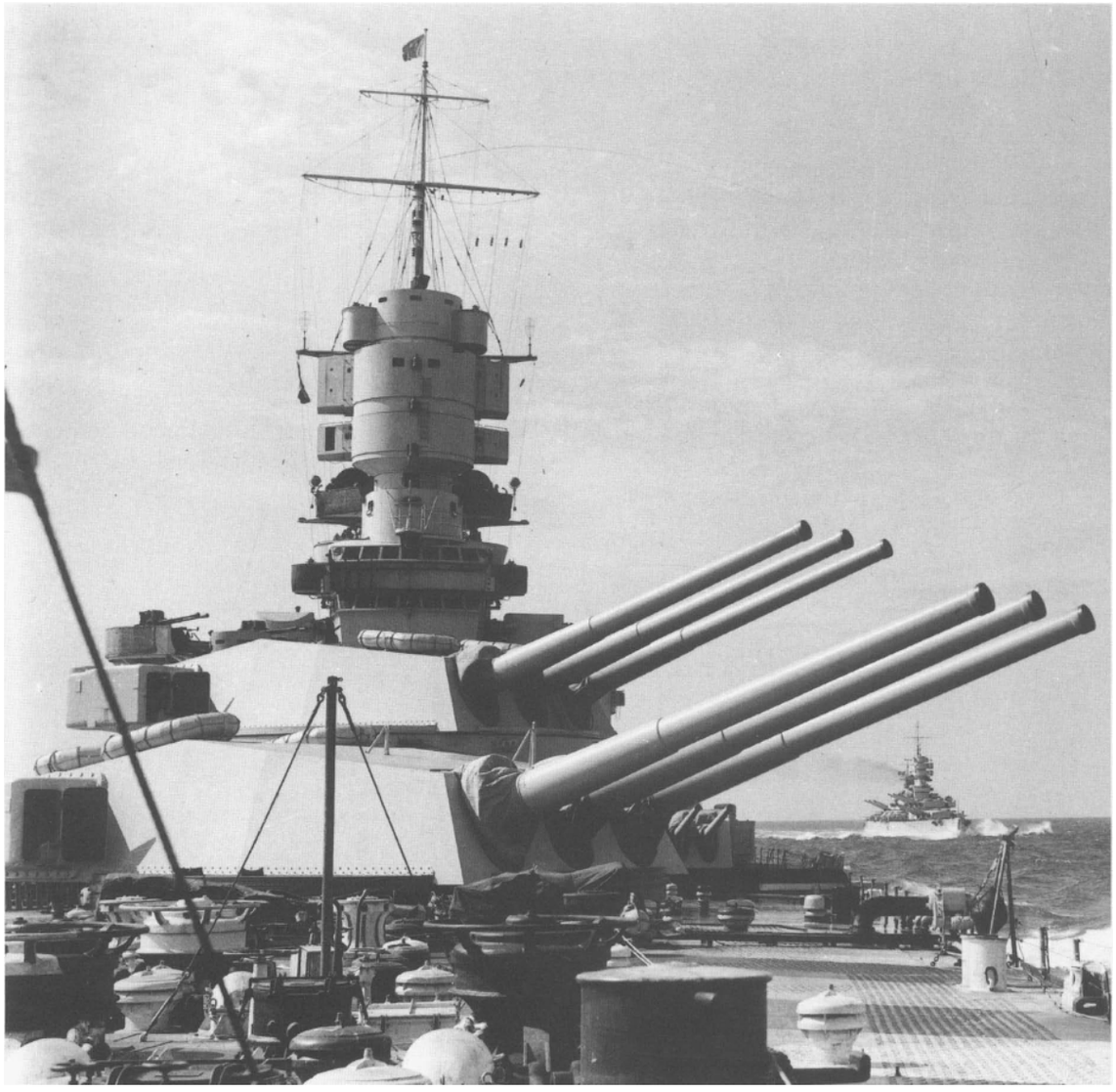

(Frontispiece) Launch of *Vitorio Veneto* at Trieste on 25 July 1937.

***Littorio* in the summer of 1940, with the flag of the admiral commanding the 9th Division at the masthead. Her sister ship, *Vitorio Veneto*, is in the background.**

INTRODUCTION

The *Littorio* class, the Italian navy's largest and most powerful battleships, have previously been the subject of only one worthwhile, but short, monograph, and this dates back to the early 1970s (Bargoni, Gay and Andò, see Bibliography). It is true that there have been a great number of articles dealing with these ships, in Italy and abroad, and chapters pertaining to them in general works on battleships or warships of the Regia Marina (Royal Italian Navy), but these are all brief treatments that add little to overall understanding of the subject.

We were inspired to write a new, comprehensive monograph dedicated to these ships by a number of factors: the unavailability for some time of the previously cited work; the continuing intense interest shown by enthusiasts for the Italian '35,000-tonners', which have become a symbol of the 'great navy' of the 1940s and of Italian technological and industrial capabilities of that era; the realisation that the level of research and understanding of the *Littorio* class had not kept pace with studies of similar battleships in other navies; and finally, the availability of new documents and photographs.

Our intention was, in fact, to produce a work that took into account all of those factors, providing the reader with the most complete and up-to-date picture possible of the genesis, design, building and employment of these ships.

The technical description – supported by an impressive number of images – is followed by a description of their operational activity from the summer of 1940 until the end of the war.

To engage in a complete analysis of the wartime activity (and inactivity) of these ships would have meant writing yet another history of the Italian war at sea during the Second World War, something which, in truth, is neither possible nor useful in this publication. We preferred, instead, on the one hand to concentrate on the more technical aspects, which are less known or less examined, which help to give a better idea of the overall effectiveness and soundness of the *Littorio* design, while on the other hand highlighting Italian official thinking about the importance of these ships, during the war and for the post-war period – concepts which we should say immediately were very different from the oversimplified and undervalued views of the role of the battleship that became common in post-war historiography.

The analysis of operational activity is rounded out by two appendices: the list of *all* movements carried out, from commissioning into the Regia Marina to the loss or decommissioning of the three *Littorio*s that entered service, and a list of damage incurred by the same ships due to wartime action. Finally, there is a brief section with modelling notes that represents a new feature in Italian naval monographs, although it is common in publications dealing with aircraft. We entrusted this section to an expert modelmaker, Giancarlo Barbieri, who recently completed a perfect reproduction of the battleship *Roma* in 1:100 scale, a highly-demanding project that required many years of work on a 'monster' that is fully 2.38 metres (7.8 feet) long!

With respect to the numerous drawings that illustrate this volume, all external views and many of the sectional views are the work of Roberto Maggi; other sectional drawings and construction details are either reproductions of original shipyard plans or drawings based on them that come from the important archives of the Associazione Navimodellisti Bolognesi (Naval Modellers Association of Bologna); the colour schemes and camouflage patterns from specific times are thanks to the collaboration of Maurizio Brescia; and, finally, the colour profiles of the shipborne aircraft are by Angelo Brioschi.

Regarding the photographs, the majority have been in our own collections for many years; for others, the source, when known, is shown in the caption. Particular attention was paid to providing as precise a date as possible for each image, by comparing them to many other photos as well as analysis of the movements of the various ships. Photo selection obviously is oriented toward those of the highest quality, but nevertheless in some cases we had to resort to images that were not technically perfect but that were irreplaceable because they referred to a particular time or event.

In concluding this brief introduction, we wish to thank all who provided help and collaboration with advice, memories, documents and illustrations. A specific citation is given for each source, be they organisations or private individuals, at the end of this volume, following the list of archival sources and a select bibliography.

We trust that we have succeeded in what we set out to accomplish: that is, to give a complete history of these ships and of their activities. We leave the final judgement of our work to students and enthusiasts of naval history, who we invite to point out any errors or to contribute suggestions that we might consider for what we hope may soon be a new edition.

E.B. – A. d.T. Milano-Udine, Autumn 2007

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Chapter 1

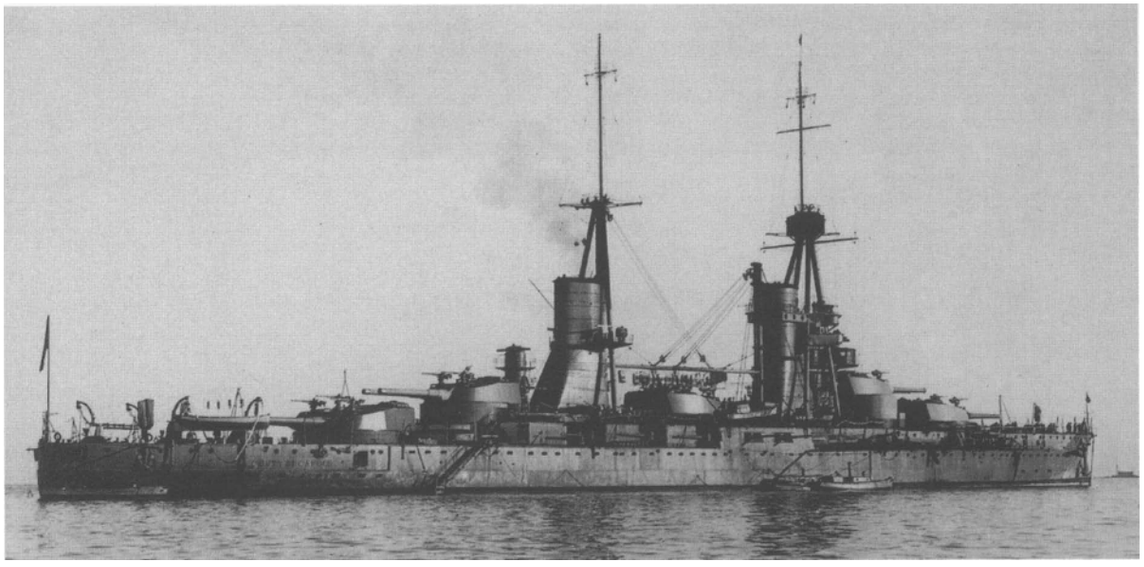
BATTLESHIPS AND ITALIAN NAVAL POLICY BETWEEN THE TWO WORLD WARS

Italy came out of the First World War having made significant efforts towards the conduct of the war at sea, especially in the construction of new ships. This construction had concentrated on light flotilla craft (destroyers and escorts), 'stealth' units (motor torpedo boats and submarines)[1] and auxiliary vessels, because the form and theatre of war greatly favoured the use of such ships, but also because the Allied powers already enjoyed sufficient superiority in larger ships over the Austro-Hungarian fleet. For these reasons, during the course of hostilities work (which had only just begun) was suspended on the four battleships of the 34,000-tonne *Caracciolo* class, whose characteristics with respect to armament (eight 381mm guns), protection (300mm at the waterline) and speed (28 knots) made them precursors of the modern fast capital ship that would combine the characteristics of the battleship and the battlecruiser. The scope and gravity of the economic and financial problems that plagued the victorious but debt-ridden European powers, and the emergence of other budget priorities, led Italy to abandon all ideas of completing the *Caracciolo* class – except for the name vessel of the class which was in such an advanced stage of construction that it was advisable at least to launch her. In the end, however, for technical reasons associated with the need to adjust her level of protection to match new types of offensive threats that emerged during the war and because of doubts about her possible use in other roles (aircraft carrier, merchant ship), *Caracciolo* was decommissioned in 1920 and the hull was assigned for scrapping. The Italian Navy thus came out of the conflict with only the battleships that had entered service before and during the war: the five 'dreadnoughts' or single-calibre types, armed with 305mm guns (the *Dante Alighieri*, the two *Giulio Cesare* class ships, and the two *Duilio* class ships), which were of modest combat value compared to the more recently-built British, American and Japanese types; there were also four of the 'pre-dreadnought' or multi-calibre type, the *Regina Elena* class, whose contemporary combat value was nil. To these could be added the *Leonardo da Vinci* of the *Giulio Cesare* class which had capsized and sunk at Taranto as a result of sabotage during the war and whose hulk was refloated and righted in a brilliant salvage operation that was so costly and complex that it was the subject of debate, even at the parliamentary level, until at least 1923.

Even France, which had become Italy's main naval rival after the extinction of the Austro-Hungarian empire, found herself in a similar situation, with an inventory of seven single-calibre

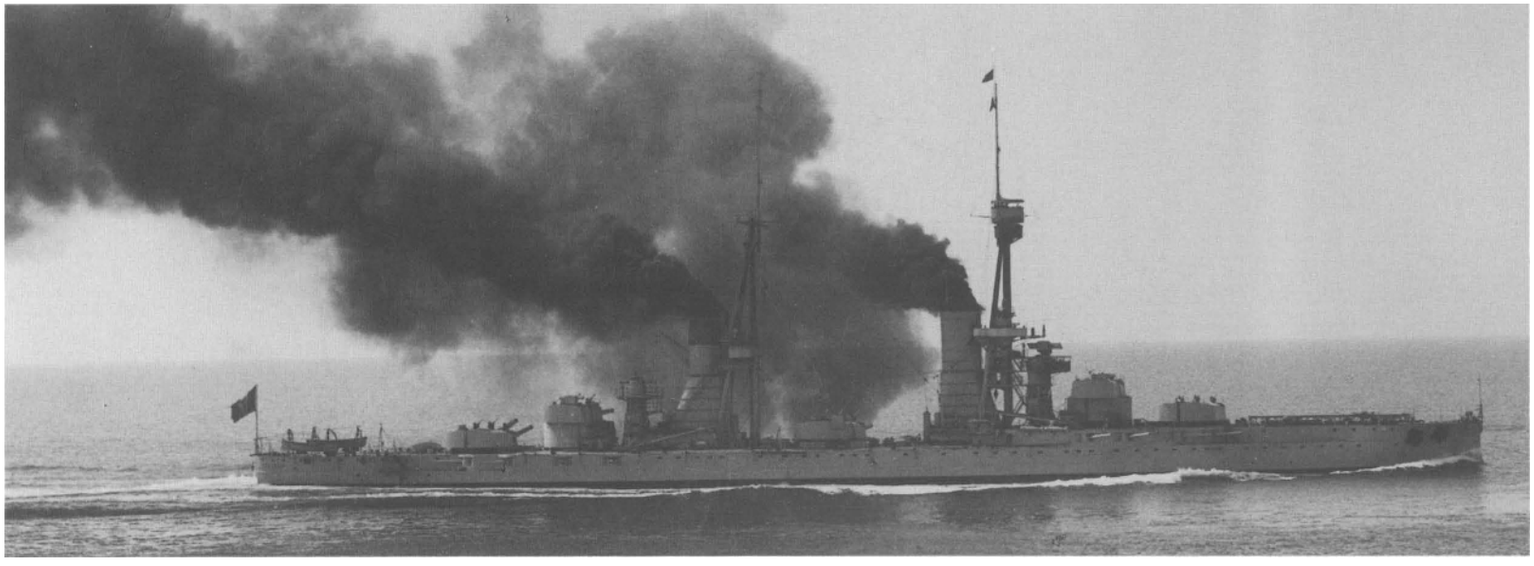
Translator's Note:

[1]The Italian term 'mezzi insidiosi' generally refers to submarines and light surface combat vessels including torpedo boats, motor torpedo boats and a uniquely Italian category of fast, light motor torpedo boat known as 'Mas' – Motoscafo armato silurante. The English term 'stealth units' is a rough approximation of the Italian term.



Conte di Cavour **at the buoy in the Gulf of La Spezia, probably in November 1923. She was the sister-ship of *Giulio Cesare* and of *Leonardo da Vinci*, which was destroyed by an internal explosion at Taranto in 1916.**

(By kind permission of F Roncallo)



***Duilio* photographed on 13 August 1932 during the major naval exercises of that summer. Note the fixed catapult on the bow.**

battleships (four *Jean Bart* class with 305mm guns and three *Provence* class with 340mm guns), generally not much better than the Italian vessels and just as far removed from the capabilities of the major naval powers. Paris also cancelled completion of five large traditional battleships of the *Normandie* class that were under construction at the end of the war, except for one, *Béarn*, which was converted into an aircraft carrier. In contrast to Italy, whose navy remained largely favourable to capital ships, the French cancellations were influenced by the experience of the recent naval war, which had highlighted the effectiveness of the submarine and submarine warfare, the great value of light ships, the lack of results achieved by large battle fleets and their increased vulnerability to the underwater threat and, potentially, to the air threat as well. At that time neither France nor Italy had any naval development programmes, let alone ones that included capital ships, but the French navy possessed a total of 700,000 tons of warships compared to 450,000 tons for the Italian navy.

In contrast, during those same years the United States and Japan found themselves in an out-and-out naval armaments race with programmes that, if realised, would have resulted after a number of years in the US Navy having between 1.5 and 2.5 million tons and the Japanese Navy between 0.7 and 1.6 million tons. This competition also automatically affected Great Britain which, even though it had begun decommissioning 300,000 tons of the 2.3 million tons that it possessed at the end of 1918, was obliged to follow with qualitative improvements.

The Washington Naval Treaty and the Italo–French naval rivalry

In order to put the brakes on this naval race that seemed to mirror the Anglo-German one that led up to the First World War and which drained the public finances of the major powers, at the end of 1921 the government of the United States proposed a conference designed to agree a reduction and a limitation of naval armaments. The conference, in which the five major victorious powers in the war participated, began in Washington on 12 November 1921 and concluded with the Washington Naval Treaty of 6 February 1922, which was to be in force until 31 December 1936. The naval policies of all of the signatory powers were driven by this treaty until the mid-1930s, and because of this it is useful briefly to mention at least its essential points.

On the political level it fixed a hierarchy among the powers in the ratio of 15, 15, 9, 5, 5, which was the result of assigning the United States and Great Britain 525,000 tons of new battleships, 305,000 tons to Japan, and 175,000 tons to France and Italy, as well as 135,000 tons, 81,000 tons and 60,000 tons respectively for aircraft carriers, the only other category of ships for which it was possible to reach a quantitative agreement. Britain lost its former status as the world's leading naval power, now sharing it with the United States, but at the same time the Washington Treaty guaranteed the Anglo-Saxon powers absolute primacy on the world stage, in every single theatre and in every ship category, in effect creating a *pax Britannica-Americana*. In Europe, Britain enjoyed a ratio of 3 to 2 with respect to the combined French and Italian fleets and a security margin of one-third in the event that a third naval power should arise that was equal to the two Latin navies. Italy, which had gone to the conference with the aim of reaching at least a ratio of 8 to 10 with France, obtained parity and, as a bonus, on a level that was low enough to be sustainable by its finances. From that point on, based on the precedent set, parity with continental Europe's most heavily-armed power, France, became the basis of Italy's disarmament policy in the coming years. France left the conference greatly disappointed, not so much because of its parity with Italy, but rather because of its downgrading compared to the other powers which, in its opinion, did not reflect its true potential, its position in the world, and its pride as a great power.

Following heated discussions the French Parliament ratified the treaty, but Paris would not recognise the agreement of parity with Italy regarding capital ships as the precedent for agreements on smaller ships, a category that above all else it considered of the utmost importance.

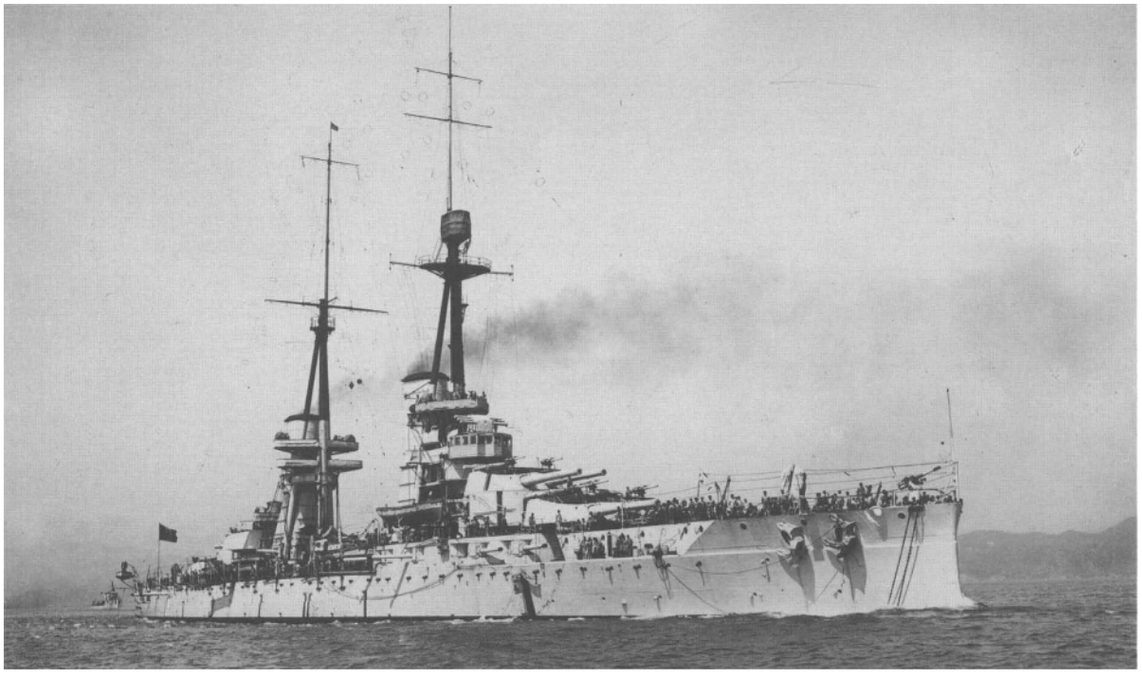
On a technical basis, from a qualitative standpoint, the treaty

fixed the maximum displacement of battleships at 35,000 tons standard – defining English tons of 1,106kg as the measure (hereafter referred to as tons; metric tons, weighing 1,000kg, are hereafter referred to as tonnes) and standard displacement as that of a ship completely fitted out and equipped, but minus fuel and water for the boilers – and a maximum calibre of 406mm for the main guns. Aircraft carriers were not to exceed 27,000 tons standard displacement (33,000 tons for those derived from authorised transformations of battleships) with armament no larger than 203mm, a fact that speaks volumes about the lack of clear ideas concerning the employment of this new type of vessel.

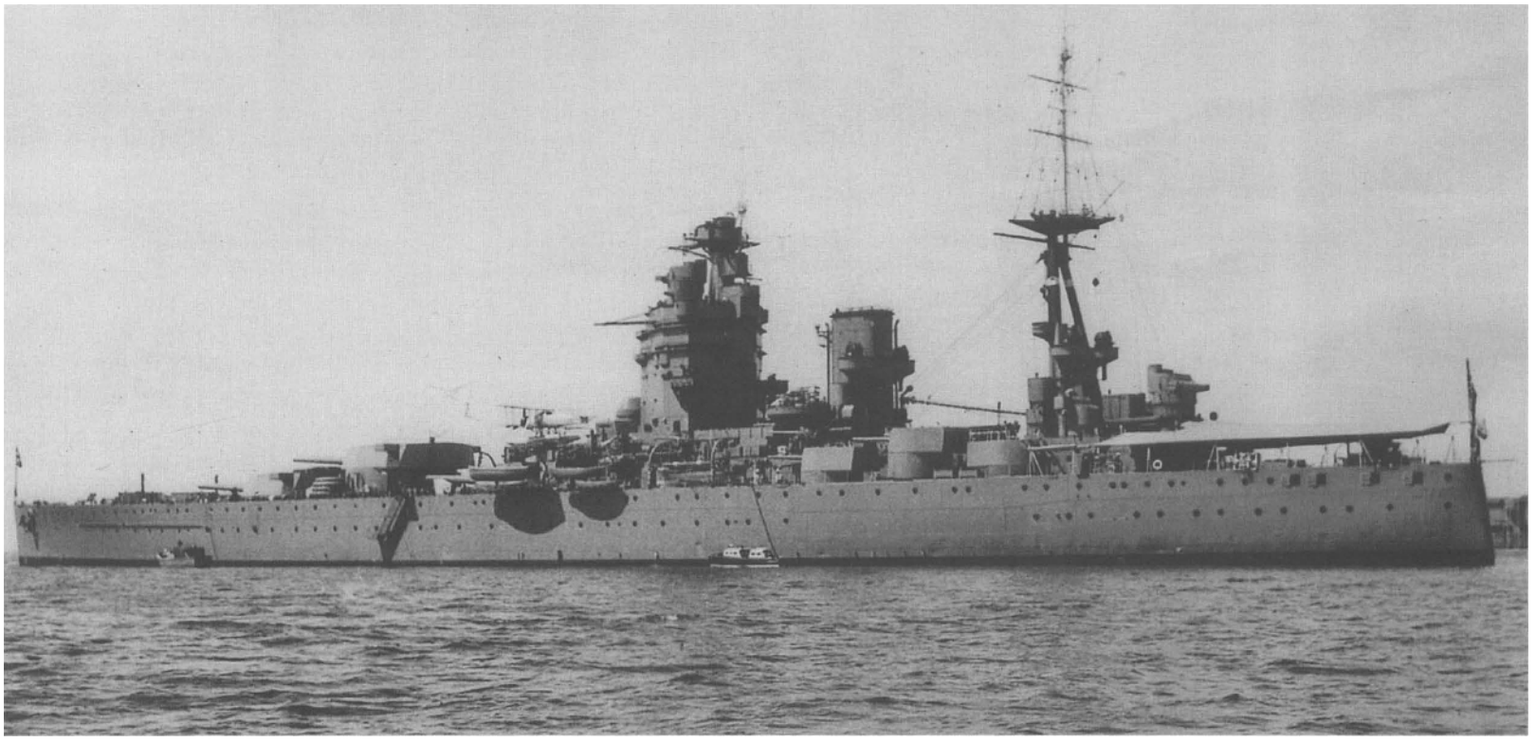
From a quantitative point of view, the treaty specifically named the battleships either existing or under construction that each nation could retain (for Italy the five previously cited plus *Leonardo da Vinci*, and for France, in addition to the seven dreadnoughts, also three old pre-dreadnoughts) or to convert into aircraft carriers or to declassify to other roles, and fixed the replacement plan that in twenty years would have led to the previously-described ratios. The treaty imposed a ten-year ban on building battleships (a 'naval holiday') which the replacement plan took into account. An exception was made for France and Italy that would allow them to lay down 35,000 tons in 1927 and again in 1929, in consideration of the low combat effectiveness of their battleships. A minimum age limit of twenty years was established for battleships. Britain, which did not have any units designed after the experience of the Battle of Jutland in 1916, was also allowed to build two, the future *Nelson* and *Rodney*, to replace four among those that could be retained. No quantitative agreement was reached with respect to light units and submarines, but qualitative agreement was reached regarding cruisers, whose standard displacement was not to exceed 10,000 tons and have armament no greater than 203mm.

During the following years, in addition to the restrictions posed by the treaty, Italy regulated its naval construction by annual programmes based on available finance and state budgets, oriented towards achieving parity or at least an acceptable position relative to France which, with respect to major ships in 1922, saw Italy at a disadvantage in tonnage (351,200 tons against 449,200 tons) and with a slight advantage in numbers (142 against 135). The early years, however, were marked by much deliberation. Between 1920 and 1925 almost all efforts were directed to the completion of light vessels that had been planned during the war and to the partial replacement of auxiliary vessels. It was not until 1925 that construction began on post-war types and that a substantial renewal and strengthening of the fleet was initiated, although battleships were excluded from these programmes. On the contrary, in order to achieve savings, between 1923 and 1928 all of the oldest and least capable ships of that category were eliminated: namely, the four *Regina Elena* class and *Dante Alighieri*.

France pursued its naval policy differently. In 1924 the government presented Parliament with a draft law, known as the 'Statut Naval', that fixed the future 'permanent fleet' at 750,000 tons of major shipping, to be reached in 1943. The plan suggested similarities to the naval laws of Alfred von Tirpitz; it differed in that it did not fix by law the development of the fleet to which annual expenditures had to conform, but, once the planned naval force level was established, left the authorisation of funding to annual budgets. The basis of the 'Statut Naval' was the criteria of the 'two-power standard' towards Italy and Germany; for the first, a total of 500,000 tons was assumed, and for the second 144,000 tons, imposed by the Treaty of Versailles; to these values 100,000 tons for colonial service were added. The parliament did not approve the draft law, which was difficult to defend at the diplomatic level in an era of arms reductions, preferring to keep to the more controllable system of annual programmes. Nevertheless, the Marine Nationale continued to present its budget requests every year with a view to still reaching the target that had been fixed by 1943. In addition, having realised its importance as a bargaining chip in international negotiations, France kept all of its antiquated ships in service until the 1930s in order to



***Andrea Doria* proceeding at slow speed off La Spezia in the early 1930s. Above the command bridge there is the 'triplex' arrangement of coincidence rangefinders, and following astern is a 'Pattison', or 'three-pipe' type torpedo boat.**



The British battleship *Nelson*, in a photograph from May 1939. (Wright & Logan via M Brescia)

'make tonnage', beginning with the three obsolete *Diderot* class pre-dreadnoughts. However, it abstained from replacing the dreadnought *France*, which was wrecked off the coast of Brittany on 26 August 1922, even though the Washington Naval Treaty allowed it.

If one considers the principal categories of warship (battleships, cruisers, destroyers, torpedo boats and submarines), between 1922 and 1929 programmes were authorised in France for the construction of 130 ships totalling 250,485 tons, for an annual average of 31,300 tons, against the eighty ships and 163,110 tons authorised in Italy, for an annual average of 20,400 tons. French preponderance was concentrated in minor vessels and submarines, demonstrating its will to outstrip Italy in those categories of ships in which it had most faith, while Italy had not shown any proof of a similar intent to achieve that parity upon which its naval policy hinged. Both countries had, however, abstained from a race to build battleships. In any case, the average annual Italian authorised construction was only 65.2 per cent of the French, far from approaching parity with the country across the Alps.

The February 1929 naval programme and the battleship question

It was only at the end of the 1920s that the Regia Marina Staff began to consider building battleships, brought about by a combination of two circumstances: the end of the naval holiday imposed by the 1931 Washington Naval Treaty, and the idea of defining a multi-year programme of naval construction along the lines of the French 'Statut Naval', in order to guarantee the renewal and growth of the fleet in an integrated and systematic manner. The first item will be addressed later in greater detail, and with respect to the second it has to be remembered that the programme of the Naval Staff owed its origin to a major study of September 1927 by Rear Admiral Romeo Bernotti, who at the time was known as one of the great thinkers of the Italian navy, and who aimed to give a solid foundation and direction to Italian naval policy following the years of uncertainty after the Great War. Bernotti's document was soon brought to the attention of the Under-Secretary of the Navy, Rear Admiral Giuseppe Sirianni, and to Mussolini himself, who at the time was the Navy Minister. This work is well known in Italian naval studies, so it is sufficient here to point out that it addressed the battleship issue more with respect to the utility or otherwise of retaining the existing ones than to the question of building new ones. This was obvious to the Duce, who agreed in general with its thinking, but pointed to the lack of information on this important point; he also displayed some doubt about Bernotti's views on aircraft carriers, which called for the building of at least one on an experimental basis.

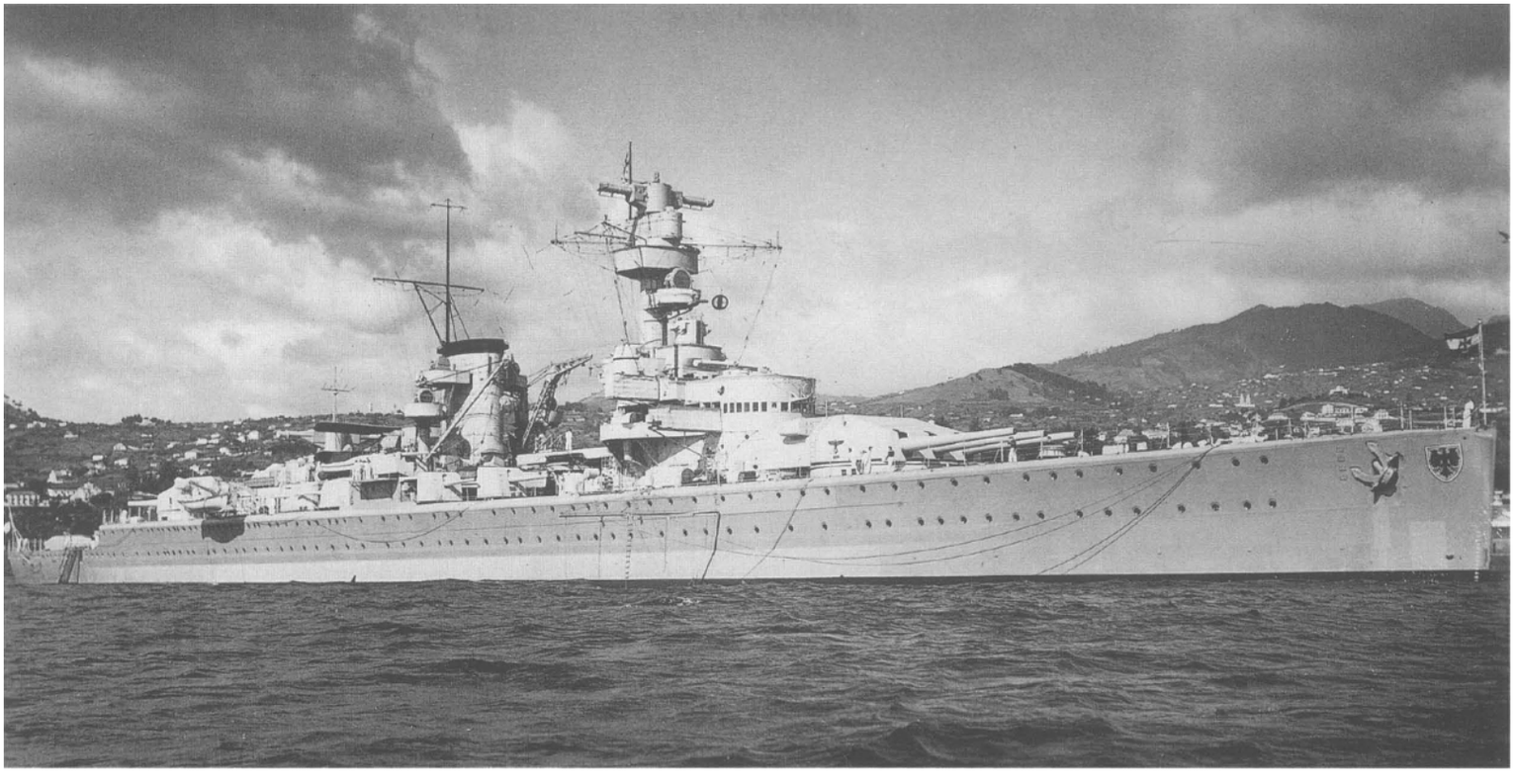
The Naval Staff formulated its scheme a year and a half later, in February 1929. It laid down the criteria for the definition of a multi-year programme for the systematic renewal of the fleet and for its complementary needs, including air–naval co-operation and the creation of an auxiliary air arm, in addition to building an experimental aircraft carrier, as well as developing a 'war book' that would include the information and dispositions necessary in the event of war. Even though the programme did not receive any legal sanction it had a strong influence on Italian naval policy until at least 1934, when new events on the international stage prompted a reorientation of priorities. With respect to battleships, the scheme addressed both the retention of the existing units as well as new construction, after which, in 1928, *Dante Alighieri* was decommissioned, *Conte di Cavour* was disarmed and *Giulio Cesare* was relegated to a training ship.

With regard to the old battleships, the factors that weighed in favour of their retention were almost exclusively of a political nature. These were linked to the position that Italy held among the major naval powers with respect to the possession of battleships and the weight that this factor would have exercised on negotiations at future international naval conferences. The only technical argument for their retention – and the Naval Staff was not totally convinced of this – was the possible support to lighter units that the old ships might be able to provide. Numerous technical as well as budgetary reasons argued against their continued retention. The *Cesare* and *Duilio* classes were decidedly outdated, above all because of their high degree of vulnerability (their horizontal and underwater protection was totally inadequate against modern offensive threats); operationally, they represented more of a burden than a bonus because of the large number of smaller ships required to escort them, while even the support that they might have provided to lighter forces appeared doubtful considering the employment envisaged for the fleet. In addition, maintenance and operating costs weighed heavily upon the navy's budget and constituted an obstacle to the renewal of lighter forces. In conclusion, for the Naval Staff the battleships represented only an illusion of strength and their gradual decommissioning appeared necessary and advantageous.

The attitude towards the construction of new capital ships was different: the Naval Staff was clearly favourable. The programme set, as an ideal, a minimum number of three units to be built, in order that at least two could always be operational. Two types were identified: one of 23,000 tons (a third of the 70,000 tons available) with six 381mm guns, a speed of 28–29 knots and adequate vertical, horizontal and underwater protection (in truth, somewhat excessive for only 23,000 tons standard displacement), and another type of 35,000 tons with six 406mm guns, good protection, and a speed of 29–30 knots. In the first case, three ships were to have been built in 1927 and 1929 within the 70,000 tons allowed by the Washington Naval Treaty; in the second case, the 35,000 tons from 1931 would also have had to be used, once the 'naval holiday' was over. The Naval Staff was in favour of the second option, even if the individual and collective cost was significantly higher than that of the first option, for the simple reason that, as long as this maximum limit was in force, it was not worth building battleships of less than 35,000 tons. The programme, however, took explicit notice of the government's attitude that, although it was not against the programme, it considered a decision on the matter premature, largely for international political reasons, as it did not appear appropriate that Italy should be the first to begin construction of new capital ships. This would, however, have hampered the modernisation programme and development of light units and submarines, which at that time was considered a high priority, and the Naval Staff decided simply to keep updating the battleship issue and to carry on, in the meantime, with design studies for the two types under consideration.

The 1930 Conference and the Treaty of London

The Washington Conference had ended without reaching any agreement on light units and submarines. In 1927 the American government had proposed a new initiative that it brought to the Geneva Conference at which only the three major oceanic powers were present. Rome and Paris preferred not to attend because of the



The German 'pocket battleship' *Deutschland* at anchor off Funchal, capital of the island of Madeira, in October 1935. (By kind permission of A Bonomi)

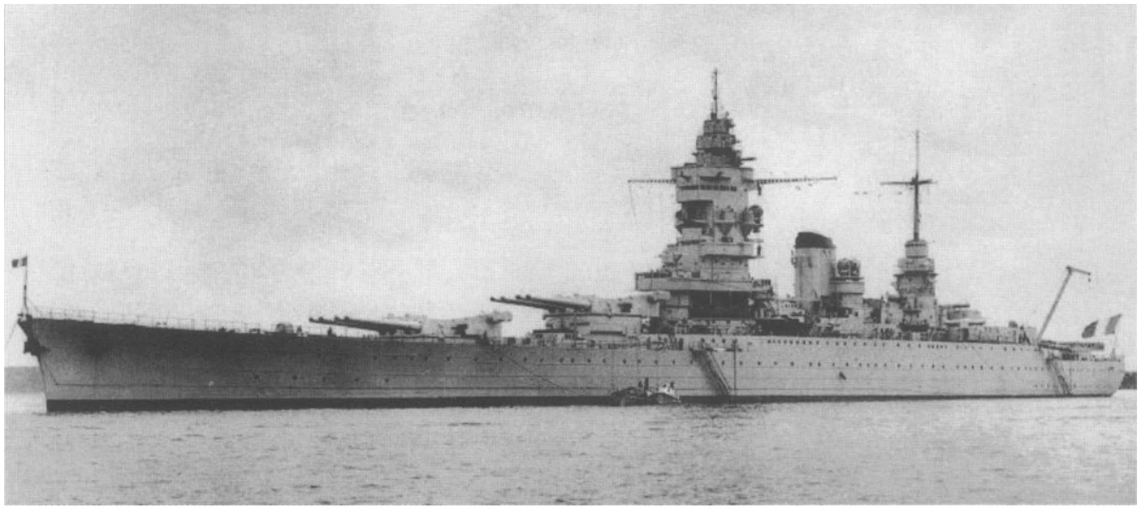
impossibility of reaching an agreement in this field and for fear of aggravating their reciprocal diplomatic relations, which were in a rather delicate state. The conference ended in complete failure due to the irreconcilable divergence of views between the two Anglo-Saxon powers with respect to cruisers. In October 1929 the London government, after having reached a preliminary understanding with Washington regarding the entire question, promoted a new conference to resolve the issue from that time until 31 December 1936, the expiry date of the Washington Naval Treaty. The conference was attended by all of the signatories to the Washington Treaty, even though the positions of Italy and France (and also of France and Britain) were still far apart. Rome supported the principle of relativity, but Mussolini instructed Foreign Minister Dino Grandi, who led the Italian delegation, to obtain parity at any cost, even at the lowest level of armaments, provided that they were not surpassed by any other European power. Paris did not formally reject the principle of parity, but, espousing the criteria of absolute requirements, put forth requests for numbers that, if accepted, would in turn have forced Great Britain to renounce the 'two-power' standard with respect to the two most heavily-armed Continental powers.

The conference began in January 1930 and ended three months later without having reached an agreement, due to the unresolved differences between France and Italy. It was, however, agreed to support a treaty on the points where an understanding had been reached and, as proposed by the Italians, to not close but rather to adjourn the conference, in the hope of smoothing out the Italo–French dispute in a more relaxed climate and with British mediation. The treaty, signed on 22 April 1930, was subdivided into five parts: Part I extended the naval construction holiday for battleships until 31 December 1936 and provided a new definition for aircraft carriers that also included ships of less than 10,000 tons; Part II identified existing ships that were exempt from qualitative limitations, and rules for the replacement of ships; the most important part, Part III, established qualitative and quantitative limits for cruisers, destroyers and submarines, and rules for their replacement; Part IV introduced restrictive rules for submarine warfare against merchant ships; Part V contained formal clauses on the ratification and entry into force of the treaty as well as the call for convocation of a new conference by the end of 1935 in view of the expiration of the Washington Naval Treaty. Italy and France subscribed to the treaty but, with the exception of almost all of Part III (in 1937 Italy agreed to Part IV). Lacking complete agreement, the conference, at Italy's suggestion, was not closed but was adjourned in the hope of a later understanding on minor units being reached between Rome and Paris. But even the parts of the treaty that they subscribed to were not ratified by their respective parliaments, so that France and Italy were not legally bound by its terms.

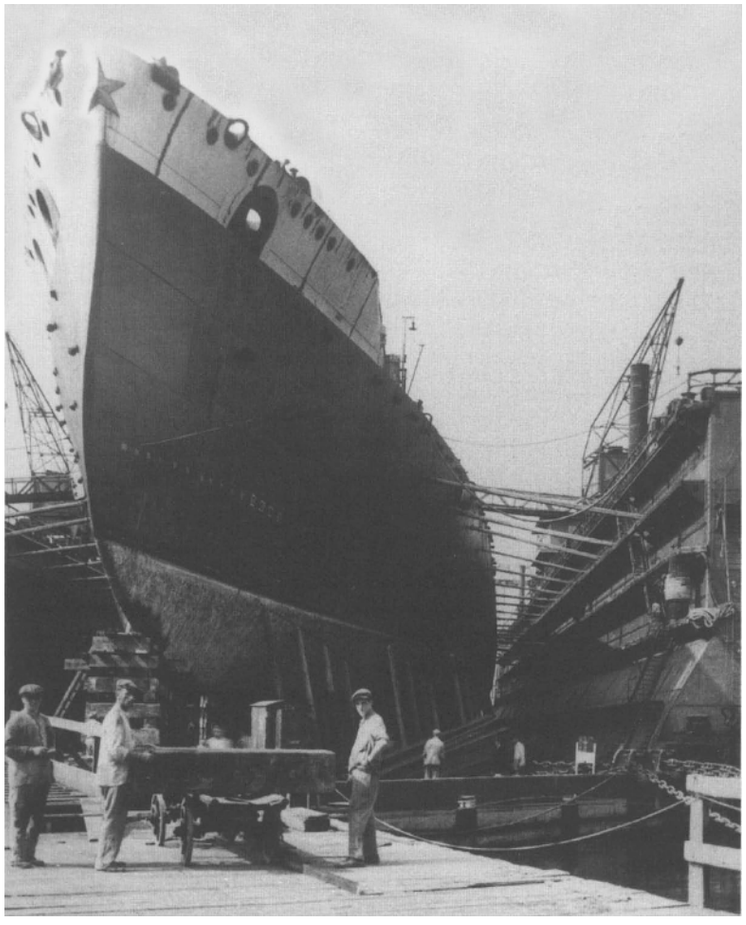
Construction of *Dunkerque* and the Italian response (1931–1933)

The Italo–French negotiations, which resumed with mediation by London in August 1930, foundered for the first time in March 1931, precisely at the moment when it seemed that an agreement had been reached. Until that time the naval rivalry between Rome and Paris had been confined to the field of light ships, but now a new area of dispute opened because of the announced construction by France of a battleship of 23,000 tons standard displacement, in response to the first German 'pocket battleship', *Deutschland*, built within the limits imposed by the Treaty of Versailles but, with its 280mm guns, outclassing all of the 'Washington' type heavy cruisers.

In France, during the years between the two World Wars, development of the navy depended greatly on public opinion and on the beliefs and whims of the parties in the parliament that controlled the purse strings, in which quarters there was substantial hostility against battleships. Until 1930 the Marine Nationale had not devoted much effort to the subject. A little less sensitive than other navies to the lure of capital ships, it was not until 1926–7 that it had begun to consider building battlecruisers of 17,500 tons (a divisor of the 175,000 tons recognised by the Washington Naval Treaty), armed with eight 305mm guns and with a speed of 35 knots, designed to face the new Italian *Trento* class heavy cruisers in the western Mediterranean, and to defend the lines of communication between France and North Africa. At the end of 1938, when the general characteristics of the first German armoured ship became known, the French Naval General Staff looked to ships of 23,333 tons – also a divisor of 70,000 tons – to surpass the German battleship both in speed (30 knots) and armament (eight 305mm



The French battleship *Dunkerque* in a 1938 photograph.



Detail of the original bow of *Conte di Cavour* while undergoing modernisation in Trieste in 1934. (M Cicogna collection)

guns) and to have protection that was capable of standing up to the 280mm armament of the German ship. But it was not until the London conference of 1930 that construction was announced and the following October the French government set out a draft law for its financing, to replace *France*. The new battleship was part of the 1931 *tranche*, whose draft law was presented to Parliament with a delay of ten months, being approved on 10 July 1931 but with the caveat that construction was not to begin without first submitting the definitive characteristics of the ship to the Chambers of Parliament. In fact, the parliamentary debate generated more than a little confusion, as other battleship concepts were pitched into the arena, namely for ships of 35,000, 23,000 and 17,500 tons. Authorisation for the new battleship had to wait for the opening of the new session of Parliament, and even then, due to a series of manoeuvres and procedural delays, it did not happen until 31 March 1932 when the 1932 finance bill was approved. Behind these delays and difficulties lurked the opposition of left-wing parties to the battleship, which was finally laid down on 24 December of that year with the name of *Dunkerque*. In the meantime the standard displacement had been raised to 26,500 tons, main armament was fixed at eight 330mm guns in two quadruple turrets, speed at 30 knots and protection arranged so as to be proof against the German 280mm guns and against foreseeable air and underwater threats.

It should be noted that the General Staff of the Marine Nationale did not rule out battleships of greater displacement. Between 1927 and 1929 it had considered designs of ships displacing 29,600 and 35,000 tons, but went no further for a number of reasons. In the first place, there was a significant lack of infrastructure for the construction and support of large battleships (slips in the building yards, dry docks, port quays), whose building would have required a cost that was then estimated at 130 million francs. Above all, until that time, the German navy had laid down only battleships of small dimensions, while the three oceanic powers would not have been able to do so until 1936, and Italy showed no serious intentions of availing itself of its rights. In addition, prior to and during the London Conference of 1930 the British had actively lobbied for a reduction of battleship displacement to 25,000 tons and, at least in this respect, the French did not want to be caught unprepared. Finally, in the run up to the general disarmament conference that had been laboriously convoked for February 1932, the French government and parliament would never have consented to such an initiative. In definite terms, at that time ships of 26,500 tons were the maximum that the Marine Nationale could obtain politically.

Faced with the news of *Dunkerque*, the Italian government for the moment waived its right to exercise the same option, either to await the outcome of the general disarmament conference that might have led to the reduction of the characteristics of that category of ship, perhaps because of budgetary reasons, or because it shared the British idea of reducing the displacement and calibre of guns of capital ships, having indeed proposed their abolition at the London conference of 1930. It should be noted, however, that on this last point the Italian Naval Staff were not in complete agreement. Although it could support the proposition to reduce the displacement of the French battleship to 26,000 tons, it was not similarly disposed to give up large ships itself, inasmuch as it was convinced that this type of ship was the most ideal for surface warfare.

During this uncertain phase of international politics, in order to match *Dunkerque*, the Italian Naval Staff began planning for a type of ship with characteristics equal to the French battleship, but in October 1933 the government adopted an interim solution, opting for the rebuilding of the two old battleships *Cesare* and *Cavour* which, equally, had been the subject of plans from the previous April. It would have thus been possible to have a standardised division of ships of the battle line at a reasonable cost and fairly well balanced with respect to armament (ten 320mm guns), speed (27 knots) and protection (250mm vertical, 80mm horizontal, and a reduced scale Pugliese-type underwater protection system) such as to adequately offset the fast French battleship, which was certainly more modern but whose combat value was not much greater than that of each of the two Italian ships.

With the events just described the question of battleships, which until then had been almost absent, burst onto the contentious Italo–French naval scene and galvanised attention. Italy now became interested in obtaining compensation (recognition of parity in light ships and other benefits of a more general nature) in exchange for renouncing the construction of battleships larger than *Dunkerque*; France, on the other hand, desired to avoid such an outcome, without making too many concessions beforehand in order not to tie its hands in the disarmament and arms-limitation conferences.

Following the March 1931 failure, Anglo-American mediation efforts continued during the general disarmament conference and culminated in the mediation proposal advanced by the British Prime Minister Ramsay MacDonald in March 1933, without, however, leading to any resolution, in view of the equally hard-line positions of both Rome and Paris. Germany's subsequent admission to the conference was an added factor in the hardening of the French position. France, in fact, feared that revision of the military clauses of the Treaty of Versailles, upon which it based its naval programmes, could come about without providing any adequate guarantees for its safety, which at that juncture led to greater circumspection and reluctance to subject itself to agreements on naval armaments, at least until the German question was clarified.

The definitive failure of the Italo–French negotiations and construction of *Strasbourg* (autumn–winter 1933–1934)

In October 1933, while Germany withdrew first from the disarmament conference and then from the League of Nations because of the failure to recognise its 'equality of rights', the conference stalled, but on the sidelines new and unexpected glimmers of hope opened for the settlement of the Italo–French naval disagreement.

In that period difficulties in French public finance and the delayed approval of the 1931 and 1932 *tranches* raised concerns about successive budget allocations for the Marine Nationale and caused much worry on the part of its General Staff. Since 1922 nine naval construction programmes had been approved by the Assembly, which had led to laying down 180 ships for about 420,000 tons of shipping; but, while building of the ships of the *tranches* between 1922 and 1930 had developed smoothly, the 1931 and 1932 programmes, which were very important because they included categories of ships in which France was deficient (battleships and light cruisers), ran into serious difficulties. From the 1931 *tranche*, which included *Dunkerque* and two light cruisers of the *La Galissonière* class, and whose parliamentary vicissitudes have already been mentioned, only one cruiser had been launched while

A view of part of the crowd at the 'San Marco' Shipyard in Trieste on 28 October 1934 for the laying down of the first plates of the battleship *Vittorio Veneto* (construction 1133) on building slip number 2. The sign in the foreground is on a slip next to that of *Vittorio Veneto*, on which five pontoon cranes (*GA 203* and *217–220*, construction 1121–1125) had recently been fitted. In the background the cruiser *Muzio Attendolo* is fitting out and the battleship *Conte di Cavour* is being rebuilt.

Conte di Cavour, with a new bow built over the existing structure, in floating dry dock *GO 12*, being moved by tug at Muggia, probably in 1935. (By kind permission of E Trevisan)

the other cruiser and *Dunkerque* were still on the ways and behind schedule in construction. Equally critical was the situation of the 1932 *tranche*, which included another four light cruisers of the *La Galissonière* class and two destroyers, which were not laid down until October 1933. In addition, in 1933 these slowdowns were compounded by a cut of 20 per cent from the 1932 *tranche*, thus leading the French government to call off new construction and to direct the funds from the 1933 *tranche* to speed up the programmes from the two previous *tranches*. As a result, the continuity of French naval shipbuilding was interrupted, while in Italy the 1932–3 programmes projected a 5 per cent increase in funding over the 1932 French programme. If this situation were to continue, in the judgement of Marine Nationale General Staff the superiority of the French fleet over the Italian fleet would be diminished and France would have to show up at the scheduled conference on naval arms limitations in 1935 with a less favourable force ratio and, thus, be less able to make its claim of naval disparity with respect to Italy. To this was added the fear that in order to present itself at the conference in a better relative position, the Rome government could launch a large naval programme in 1934, with the mental reservation of not achieving it in full, but using it as a bargaining chip in the negotiations, thus introducing a ploy that France could not match because of the restrictions and more complex procedures of its parliamentary system. From this stemmed the idea of the Chief of the General Staff of the Marine Nationale, Vice Admiral Georges Edmond Just Durand-Viel, and the Navy Minister, Albert Serraut, to resume talks on the margins of the general disarmament conference under way in Geneva for a naval agreement with Italy, with a secondary aim of freezing construction until the expiration of the Washington Naval Treaty (31 December 1936) and, as a consequence, of freezing the relative positions of the forces existing in 1933.

After several preliminary talks, the initiative was formalised on 16 October 1933 in a proposal by the naval expert of the French delegation, Captain Deleuze, to the Italian delegation represented by Commodore Fabrizio Ruspoli and Captain Giuseppe Raineri Biscia. The proposed agreement would have bound the parties until 31 December 1936 and fixed the standard displacement of battleships at 26,500 tons, an overall total of 30,000 tons of light surface vessels and 8,000 tons of submarines with the condition that France would renounce her own, if Italy would promise not to build more than one battleship. The proposal did not explicitly mention the number of battleships that each country would be able to build, precisely to avoid the thorny problem of numerical parity. The 'Deleuze proposal' was well received by the Italians, and the negotiations, which reached the highest political and naval personalities of both parties, developed in a positive fashion, so much so that on 1 December Deleuze and Raineri Biscia agreed upon an outline of a definitive agreement, more or less following the original proposal. When, however, the moment was reached to finalise the affair, on 27 December 1933 the French Ambassador in Rome, Charles Pinetou de Chambrunn, presented the Chief of Cabinet of the Italian Foreign Ministry Pompeo Aloisi with a text substantially different than the one that had been agreed to by the naval experts, in which, among other items, it stated that each party could build one battleship of 26,500 tons which, added to *Dunkerque*, would have sanctioned a disparity of 2 to 1 in France's favour. The volte face by Paris was due, at least in part, to a confidential talk between Mussolini and de Chambrunn on 18 November during which Mussolini gave him to understand that if France were to lay down a second *Dunkerque*, Italy would limit itself to laying down only one battleship. It was also influenced by recent news of Italian finances that assumed as certain that there would be a reduction in funding for the Italian navy in the 1934/35 budget while at the same time the French Assembly would be more sensitive to the problems of naval defence. Thus, in formulating the wording of the agreement of 27 December 1933, the French Navy Minister and Prime Minister, Albert Serraut, was guided by what had been reported by de Chambrunn rather than by the text that had been agreed to by the naval experts. Rome, naturally, did not welcome the French agreement as presented and in January 1934 the talks foundered.

Perhaps the failure would not have had serious consequences if in

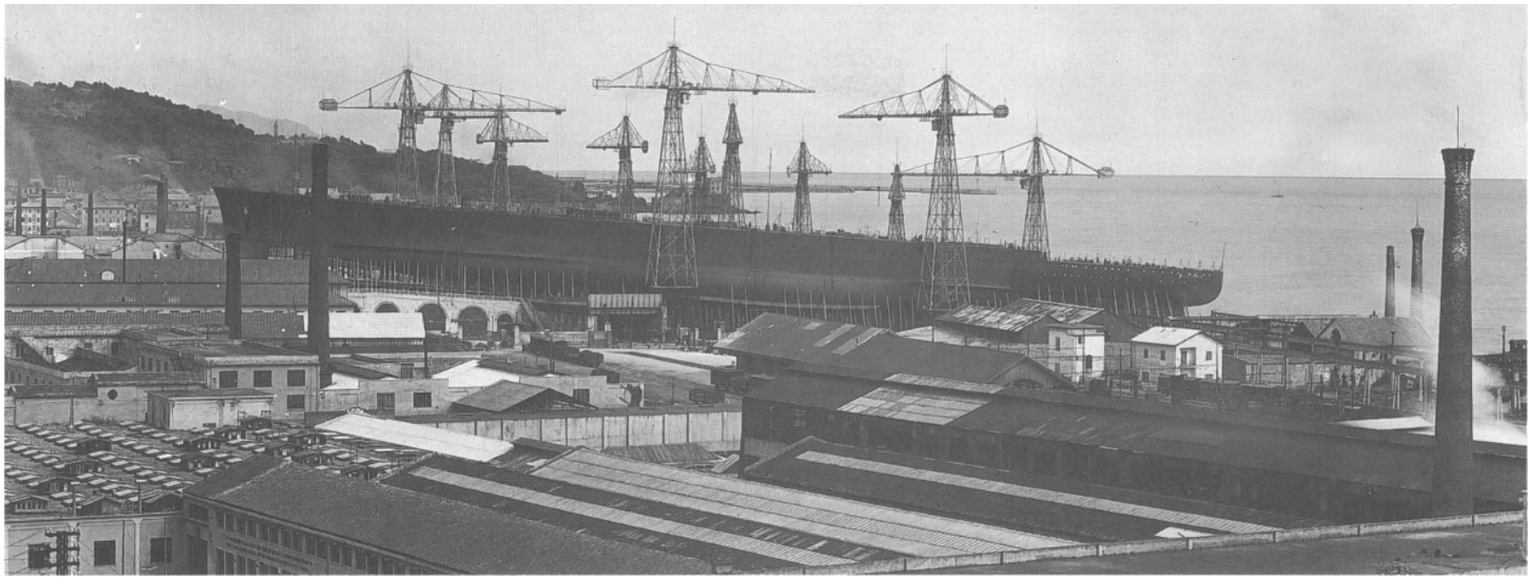
Benito Mussolini, with Admiral Cavagnari behind him, on board the cruiser *Pola*, observing the manoeuvres of I and II Naval Squadrons, while returning to Italy from a visit to Libya in March 1937.

the early months of 1934 the decision had not been reached in Paris to build a second *Dunkerque*. News had in fact been received that Germany would lay down a fourth unit of the *Deutschland* class in 1934. This news, added to information indicating that construction of the three preceding members of the class was proceeding well while that of *Dunkerque* and the remainder of the 1931 and 1932 *tranches* was languishing, generated more than a little apprehension in Paris and a favourable climate in the Assembly, supported by a vigorous press campaign encouraged by the Marine Nationale and by political circles most well disposed to their arguments. On 28 February 1934 the Finance Committee of the Chamber approved the navy's draft budget law, and the Council of Ministers presented a draft law relative to the naval construction programme for 1934, including a second battleship of 26,500 tons, a large destroyer, and two submarines. On 3 March 1934 the new Navy Minister, François Pietri, made an official announcement, accompanied by a notification to the government of Italy with assurances concerning the anti-German nature of the decision that had been made. The second *Dunkerque* would run into problems in the Assembly not unlike those encountered by the first, to the point that the draft law was rescinded, then again presented in the next parliamentary session and approved by the two chambers, but not until early summer 1934. In actuality, behind several procedural difficulties lay the resistance of those within the Assembly and in the new government who were opposed to increases in spending on armaments at the time of a budget deficit, or who were in favour of a policy of disarmament or who were inclined to avoid tensions with Italy just when the atmosphere between the two countries was mellowing and closer ties for an anti-German stance were being sought. Among the sceptics were the President of the Council of Ministers, Gaston Doumergue, the Foreign Minister Louis Bartou, and also Serraut, who was now the Interior Minister. Paradoxically, the battleship that was to be named *Strasbourg* was laid down on 25 November 1934 – a month after the two Italian '35,000' class ships that represented the response to it were themselves laid down.

Construction of *Littorio* and *Vittorio Veneto* and reaction abroad

The failure of the 'Deleuze talks' left a negative impression in Rome, especially in the Lungotevere delle Navi (the district in Rome along the Tiber that was home to the Navy Ministry), but not to the point that they altered the naval plans. On 11 January 1934 Rear Admiral Domenico Cavagnari (Under-Secretary of State for the Navy since 11 November 1933) presented the navy's budget for 1934/35 to the

***Littorio* in August 1937 on one of the ways of the Ansaldo shipyard at Genova Sestri-Ponente; the ship is almost ready to take to the water and the pontoon in the background is working on preparing the foreslip.**



***Littorio* shortly before her launch, which would take place on 22 August 1937.** (By kind permission of A Gerace)

Senate. Under instructions from Mussolini, who had again become Navy Minister on 11 November, Cavagnari invoked the Washington Naval Treaty's option granted to Italy to build 70,000 tons of battleships during the 'naval holiday'; but this was only a warning to France, because Italy was also experiencing a difficult financial situation. In fact, also as instructed by the Duce, the proposal that Cavagnari presented to the chambers of parliament did not include any provision under the extraordinary section of the budget for complementary funding for new naval construction – with the only reservation that it be financed if the international political situation should require it – but only funding to continue construction that had already been begun or ordered, under the ordinary part of the budget. In substance, at the beginning of 1934 Rome had no intention of proceeding with any increase in its naval forces, but only to 'consolidate' – to use Mussolini's own expression – construction that was already under way or that had been ordered, through ordinary funds, similar to what had happened in France with the 1933 *tranche*.

The picture was radically altered, at least in the eyes of the Italian navy, with the news of the building of the second *Dunkerque*. This new development pushed Cavagnari to make a strong effort to convince Mussolini, who at the time was also the Navy Minister and the Foreign Minister, on two levels: firstly, in response to the French initiative, to authorise the building of two battleships of the maximum displacement allowed; and secondly to freeze all negotiations for a naval agreement with Paris and to keep the naval question separate from more general relations with France, in order to have a free hand not conditioned by any factors unconnected to the naval problem. Cavagnari found valuable support from the Foreign Under-Secretary, Fulvio Suvich, who ultimately espoused the navy's position following repeated failures of the naval negotiations.

In the meantime, on 8 March 1934, Cavagnari presented the Admirals Committee (a consultative body of the Navy Ministry) with the question as to whether it was opportune to build battleships of 35,000 tons armed with 406mm guns or a smaller alternative, from 30,000 to 35,000 tons, armed with 381mm guns. The question was accompanied by a thick memorandum that summarised the policy followed by Italy since the time of the Washington Naval Treaty, the heads of the disagreement with France up until the most recent developments and other technical, financial and political subjects connected with the problem. Among these was a forecast of the outcome of the upcoming London conference of 1935 which, because of the American attitude that favoured large displacements and heavy guns, gave no hint of any significant reduction of the qualitative limits imposed by the Washington Naval Treaty. The Admirals Committee also examined a design concept drawn up by the Ship Design Committee (another consultative body of the Navy Ministry) for a 35,000-ton battleship armed with nine 381mm guns in three triple turrets, twelve 152mm guns in six twin turrets, and a maximum speed of 30 knots. In essence, Cavagnari's question had been formulated in such a way as to point the Admirals Committee, if indeed it was necessary, toward a choice that had already been determined. It was precisely in that direction that the committee voiced its opinion in its meetings of 21 and 22 March, expressing agreement for battleships of 35,000 tons armed with 381mm or 406mm guns. This thinking also corresponded to that held by the upper echelon of the Regia Marina and that political circumstances had underscored time after time in that crucial period, namely that:

- from the doctrinal point of view, battleships continued to be the fundamental and indispensable part of every fleet;
- from the technical standpoint, only a large displacement could offer assurance against threats from guns, torpedoes and bombs and it would have been a mistake to abandon battleships as long as other ships with these characteristics existed (such as the British *Nelson* class) or could be built, given the uncertain outcome of the conferences on limitation of naval armaments;
- from the legal standpoint, Italy was well within its rights to build battleships of the maximum displacement and calibre allowed;
- from the political standpoint, Italy had shown every willingness to reach a naval agreement with France, who was completely

Guilio Cesare **re-entered service in October 1937 after her reconstruction, and is seen here in the Gulf of Naples during the large naval review in honour of Hitler – called 'Review H' – that was held on 5 May 1938. The much more elegant and functional lines as a result of the radical modernisation begun in October 1933 can be clearly seen.**

responsible for the failure to achieve it, while the preponderance of the Italian 35,000-ton ships over the French 26,500-ton ships was justified in the same way that the French ships were justified with respect to the German 10,000-ton ships.

Even so, at the end of March 1934 a final decision had not yet been made. On 19 March Suvich gave a cold reception to de Chambrunn's move aimed at resuming the stalled 'Deleuze talks', the chief motive of the French being to test the waters following the announcement of the second *Dunkerque* and in some measure to tie Italy's hands, but on 25 March Mussolini, meeting with the French ambassador himself, revived the negotiations, proposing abandonment of plans to build battleships of 35,000 tons in favour of two 26,500-ton ships as well as 30,000 tons of light vessels for each country.

Mussolini's proposal was presented by de Chambrunn to the Quay d'Orsay (the French Foreign Ministry). In the now relaxed climate between Rome and Paris, it was the French ambassador's understanding that Mussolini desired to resolve the naval controversy and for this reason would renounce the two 35,000-ton battleships for types that would not devalue the *Dunkerque* class. In addition, the idea was formed that the head of the Italian government was interested mainly in equality of rights and that he would be ready to relinquish the two smaller battleships as well in exchange for such a recognition, leaving France with a *de facto* superiority in this type of ship. The only disadvantage de Chambrunn could see was in the precedent that such an understanding might set, in effect ratifying naval parity for light ships as well, at the upcoming London conference. Even this appeared to be relative because, all things considered, the actual balance of forces would have been more important. Mussolini's proposal was closely examined in Paris and was the subject of intense consultation between the Quay d'Orsay, which was more inclined to accept it, and the Rue Royale, home of the navy and its General Staff. After about a month of consultations, the proposal was tacitly left to wither. The opposition of the navy had prevailed: it was due not only to fear of the consequences of equal rights, but also because of the intention to lay down a third *Dunkerque* before 1936 – it should not be forgotten that the first of the class was to replace the battleship *France* – as well as the conviction that Italy would not be able to lay down even one 26,500-ton battleship if it wanted to carry out its light ship programme at the same time.

The French Navy was not the only party to be opposed to a resumption of negotiations. On 27 March, as soon as he became aware of Mussolini's move, Cavagnari stepped in to argue against resuming the negotiations, adopting a new stance: namely, equality of programmes for an extended period (beyond 31 December 1936) and geared to Italy's financial means and on a related reduction of land and air armaments. On the other hand, Cavagnari did not acknowledge conditions by which Italy should be constrained to battleships of 26,500 tons, which he judged to be inadequate for Italy's military needs. These conditions clearly were unacceptable to France and were formulated only so as to avoid any resumption of negotiations.

The silence from Paris and the pressure from the Under-Secretary of the Navy put an end to Mussolini's hesitation. Following a series of consultations with Cavagnari, on 19 April the government authorised 480 million lire in complementary funding in the navy budget over a period of five years (for the financial years 1935/36 to 1939/40) for new construction, and on 26 May the Head of Government announced the building of the 70,000 tons of battleships allowed by the Washington Naval Treaty. He avoided any reference to the naval rivalry with France and made only an ironic reference to the languishing disarmament conference, almost as if to attribute the decision he had made to the failure of the conference rather than to the lack of agreement with Paris. He reserved the major portion of his speech for the social benefits, and in particular to the guarantees of employment afforded to the shipyard workers and to the naval industry. Two weeks later, on 10 June, the government formally authorised construction of the two battleships and the following day the semi-official Stefani News Agency issued a news release. The announcement made no reference to the naval discord with France, which was very much appreciated in Paris, and was largely focused on highlighting the technical reasons for the selection that favoured the maximum displacement. On 19 June, after some delay, the Navy Ministry forwarded the characteristics of the two ships to the Foreign Ministry so that it could notify the other powers signatory to the Washington Naval Treaty. The two battleships were promptly assigned the names *Littorio* and *Vittorio Veneto* and were both to be laid down with a solemn ceremony on 28 October 1934 (the anniversary of the Fascist March on Rome), respectively at Ansaldo's 'San Marco' Shipyard at Genoa Sestri, and the Cantieri Riuniti dell'Adriatico (C.R.D.A.) in Trieste. However, the diplomatic manoeuvring was not yet at an end and a new act opened, this time on the British side.

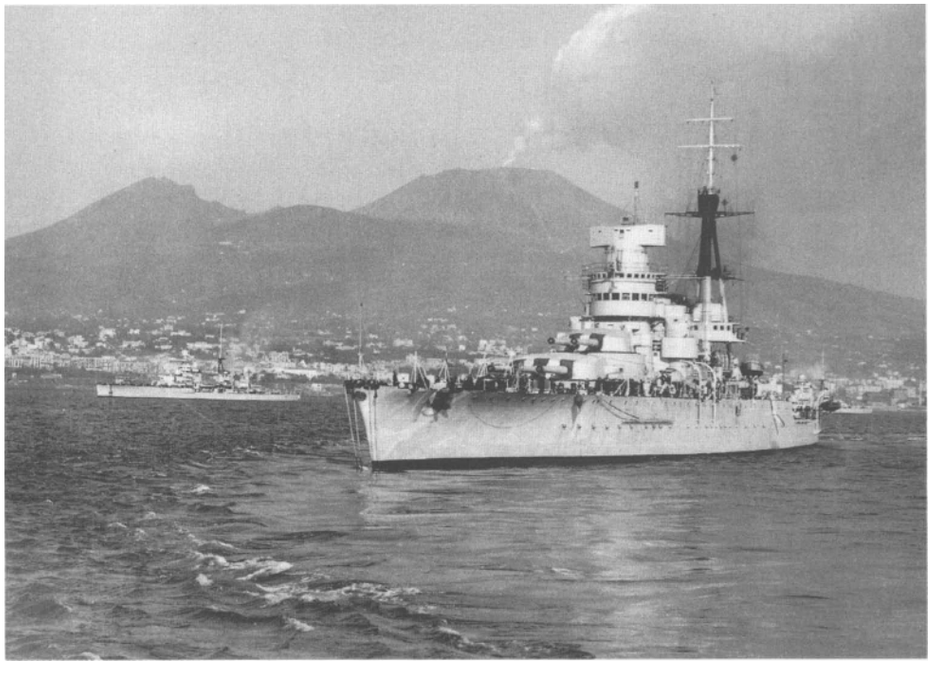
In anticipation of the London Naval Conference of 1935, in early 1934 the British Foreign Office had begun a series of bilateral meetings with the other four great powers to settle the major points

of contention beforehand and to determine possible lines of convergence, in order to ensure a positive outcome to the conference. Among the foremost was the Italo–French naval question, but the Foreign Office, over the opposition of the Admiralty, also intended once again to propose a drastic reduction of maximum displacement and gun calibre for battleships, respectively to 25,000 tons and 305mm. These formulas had foundered during the earlier 1930 conference due to opposition by the United States, which was against going below the limits set by the Washington Naval Treaty. London, however, counted on softening the American position and reaching a compromise position around 28,000 tons, so it considered the Italian decision to build battleships of 35,000 tons inopportune, as it risked generating an equivalent French reaction and thus nullifying British efforts towards a reduction in battleship characteristics. There followed a series of moves directed toward the Rome government, culminating in the presentation of a *note verbale* on 14 July 1934, to persuade it to forsake ships of that size or, at least, to await the outcome of the preliminary talks before making a binding decision.

The reaction at the Lungotevere delle Navi was very negative, and Cavagnari, who was worried about the consequences of British interference, found a strong ally in Suvich, with whom he agreed a course to be followed. This was specified on 25 July in the formal reply by the Palazzo Chigi (the home of the Italian Foreign Ministry) to the British *note verbale* and in other forums in which not only was the legitimacy of Italy's decision repeatedly stressed (which no one took exception to), but equally the fact that a vested right could not be exchanged for rights that were contingent upon future agreements. Italy, it was argued, could not be called upon to renounce her rights when other countries had battleships with similar characteristics; no one had objected when Britain built the two *Nelson* class ships displacing more than 33,000 tons standard and armed with 406mm guns. These reasons were accompanied by those of a more purely political and technical nature, associated with French hostility towards an agreement with Rome, to doubts concerning Washington's true intentions, and to the lack of belief in ships of lesser displacement. When London understood that Rome would not budge, it tried to convince Italy to at least reduce the calibre of the guns from 381mm to 356mm, which seemed to offer promise of convergence with Washington. This final attempt was tabled at the meeting in London on 30 July between the British and Italian delegations – which Rome, however, was determined to hold on a purely technical basis – and repeated on 14 August with another approach to the Palazzo Chigi. These proposals, which were also opposed by Cavagnari (formally because they were not counterbalanced by any concrete offsets), had no effect whatsoever and it was Mussolini himself who decided to leave them unanswered. The calibre of the main armament of the *Littorio* class thus remained fixed at 381mm. It should be said that Italian inflexibility was not without reason. The preliminary conversations desired by London in that brief period of 1934 were disappointing: the United States showed no intention of reducing the displacement of battleships, nor of reducing the calibre from 406mm to 356mm; above all, they were clearly indifferent towards the construction of a few 35,000-ton battleships by France and Italy.

There was no French diplomatic reaction, but only a certain bewil-

(Below): *Giulio Cesare*, with the cruiser *Zara* in the background, while manoeuvring with engines going astern, with Naples in the distance, in May 1938. (E Leproni archives) **(Right): Trieste, 18 September 1938. Mussolini paying a visit to the 'San Marco' Shipyard to witness the launch of the motor vessels *Fede* and *Lavoro* and the laying of the keel of the battleship *Roma*.**



derment along the Seine because it was not expected that Italy would decide to build two 35,000-ton battleships. In fact, de Chambrunn was questioned by Bartou in order to clarify whether this was a true intention or a political stratagem prior to the 1935 naval conference. The ambassador confirmed that it was not a bluff and, as Suvich had declared to him on 13 June, Mussolini had reached the decision only after Paris had left his approaches of 25 March unanswered. Once the Italian position was made clear, on 25 June, the French Navy General Staff considered the possibility of replacing the second *Dunkerque* in the 1934 *tranche* with a '35,000-tonner' or, at least, with a battleship of 30,000 tons. It opted, instead, to give up the idea because construction of a new larger ship would have led to a delay in preparation estimated at fifteen to eighteen months. The 1934 *tranche*, therefore, remained unchanged, except that the second *Dunkerque* was to receive greater protection than the first. However, on 25 July the Superior Council of the French Navy came to the conclusion that although the two *Dunkerque* class were enough to oppose the *Deutschland*s in the Atlantic, in order to balance the equation in the Mediterranean another two battleships of 35,000 tons armed with 381mm or 406mm guns were needed. Meanwhile, in early July talks had also been held between the French and the British prior to the London Conference which, in contrast to the Anglo-Italian talks, took place at the highest level because both the Foreign Minister and Navy Minister participated. Politically, the outcome was favourable to the French in that, as the parties had convened to review the Versailles clauses and to admit Germany to the forthcoming naval conference with equal rights, the British showed themselves to be disposed towards reviewing the ratios posed by the Washington Treaty and to recognise the 'two-power standard' of France with respect to Italy and Germany. Regarding battleships, Pietri agreed to limit the standard displacement to 25,000 tons, on condition that Italy abandon its '35,000' class. This position was made public the following August and, as Italy made no change in direction, on 13 March 1935 the Council of Ministers presented the National Assembly a draft bill for the 1935 *tranche* that called for laying down two '35,000' ships, one by 31 December of that year (within the timeframe recognised by the treaties), and the other on 1 January 1937, after the expiration of the Washington Naval Treaty. As in the case of the *Littorio* class, it is testimony to the favourable political climate between the two countries that the tone in political circles and the press was mild and there was little or no animosity towards Italy. The link between the two French 35,000-tonners and the Italian ships was not hidden, but what was the importance of French naval interests in the face of German rearmament and the failure of the disarmament conference that was highlighted, rather than the naval competition with Italy. The two units were assigned the names *Richelieu* and *Jean Bart* and were to be laid down on 22 October 1935 and 12 December 1936 respectively.

France and Britain were not the only countries to show concern over the two Italian '35,000' ships. Anxieties also arose in Spain, so much so that at the end of June the Madrid government consulted with the French to determine if Rome's announcement corresponded to a real intention. Once verified, Spain did not hide its anxiety over the defence of its coast, given the weak state of its navy and coastal defences, and proposed joint Anglo–French–Spanish co-operation in order to deal with the Italian '35,000' class. Naturally enough, the initiative was not pursued, but it was a clear symptom of the mistrust that Madrid felt towards Italy at the time.

Simply stated, the first two *Littorio* class were the result of two related factors: the French decision to build the second *Dunkerque* and the failure of the negotiations for an Italo–French naval agreement. Mussolini would have happily cancelled their building for political and financial reasons but caved in, not only because of Cavagnari's persistence, but also because the advantage that France would gain by the two *Dunkerque* ships would have compromised the right to equality which he had no intention of abandoning. Cavagnari, who from 1 June 1934 was also Chief of Staff of the Navy, showed himself to be the most tenacious proponent of the building of these ships, because he was convinced of the value of battleships of large displacement and was keen to narrow the gap between the two navies. On the international scene they were clearly a key event and marked the apex of the Italo–French naval argument, but their importance should not be overstated. Neither they, nor the two *Richelieu* class – nor even the naval rivalry itself – hindered the rapprochement between Italy and France that culminated in the Mussolini–Laval agreement of 7 January 1935 and in the Badoglio–Gamelin military agreements of 19 and 28 June 1935. Anglo–Italian disagreement was marginal; London did not believe that its interests were threatened, but felt hindered in its attempts to lower the limits on battleships in the 1935 conference where, as it played out, the disruptive factor was not the existence of the Italian '35,000' class or of the French ships, but rather Washington's continuing opposition to going below this existing threshold.

The ships were a significant factor in Italian naval policy, but were not a turning point. After a decade of developing its lighter ships the Italian navy turned its attention to battleships, which in the preceding years it had never shown an inclination to abandon. The situation, however, had not yet been affected by any changes in the politico-military scenario and remained rooted in the hornet's nest of the naval dispute with France. Indeed, the Mussolini-Laval agreement and, soon after, the London Naval Conference of 1935–6 marked the end of the argument concerning Italo–French naval parity. In the years between 1930 and 1935, considering only major units, France had authorised construction of forty-seven ships for 231,371 tons, among which were four battleships (two of 26,500 tons and two of 35,000 tons) compared to seventy-three ships for 177,499 tons authorised by Italy, among which were two 35,000-ton battleships, but not including rebuilding of the two *Cesare* class ships. The smaller number of ships but greater overall displacement on the part of the French is explained by the two additional battleships that had a greater aggregate displacement than the destroyers. However, in an overall sense, compared to the period from 1922 to 1929 Italy was narrowing the gap, having authorised a number of significantly larger ships while, in tonnage, the Italian yearly average of 29,600 tons now represented 76.9 per cent of the French yearly average of 38,500 tons.

Building *Littorio* and *Vittorio Veneto*

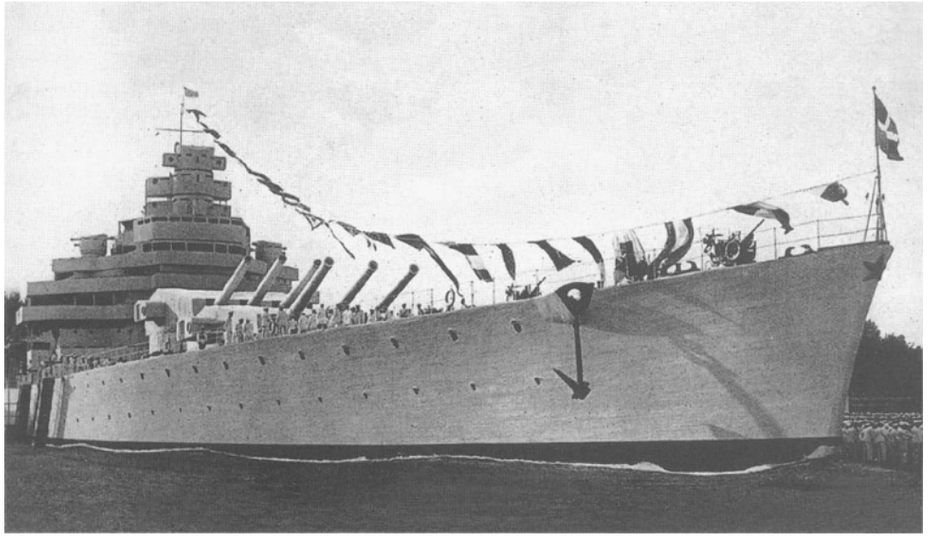
Littorio and *Vittorio Veneto* were laid down with great ceremony on 28 October 1934, the anniversary of the Fascist March on Rome, respectively in the Ansaldo shipyard at Genoa-Sestri Ponente (con-

struction project no. 301) and the 'San Marco' yard of the Cantieri Riuniti dell'Adriatico (C.R.D.A.) (construction project no. 1133) in Trieste. The two companies, both participants in the Istituto di Ricostruzione Industriale (the I.R.I.), had in May, prior to the actual definitive political decision, been awarded the contracts for one battleship each after the Navy Minister had conducted a preliminary technical inquiry via a specially-appointed commission to determine which Italian shipyards potentially were able to build ships of the required dimensions. The inquiry was carried out in the spring of 1934 and, in addition to the two named yards, it also examined the Odero-Terni-Orlando yards at Livorno and the Muggiano yards at La Spezia, but, strangely, not the Cantieri Navali Triestini at Monfalcone that were part of C.R.D.A., and was aimed at determining which yards were best equipped for such an undertaking, in order to avoid delays and added costs to the state for supplementary work on infrastructure and facilities. The cited yards at Genoa and Trieste were by far the best equipped, with the 'San Marco' slightly the better, thanks mainly to the investments that previously had been made for construction of the transatlantic liners *Rex* and *Conte di Savoia.*

Even though at that time almost all Italian shipyards had joined the I.R.I., the award of such important contracts led to a lively competition among the industrial groups and their respective regional territories (Liguria and Livorno on the one hand, and Trieste and the Giulia region on the other), and no punches were pulled to win the bids, even following the awards. On more than one occasion approaches were made to Mussolini himself. Typical of these was the representation by the Honourable Francesco Giunta, President of C.R.D.A., at the end of May 1934, aimed at foiling an attempt by a rival group from the Tyrrhenian yards to take the battleship contract from the Trieste shipyard; Giunta counter-attacked by pointing out that C.R.D.A. had submitted the best offer and was, in fact, capable of building both battleships at the same time if required. The fact was that at the end of the First World War Italy had inherited all of the shipyards of the Austro-Hungarian empire (along the Adriatic coast), whose total capacity was slightly less than that of the Italian yards but whose productivity was greater, even though logistically they were at a disadvantage because of the greater distance from the suppliers of armour plate and guns, which were centred more closely on the Tyrrhenian side. The excess capacity of Italian shipyards over national requirements after 1919 led to increasing competition between the two or three major groups, and various companies, local government, and even party authorities, continuously lobbied Mussolini about the employment and social considerations.

Handover of the two ships to the navy was originally set for February 1939 for *Vittorio Veneto* and the following April for *Littorio.* The materials began to be collected in June 1934 and work began much earlier than stipulated by the contracts, which were not actually finalised until July 1935. This delay caused several financial problems for the shipyards, which could not be paid before the contracts were registered with the appropriate courts, but the solution was found by advance payments from the Consortium for State Aid for Industrial Stocks that were guaranteed by the national government. But during the following years even greater difficulties arose, which were beyond the control of the shipyard. First off, at the end of 1935 and the beginning of 1936 there was a temporary halt in construction while the design was modified (during the course of building the standard displacement rose from 35,000 tons to 38,000 tons and then to 40,500 tons). This was followed by shortages of raw materials from abroad (primarily scrap metal and non-ferrous metals) linked to sanctions imposed by the League of Nations against Italy because of the war in Ethiopia. Finally, there were the knock-on effects of simultaneous orders to the Italian steel industry,

A full-size wooden mock-up of the forward portion of a battleship of the *Littorio* class erected in Rome for Italian Navy Day on 10 June 1939. To the right is Mussolini, with Admiral Domenico Cavagnari and the Secretary of the Fascist Party, Achille Starace, on board the wooden ship. The Italian Navy attached great importance to the building of these large battleships.



beginning in 1937, for armour plate for the *Duilio* class reconstructions and for other plates needed for the new classes of submarines, to which were added technical problems in the production of the armour plate. All of this led to extended delivery dates for the battleships that finally became 28 April 1940 for *Vittorio Veneto* and, after a rather hurried fitting-out, 6 May 1940 for *Littorio*.

The costs, including all of the armament, were originally estimated at 480 million lire for each ship spread over six financial years from 1934/35 to 1939/40. At the end of the day, due to increased costs of armour plate, other materials, and labour, the official total rose to 559,033,000 lire for *Littorio* and 575,833,000 lire for *Vittorio Veneto*, but it is more likely that the real cost of each was not less than approximately 800 million. Both ships were built in about five-and-a-half years, or a year more than had been scheduled. More precisely, there was a fourteen-month delay for *Vittorio Veneto* and a little over twelve months for *Littorio*. The delays could be judged as tolerable, compared to similar delays that plagued French battleships like *Richelieu* and *Jean Bart* at the same time, even though French industry had not experienced the same problems as its Italian counterpart in the second half of the 1930s. Nevertheless, the ultimate consequences were quite negative, as the two Italian '35,000' type only entered service just before Italy went to war, and were far from being fully worked up.

The London Conference of 1935–1936 and the end of naval disarmament

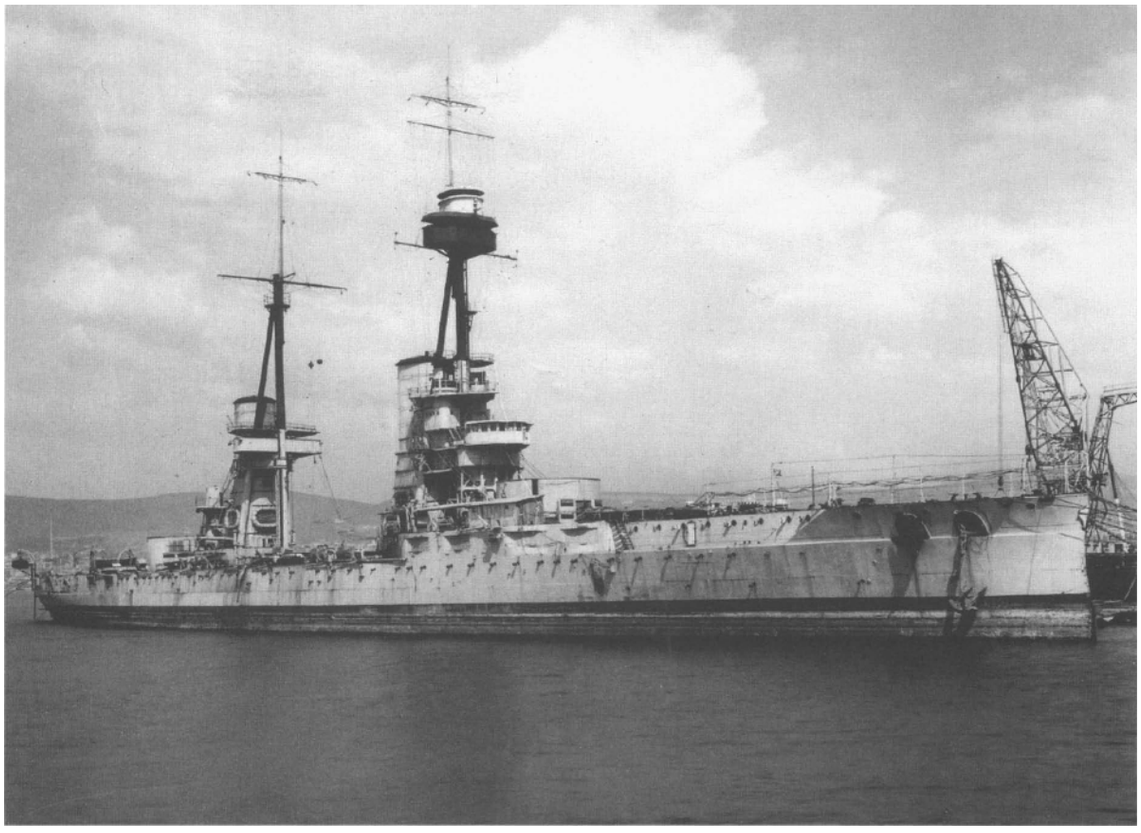
The 1930 London Treaty provided that a year before expiration of the Washington Naval Treaty the signatory states would meet at a conference to reach a new agreement on naval arms limitation. However, between 1935 and 1936 the international situation had deteriorated to the point that it compromised the delicate balances that had previously been achieved. After months of unproductive discussions, the General Disarmament Conference adjourned indefinitely, having failed to accept the German demand for repeal of the military limitations imposed by the Treaty of Versailles and recognition of equal rights with the other powers. Hitler and the National Socialists, who had been in power since 30 January 1933, withdrew Germany first from the conference, then from the League of Nations, and finally, on 16 March 1935, unilaterally repudiated the military clauses of the Treaty of Versailles. In the naval field, as Germany was not a signatory to the Washington Naval Treaty, London made haste, much to the disappointment of Rome and Paris, to agree a pact on 18 June 1935 that established a quantitative ratio to the British fleet of 35 per cent of total displacement and the same figure for every individual category of ship, except for submarines where the percentage was 45 per cent, which in circumstances of special need could to be raised to 100 per cent. Japan, in turn, became convinced during the preliminary conversations of the conference that it would not be able to obtain parity with the Anglo-Saxon powers, so on 29 December 1934 repudiated the Washington Naval Treaty and reserved complete liberty to act as it wished.

The second London Conference opened on 9 December 1935 and was attended by Italy, despite some hesitation caused by the diplomatic crisis with Britain over Italy's 'Abyssinian' (Ethiopian) adventure, which had resulted in the concentration of the Home Fleet in the Mediterranean and the adoption of a sanctions regime by the League of Nations. In January the conference was abandoned by Japan who saw its proposals for a 'common upper limit' and the 'abolition of offensive ships' (battleships, aircraft carriers and heavy cruisers) rebuffed. The conference concluded on 25 March 1936 with a treaty signed only by the United States, Great Britain and France, as Rome chose not to accede because of the worsening of the crisis stemming from the Ethiopian conflict. But, for the first time, Rome and Paris had participated in a conference of naval negotiations sharing the same views, thanks to the improved political climate and the common wish to put an end to the argument concerning naval parity. This favoured the abolition of the ratio set in 1922 at Washington and of the consequent ranking amongst the naval powers, with each then becoming free to build its fleet according to its own needs. The treaty adopted only qualitative clauses that for battleships maintained the maximum displacement at 35,000 tons but which reduced main gun calibre from 406mm to 356mm. The minimum age for battleships was raised from twenty to twenty-six years; lower age limits were introduced for other ship categories. In addition, the treaty established a complex system of advance notification and reciprocal communication on naval programmes, regarding not only the ship-types subject to limitations, but also relating to other categories not included. The treaty was to have remained in effect until 31 December 1942 and called for interim consultations in 1940.

During the discussions all of the powers, except for the United States, declared their desire for a reduction of the displacement and calibre for battleships. In particular, the Italian and French delegations jointly proposed the reduction of displacement to 27,000 tons and of calibre to 305mm. Ultimately American intransigence prevailed and in fact a clause was inserted whereby the maximum calibre would be again raised to 406mm if Japan and Italy did not agree by 1 April 1937 to accept 356mm as the maximum. Other safeguard clauses regarded abstention from treaty obligations in case of war, or the authorisation, construction or acquisition of ships not conforming to treaty standards by countries that were not signatory to the treaty.

Because the validity of the treaty depended on the compliance of other naval powers, the British government tabled a series of bilateral discussions. On 9 January 1937 Rome gave assurances that it would not install guns larger than 356mm on future ships, on condition that all other countries would do likewise. In fact, for economic and infrastructure reasons it was in the best interests of the Italian government and navy not to go above these limits. However, Japan's negative response on 27 March activated the safeguard clause, and as a result the maximum calibre again rose to 406mm.

During 1937 and early 1938 the situation deteriorated because of the suspicion that Japan was constructing large battleships (these were *Yamato* and, in 1938, her sister-ship *Musashi*, of 64,000 tons with 460mm guns) and because of Tokyo's refusal to make known its intentions. Following consultations, London, Washington and Paris decided to avail themselves of the other safeguard clause and on 30 June agreed to raise displacement to 45,000 tons, leaving the calibre at 406mm; at the same time, London and Paris announced that they would refrain from building ships displacing more than 40,000 tons and 35,000 tons respectively, if the other European



Andrea Doria **in Trieste in the spring of 1937; the ship has already had her armament removed and is ready for radical modernisation work to begin that would entail the complete rebuilding of the superstructure, the bow, and part of the after end of the hull, replacement of the entire propulsion system, and a total modernisation of her armament.** (F Petronio collection)

powers would do the same. These declarations were aimed at Rome and Berlin, who had formally established the Axis in November 1936 following international developments that drew Italy and Germany closer together (the rise to power in France of a markedly anti-Fascist popular front, and the outbreak of the civil war in Spain). The Axis powers began consultations to provide a joint answer, but due to economic, financial and infrastructure concerns the Italians opposed raising displacement to 40,000 tons, while the Germans preferred 45,000 tons. However, on 17 January and 14 February the two countries signalled acceptance of the British proposal to London, but for Berlin – which had set into motion its anti-British 'Z Plan', that included building battleships of 56,000 tons – acceptance was limited only to 1939. In the meantime, on 2 December 1938, the so-called Easter Treaties between Italy and Britain had come into effect, marking a temporary rapprochement between the two countries following the Ethiopian and Spanish crises, and also included Italian acceptance of the Treaty of London. It should be remembered that both Berlin and Moscow, in addition to other minor powers, had agreed with London through bilateral accords on 17 July 1937, although Japan did not do likewise. All of these declarations occurred in a period of total European and world tension and could not even faintly disguise the naval rearmament that all of the powers had begun to engage in from 1936 onward. On 27 April 1939 Germany repudiated the 1935 and 1937 naval agreements with Britain, assuming complete freedom of action. Finally, in September and October 1939, with the outbreak of war in Europe, Great Britain and France declared the suspension of the Treaty of London and the bilateral agreements connected with it, soon followed by the United States and Italy.

Sanctions and naval construction

The crisis with Britain and the imposition of sanctions against Italy by the League of Nations was not without consequence for Italian naval policy, politically because Britain now entered the ranks of Italy's potential enemies and from a financial standpoint because the restrictions that had been introduced as a result by the Italian government had a noticeable effect on ship construction.

The Italian military hierarchy held a meeting on 13 August 1935 at the General Staff to examine measures to be adopted in response to the situation of extreme tension with Britain. As of January 1935 Cavagnari had declared himself in favour of the undertaking in Abyssinia (in contrast to other military chiefs, among them Badoglio) but he made no secret of the absolute inferiority of the Italian navy relative to the British, which, together with the shortcomings of the air force, would have made a conflict with Britain very difficult. He attributed this inferiority to the almost total lack on the Italian side of any capable battleships as the only two in service, the *Duilio* and the *Doria*, were of limited combat value. If the new force of modern battleships, formed by the two *Littorio* class and the two *Cesare* class, had been available, the picture would have been different, 'even if only from the British standpoint of risk'. This stance makes it possible to understand the crux of Cavagnari's thoughts, even before the war, about the function of battleships, namely, that essentially they would have been a deterrent against potential or real enemies. As succeeding events brought to light, the tension with Britain, as long as it was manageable and did not break out into a conflict, was not completely unwelcome, as it could be exploited to obtain an expansion of the fleet, and in particular, of the battle squadron.

This school of thought came to full bloom in October 1935, with the beginning of the Abyssinian campaign when Mussolini, following the adoption of sanctions against Italy, issued extremely severe directives regarding imports (including military supplies), restricting the importation of machinery, instruments and finished products, and minimising orders for foreign raw materials, even at the cost of settling for quality below that specified. It should be noted, however, that the first series of measures did not weigh very heavily on naval construction: stopping the import of machinery and equipment posed no difficulties, while imports of finished or semi-finished products were maintained at modest levels. Raw materials posed greater difficulties, but for the time being there were sufficient stocks on hand to meet all of the requirements for ships under construction, including at least in part for the *Littorio* ships. Even though the situation was not yet worrying for the navy, Cavagnari approached General Alfredo Dallolio, Commissioner General for military production, as well as sending a memorandum to Mussolini on 24 October, in order to obtain the loosest possible limitations on imports that affected the navy. The motives of the Under-Secretary of State for the Navy are most interesting. In a memorandum to the head of the government (Mussolini) that was markedly anti-British in tone, he repeated in greater depth the concept previously expressed in the meeting with Badoglio and the other military chiefs that Italy's weakness with respect to Britain was attributable to its lack of large battleships and that having four modern operational battleships would have rendered the British less arrogant and the French more inclined to co-operate. More generally, in Cavagnari's opinion, further development for Italy was only possible overseas but she was now held in check by the previously friendly major maritime powers, so it was indispensable that she should have a well balanced naval force based on heavy battleships, as they were the only ships that were of high offensive and defensive value. Only such a force would be able to ensure respect for Italian rights and aspirations, whatever the vicissitudes of Italy's relations with other countries. Cavagnari's move had a dual purpose: to guarantee a balanced growth of the naval forces with specific regard to battleships and, in the short term, to avoid any slowing of construction already under way, especially of the battleships. Symptomatically, even later, as happened on 4 March 1937 in discussions concerning the navy's 1937/38 budget, he again stressed the role, small as it may have been, played by the fleet during the 1935–6 Mediterranean crisis.

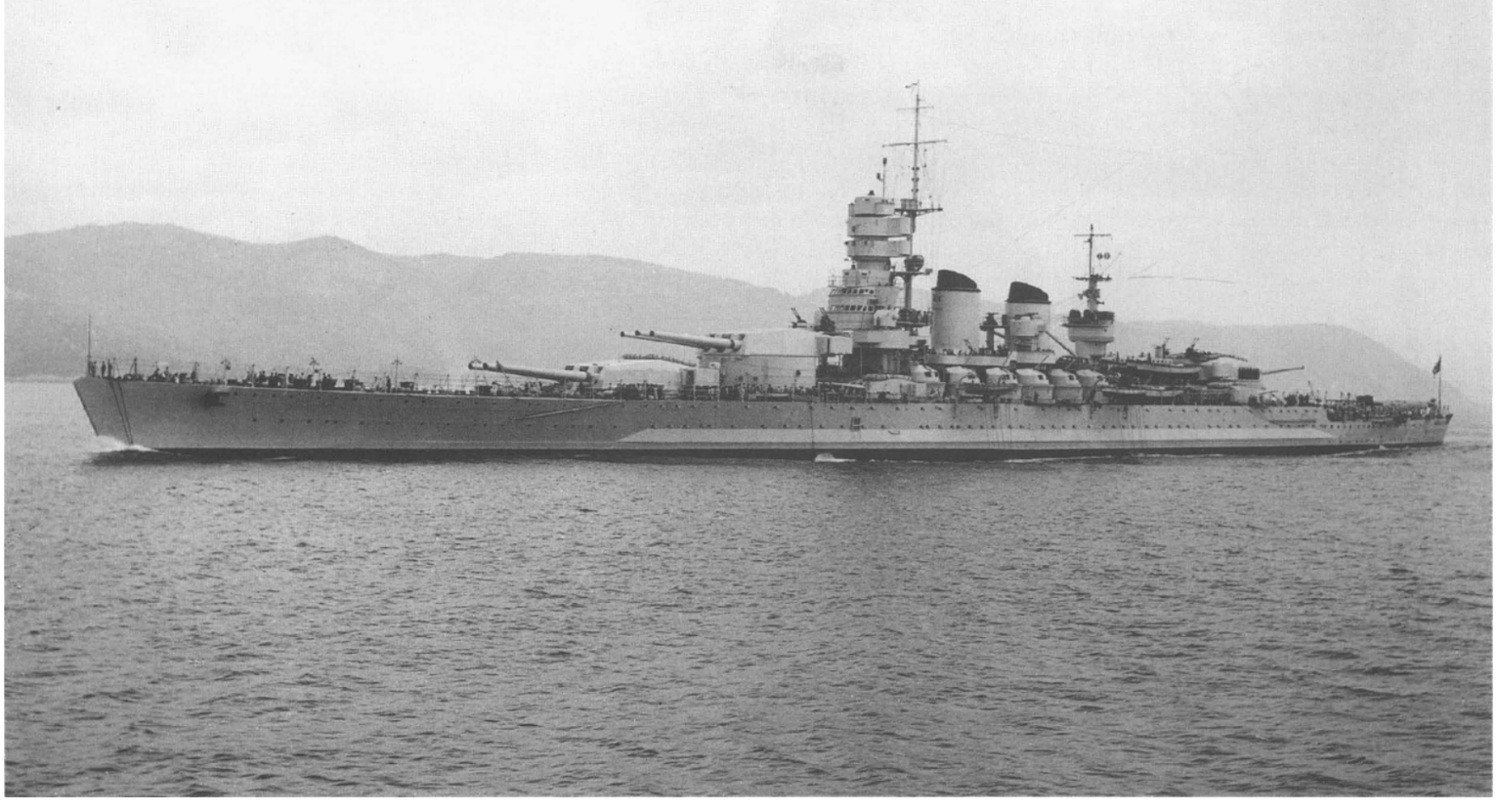
Reconstruction of the *Duilio* class ships and plans for 27,000-ton battleships (1935–1937)

Cavagnari's moves were not a dead issue. In light of the glowing results expected from the reconstruction of the two *Cesare* ships, in mid-November the Plans Office of the Naval Staff also began to consider the radical modernisation of the two *Duilio* class ships. The goal was to harmonise the characteristics with those of the earlier two ships in order to form a division of four similar ships. Otherwise, the two *Duilio*s, whose combat value was practically nil, would have found it impossible to operate with the *Cesare* and *Littorio* groups due to differences in armament, speed and protection. The initiative went forward, and beginning in February 1936 the Ship Design Committee, in co-operation with Ansaldo and C.R.D.A., began to busy itself with the transformation of the two *Duilio*s, using the *Cesare* as a model, but improving it in light of experience gained from the *Littorio* class that were still under construction. The biggest changes were with respect to anti-torpedo armament (135mm guns instead of 120mm guns) and anti-aircraft armament (90mm guns in lieu of 100mm guns), while the bows of the ships were to be completely rebuilt rather than new ones being superimposed over the existing bows. Radical modernisation of the *Duilio* class was finally decided in early 1937 and the two units became part of the 1937/38 programme, of which more will be said later.

The decision raises questions. It was given impetus by Cavagnari's view that favoured strengthening the battle squadron; by the possibility of acquiring two additional ships at modest cost; and by the observation that almost all of the battleships of other countries were of similar vintage and, therefore, that it was worth modernising old equipment as it would continue to form the bulk of the battle squadrons of other navies for many years to come, regardless of the outcome of the London Conference.

However, a number of factors failed to be taken into account: first, that naval rearmament was gathering pace and that the new ships would inevitably outclass the rebuilt *Cesare* and *Duilio* types, as became evident during the early part of the war; second, that in a period of financial difficulty for Italy, especially with regard to importing raw materials, the resources for these two battleships would adversely affect supplies for the much more important *Littorio* class; third, that the steel industry would suffer bottlenecks in the production of armour; and finally, that the costs of reconstructing these two units would equal the cost of building one *Littorio*. This last point is the most astonishing: the cost of rebuilding the *Cesare* was 160,499,000 lire and that of *Cavour* was 161,499,000 lire, but the cost of rebuilding *Duilio* was 302,572,000 lire and of *Doria* 302,969,000 lire, the overall cost of the latter two ships approaching the approximately 800 million lire for a *Littorio* of the first group. Without even considering the steel that could have been salvaged from their demolition in a time of shortages, the resources and effort dedicated to rebuilding two battleships that soon showed themselves to be second-line ships would have been better directed toward building other ships or to speeding up completion of the larger battleships so that in 1942 Italy could easily have had a total of four of these large and modern ships. In essence, while the radical modernisation of the two *Cesare* ships might have made sense because it was carried out at a time when the fate of disarmament and of capital ships was still in doubt, by 1937, when the decision was made to rebuild the *Duilio* class, the political, military and technological situations had changed drastically and no longer argued in favour of undertakings of this sort. Furthermore, apart from a small number of French and American ships, all of the other old battleships were originally superior to the corresponding Italian ships because they were better armed and protected and lent themselves to worthwhile modernisation. Perhaps most astounding is the lack of a strong opposition voice within the Regia Marina, which was not silent when it came to the contemporary proposals for 27,000-ton battleships, which is worth mentioning because of the significant conclusions reached by the technical departments of the navy.

In the run-up to and during the London Conference one of the more popular proposals with respect to limits on future battleships was for a standard displacement of 25,000–27,000 tons and a gun calibre of 305–330mm – that is, characteristics equal to or close to the *Dunkerque* class. This position was initially shared by Great Britain and by France and Italy, who were in agreement. To meet this contingency, since September 1935 the Ship Design Committee had been carrying out feasibility studies, prior to design, assuming a standard displacement of 26,500 tons and main armament consisting of 305mm or 320mm guns. In 1935 the design options within these parameters were presented for consideration to the Admirals Committee, which made a wide-ranging series of judgements and proposals, which in early 1936 were again presented for review to the Ship Design Committee. The general consensus that emerged from the Admirals Committee could be summarised as a preference for a 27,000 tons standard ship armed with nine 320mm guns in triple turrets, twelve or sixteen 140mm guns in triple or quadruple turrets, twelve 90mm anti-aircraft guns in protected mounts, plus light anti-aircraft guns, with protection comparable to that of the *Littorio* class and a steam plant capable of developing a speed of 30 knots and having a range of 4,000 miles at 20 knots, capable of being increased for ocean-going missions. In reaching their conclusions on 6 February 1936, the Ship Design Committee pointed out that providing these characteristics would require a displacement increased to 30,000 tons – similar to what was happening to the *Littorio* class, whose design at that moment (February 1936) had already expanded to 38,500 tons. In order to stay within the 27,000-ton limit it would have been necessary either to adopt the quadruple-turret formula of the *Dunkerques* or to reduce speed to 28 knots, while retaining protection similar to that of the *Littorio* class. But, in a climate that favoured large battleships, the conclusion of the Ship Design Committee was that it would not be advisable for Italy to choose willingly – as France had done with the *Dunkerque* – to build battleships of medium displacement, if not restricted by international treaties, and that from a technical standpoint it would have been preferable to continue with construction of other units of the *Littorio* type. These plans came to nothing, as the 1936 London Treaty left matters practically unchanged with respect to the Treaty of Washington, and it would not have been advantageous to build battleships of 27,000 tons when other powers would have been able to build 35,000-ton ships. In short, the two committees reiterated the opinion that had been expressed in 1934, when it was necessary to respond to the two *Dunkerques*, that a displacement of 27,000 tons was insufficient to provide the requirements indispensable for a modern battleship. It does not appear that similar considerations were taken into account when it came to thoughts of modernising the *Duilio* class. However, as Cavagnari perfectly understood, the events connected with the London Treaty of 1936 also demonstrated that, leaving aside technical considerations, it was not advisable for Italy to push for higher displacements, which would put her economically and financially at a disadvantage compared to other countries. Battleships of 40,000 tons standard displacement, such as the *Littorio* class, represented a threshold that could be surpassed only with difficulty and to its disadvantage.



***Vittorio Veneto*, only a few days after her entry in service, photographed in May 1940 off the Ligurian coast.** (F Petronio collection)

PROGRAMMES	BB	CV	CA	DL	DD	TB	SS	DE	M	ASW	GB	MTB
Situation early 1936	4	–	23	21	40	37	71	4	15	1	15	30
Minimal programme	6	–	22	28	44	44	75	8	18	24	24	48
Breakout fleet	9	3	36	58	40	44	84	16	18	24	24	48

Note: BB = battleship; CV = aircraft carrier; CA = cruiser; DL = destroyer leader ('esploratori'); DD = destroyer; TB = torpedo boat; SS = submarine; DE = destroyer escort; ML = minelayer; ASW = anti-submarine vessels; GB = gunboat; MTB = motor torpedo boat

From the *Littorio* to the *Impero* class and the French response

The war in Abyssinia and the Mediterranean crisis, although far from sparking a war and still open to a diplomatic solution, left a profound mark on relations between Rome and London that was reflected in their respective war plans. In addition, Italy's overseas conquests, as Cavagnari had hoped and expected, forced attention to Italy's maritime difficulties and the development of the navy, even in an oceanic context.

In the first half of 1936, while the Mediterranean crisis was at its peak, the Operations Plans Office of the Regia Marina Staff put together a plan for a six-year naval programme to be realised during the financial years between 1936/37 and 1941/42. The purpose of the plan was to develop the navy in the context of a politico-military scenario in which either France or Britain would be either an ally or benevolently neutral. Based on this premise, the plan examined two hypotheses, one for a minimal programme and the other for a 'breakout fleet'. The minimal programme assumed the replacement of ships to be decommissioned, as well as some additional ships, in order to maintain a construction policy not very different from the one that had been followed up to that time, namely, of a ratio of 0.33:1 with Great Britain and 0.66:1 with France. In contrast, he 'breakout fleet' programme aimed at increasing Italy's maritime power, establishing a force that could exert an influence on the ocean as well as the Mediterranean, and that would thus change the force relationships with Britain and France. However, it was not specific in detail, nor did the document enter into the issue of having ocean bases from which the 'breakout fleet' could operate. A summary of the situation envisioned for 1942 for both cases is shown in the table above.

Aircraft carriers were called for only for the 'breakout fleet' hypothesis, while it should be pointed out that in the minimal programme the six battleships would have been formed by three *Littorio* class ships, not four, and three of the *Cesare/Duilio* classes, with the radical rebuilding of only one of the *Duilio* class in order to create two homogeneous divisions of three battleships each of the same type.

The prospect of a conflict with Great Britain was addressed somewhat later in a second study by the Plans Office in September 1937 which, this time, took into account an alliance with Germany, a rapprochement which, two months later, Cavagnari did not oppose in his meeting with Badoglio, either because of a desire to escape the isolation in which Italy had found itself, or to offset the increasing Anglo-French relationship. The programme, which was to run for seven years, was reminiscent of the French 'Statut Naval', acting as a guide to development of the fleet. The programme covered financial years 1937/38 to 1943/44 and set criteria for construction, according to which the overall displacement of the combined Italian and German fleets would have reached a ratio of 5:10 compared to the combination of Britain and France, while the ratio of the Italian to the British fleet would have reached 4:10 and with the French fleet 7.7:10. In 1944 the Italian fleet, by major ship class, was to have been composed as follows:

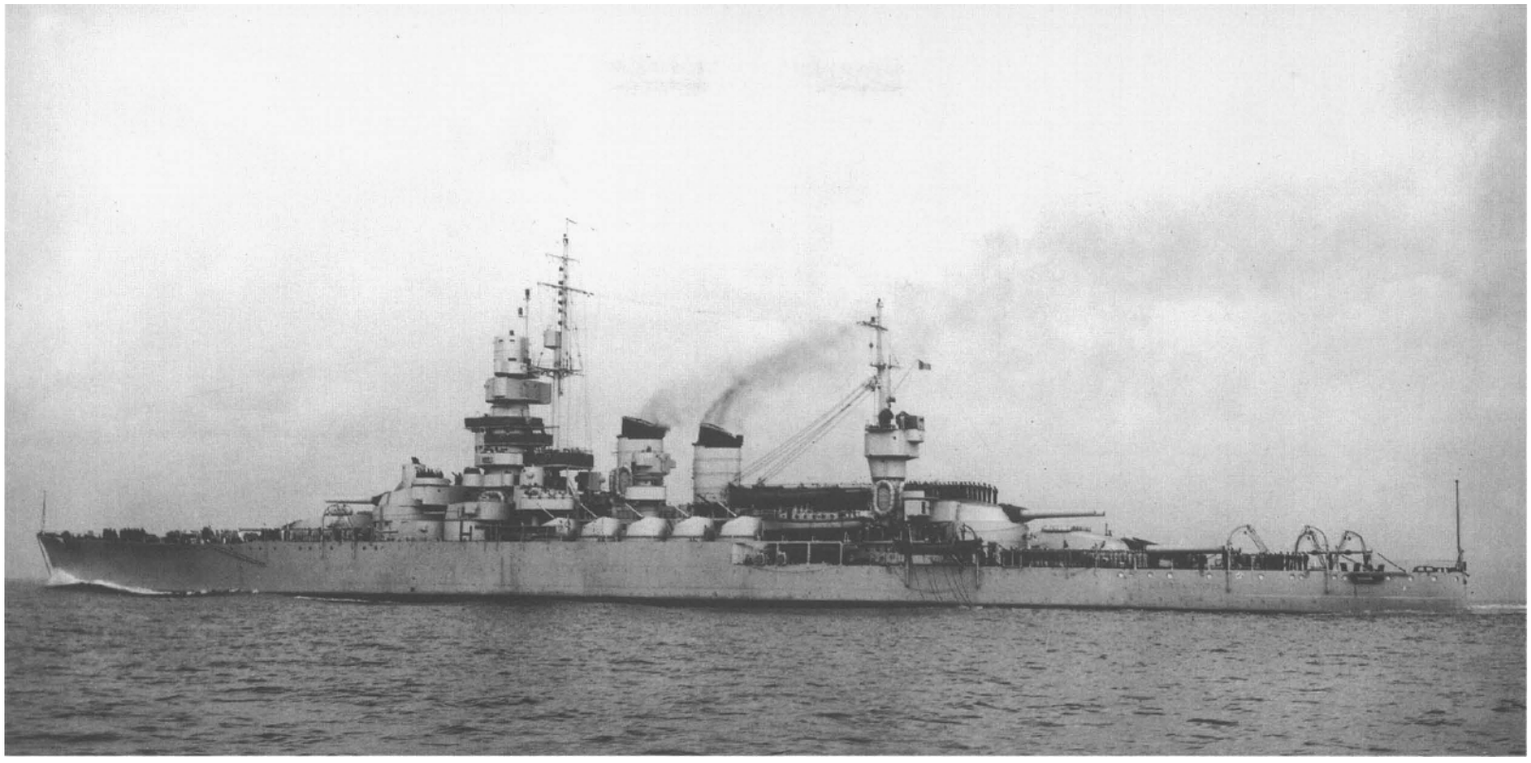
8 battleships totalling 236,000 tonnes
3 aircraft carriers totalling 34,000 tonnes
7 heavy cruisers totalling 70,000 tonnes
20 light cruisers totalling 120,600 tonnes
135 torpedo boats totalling 168,152 tonnes
115 submarines totalling 93,900 tonnes

If the two alliances are considered according to the assumptions of the study, the relative numbers of ship, by category, for 1944 would have been as shown in the table below.

Again it should be noted that the Italian figure of eight battleships would have been formed by four *Littorio* class and four *Cesare/Duilio* class ships that had been rebuilt. In other words, in both this and the preceding study the rebuilding of at least one *Duilio* was envisioned.

Both of the studies of the Operations Plans Office never got past the embryonic stage, largely because they exceeded Italy's economic capabilities. They did, however, have some influence, at least with respect to battleships, because the 1937/38 naval programme, which was increased by a supplementary programme in 1938, provided for rebuilding of the two *Duilio*s and the construction of another two 35,000-ton *Littorio* type, as well as twelve 'esploratori' (literally 'scouts': these were the future 'Capitani Romani' class), and sixteen long-range submarines, for a total of 128,000 tonnes. Construction of a second group of *Littorio*s and of the other units of the supplementary programme had in fact been agreed on 7 January 1938

	Battleships	A/C carriers	Heavy cruisers	Light cruisers	Torpedo craft	Submarines
Italy	8	3	7	20	135	115
Germany	10	4	5	17	66	101
Total (a+b)	*18*	*7*	*12*	*37*	*201*	*216*
Britain	21	11	15	51	176	83
France	10	4	7	18	99	104
Total (c+d)	*31*	*15*	*22*	*69*	*275*	*187*

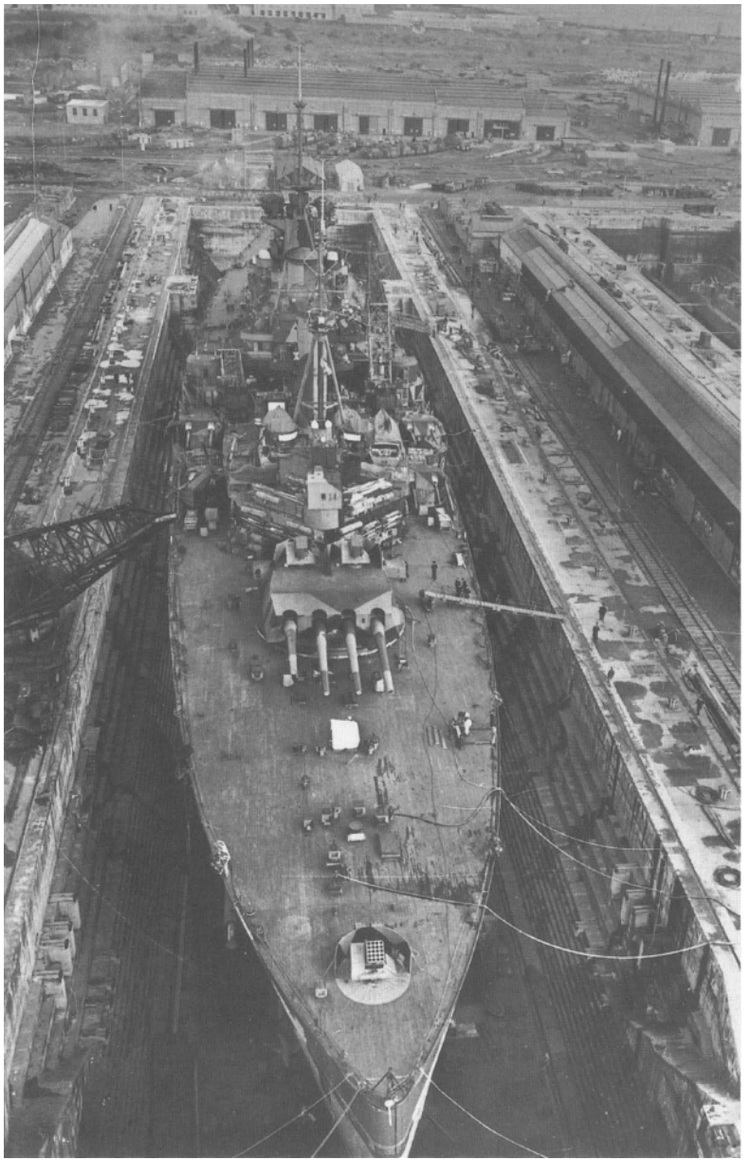


***Andrea Doria*, her reconstruction complete, in the Upper Adriatic in October 1940.** (F Petronio collection)

following discussion of the economic and financial viability of the programme at the Palazzo Venezia, seat of the Head of Government, between Mussolini, Cavagnari and the Finance Minister Paolo Thaon di Revel (grandson of the Grand Admiral of the same name). The new battleships were promptly assigned the names *Impero* and *Roma* and construction, as for the previous two ships of the class, was awarded respectively to the Ansaldo shipyard at Genoa-Sestri Ponente and the C.R.D.A. 'San Marco' yard in Trieste. *Impero* was laid down on 14 May 1938, and *Roma* on 18 September 1938. The first was to have been delivered in August 1941, but never entered service, and the second in June 1942, a deadline that was met without difficulty. It has not been possible to determine the cost of *Roma*. Presumably, it was less than that of the two earlier units because of the shorter production time of about three years nine months, and the fewer design and construction problems encountered.

The 1937/38 naval programme represented the maximum effort made by Italy to strengthen the fleet between the two World Wars and, probably, the greatest effort in its entire history, and the maximum that Italian financial resources of the time could allow. It is likely that it would have been achieved had the war not imposed other needs and if, above all, the fitting-out of *Impero* had been better managed (see Chapter 4). In any event, it caused much apprehension in the General Staff of the French Marine Nationale. On 19 January its chief, Admiral François Darlan, promptly met with the President of the Council of Ministers, overdramatising the new situation in order to secure additional funding for the 1938 *tranche* that had been approved a few weeks earlier but that still was running the political gauntlet. His assessment was that, with the current programmes, until 1939 the French fleet would remain stronger than either the Italian or German fleets, but that from mid-1939 to the end of 1941 it would be equal to the Italian fleet and stronger than the German fleet, and that beginning in 1942 it would be clearly weaker than the Italian fleet and more or less on a par with the German fleet. In such a scenario, until 1939 France would be able to hold its own against either of the two Continental powers at sea with the assets on hand. From 1939 to 1942 it would be able to act successfully with the assistance of an allied power; after 1942 French naval weakness would have represented a burden for any potential ally and would have been beaten at the outset in all maritime theatres, with its overseas possessions at the mercy of the enemy. For Darlan, Italy's ambitious 1938 naval programme was not a bluff, as all of the earlier programmes had been fully realised and in view of a future conference on limitation of naval armaments – in theory scheduled for 1940 – France could not present itself in a situation of inferiority compared to Italy. Darlan obtained the result he had hoped for. On 2 May 1938 the Council of Ministers by draft law authorised *tranche* 1938 *bis*, including two additional 35,000-ton battleships, *Clemenceau* and *Gascogne*, in response to the two *Impero* class. Altogether, the two French *tranches* of 1938 authorised construction of the two large battleships, two aircraft carriers, two cruisers, fifteen destroyers, six torpedo boats, and ten submarines for a total of 156,160 tons.

In 1939 both Italy and France launched two new programmes, respectively for 76,992 tons (over two years) and 7,844 tons, neither of which included battleships, although the Italian programme, for the first time, also called for a 'breakout force' with three cruisers (*Costanzo Ciano* class), six destroyers, twelve submarines, and two



The British '35,000-ton' battleship *King George V* in dry dock in Rosyth in the autumn of 1940, shortly after her entry into service.
(IWM 1485)

oilers not counted in the tonnage limits, slated to operate in the Indian Ocean. Both programmes were suspended due to the outbreak of war in Europe.

French fears, which gave origin to the 1938 *bis* programme, although exaggerated, were not without foundation. Altogether, between 1936 and 1939 France had approved, for major units, fifty-eight ships for 191,342 tons and Italy 157 ships for 277,723 tons, excluding the two *Duilio* class that were being rebuilt, with a decided edge for Italy both in the number of ships and overall displacement. Very briefly summarised, the naval programmes between 1922 and 1939 saw the authorisation of 205 ships for 673,178 tons for France and 286 ships for 599,420 tons for Italy. In about eighteen years Italy had surpassed France in numbers and had significantly reduced the disparity in tonnage. In 1940, considering only major ships in service or under construction, Italy counted 280 ships for 700,722 tons compared to 240 ships for 827,972 tons for France, and the tonnage ratio had reached 0.85:1 compared to 0.63:1 in 1931 (401,318 tons compared to 638,660 tons) and 0.64:1 in 1919.

During the Second World War, in contrast to its German ally, Italy did not make extensive calculations as to what the structure of the fleet would be following the war, other than to save as much of the existing battle fleet as possible, applying the military principle of the 'fleet in being' to the political field as well. At any rate, as a indication of how much battleships were the focus of thought in the Regia Marina Staff, even in 1943, it is useful to recall the development plan for the fleet that was finalised on 14 January of that year. The document – consisting of a memorandum by Supermarina, its operational branch – reaffirmed full faith in this type of ship in the conduct of maritime warfare. Their operational limitations did not stem from shortcomings intrinsic to the type of ship, but to external negative factors, such as insufficient numbers and training of air support, numbers and technology of naval escort vessels, lack of radar and deficiencies in defensive measures against air attack (the shortage of fuel was not, however, mentioned). The Allies had overcome such shortcomings and employed their battleships in every theatre, always with decisive results, as demonstrated only a few months earlier prior to the invasion of French North Africa. According to Supermarina, Italy also was capable of overcoming the listed deficiencies in a short time and the core of battleships would have carried great weight in a war of long duration and of oceanic development (*sic*) and would have been a highly important factor in peace negotiations. In this context, the detailed programme that Supermarina laid out for all categories of shipping, down to and including motorised barges, that also took into account assumed losses, forecast the following availability for battleships:

- 1943: Three *Littorio* type, three *Cavour* type (*Cavour* itself refloated and modernised after being torpedoed at Taranto and the two *Duilio* class) with *Cesare* in reserve;
- 1944: Four *Littorio* type, two *Cavour* type (*Cavour* and one *Duilio*), one *Duilio* and *Cesare* in reserve;
- 1945: As in 1944;
- End of 1946: Four *Littorio* type, two *Cavour*/*Duilio* type, the two *Dunkerque* class (recovered from Toulon and reconditioned), one *Duilio* and *Cesare* in reserve.

The losses that would have occurred would have made implementation of the programme even more urgent, as the programme projected that between the summer of 1943 and spring of 1946 four carriers would enter service: *Aquila* and *Sparviero*, as well as *Bolzano* that was to be reconditioned and converted, and *Foch*, recovered from Toulon and at that time scheduled to be converted.

It is easy to say how unrealistic these plans were; what is important, however, is to understand the thinking behind them.

With the fall of Fascism and the loss of the war, and with it the role of naval power, the Naval Staff and post-war Italian governments sought, up to and past the signing of the peace treaty, to save the last two *Vittorio Veneto* class ships and to build a new navy around them. After the war even Great Britain and France completed two final large battleships, *Vanguard* and *Jean Bart*, in spite of the obvious decline of this fascinating category of ship.

Chapter 2

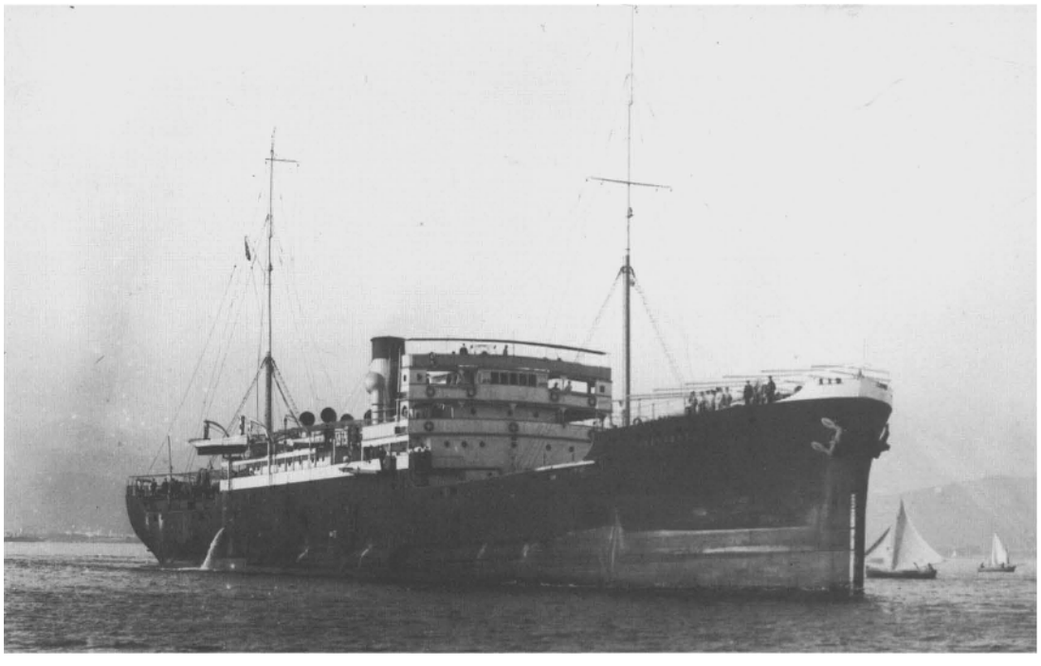
DESIGN AND GENERAL CHARACTERISTICS

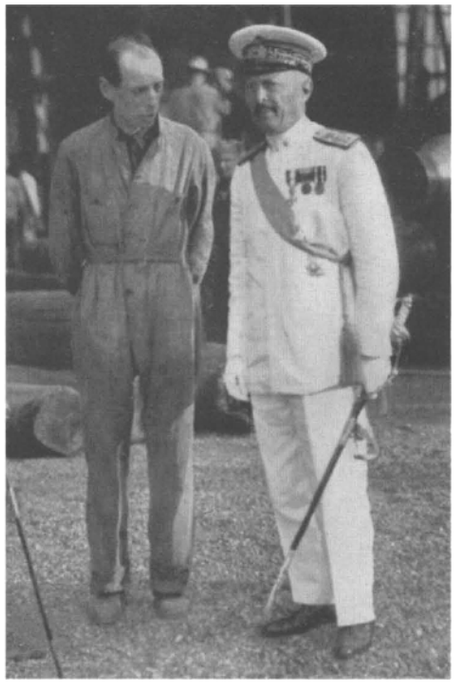
In Italy, 1928 marked the beginning of systematic preliminary design studies for battleships of the largest size allowed by the 1922 Washington Naval Treaty. However, it is logical to assume, even if there is no reliable evidence, that the Ship Design Committee (Comitato per i Progetti delle Navi, whose telegraph address was Maricomnav) of the Navy Ministry had in previous years already conducted feasibility studies for battleships of 35,000-ton standard displacement with 406mm guns.

While other studies were still under way for battleships of lesser displacement (23,000 to 26,000 tons, etc.) and armament of smaller calibre (381mm, 343mm) that were subsequently abandoned, during 1932 a preliminary design for battleships of 35,000 tons (35,560 tonnes) was ordered. To be completed in a short timeframe, it was to be directed by the Inspector-General of Naval Engineering, Umberto Pugliese, a talented and innovative engineer who was at that time head of the Navy Ministry's General Office for Naval and Mechanical Construction (Direzione Generale delle Costruzioni Navali e Meccaniche, or Maricost). The study was based on a brief to give the new battleships characteristics that were 'primarily offensive' by means of:

(a) a main battery greater than (or equal to) the maximum size of a potential adversary and with its main capability in the forward sector;
(b) a speed designed to safely maintain contact within gun range with *standard* cruisers (10,000-ton 'Washington' type) and with ships of the battle line in service with or building for other Mediterranean navies;
(c) a degree of protection sufficient to sustain prolonged combat against similar ships, under average conditions.

Because of the need to provide effective protection for the ship and because of the specific request of the Regia Marina Staff for a





(Above left): The naval tanker *Brennero*, fitted with an experimental Pugliese underwater protection system, at La Spezia around the end of the 1920s.
(Above right): Genova-Sestri, 22 August 1937. Launch of the *Littorio* at the Ansaldo yards. General of Naval Engineering Umberto Pugliese, designer of the ship, and an Ansaldo engineer at the launch.

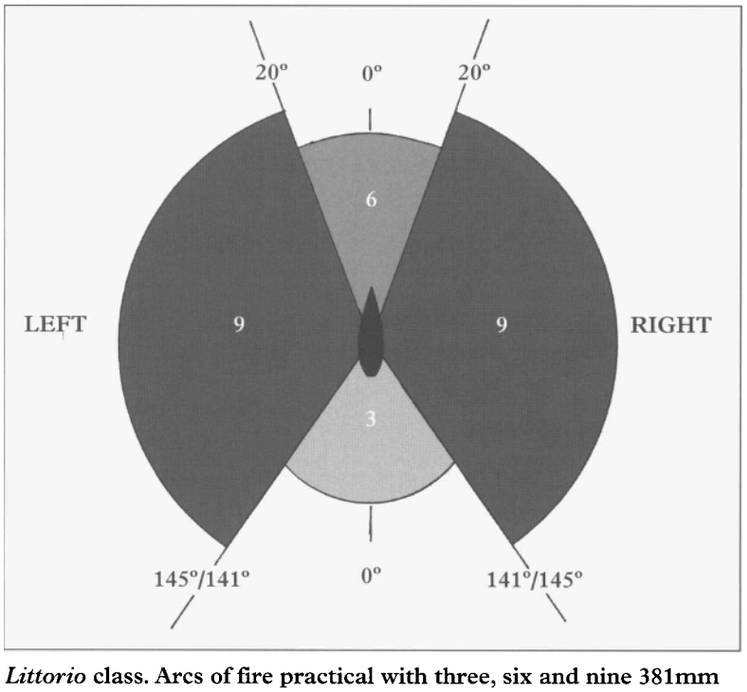
maximum speed in the order of 30 knots, from the outset the designer stressed the difficulty of reconciling these desired characteristics while still mounting a large battery of guns of the maximum allowable calibre within the obligatory standard displacement limits. An additional consideration concerning the armament was that such a large calibre (406mm) had never been designed or produced by Italian manufacturers and, as a consequence, its design, production, and actual readiness for service would require a rather long timeframe, probably in the order of several years.

On the other hand, the principal Italian firms capable of producing heavy artillery already had experience in successfully manufacturing 381mm naval guns. These comprised twenty-three 381/40 guns[1] (for a total of thirty-two, including reserve guns) built by Ansaldo (nine guns), Vickers-Terni (ten guns) and Armstrong's Pozzuoli works (four guns) slated to arm the four *Caracciolo* class 'super battleships' that had been laid down in 1914–15, but whose construction had been suspended in 1916 and later cancelled. Designed respectively by Schneider, Vickers and Elswick, the 381/40 had proven themselves to be, with respect to characteristics and performance, good weapons that were later usefully employed on self-propelled barges, railway mountings and in coastal batteries.

The selection of the main gun calibre to mount on the new Italian 35,000-ton battleships was thus inclined towards the development of a new type of 381mm gun based on earlier experience, to be undertaken by the two largest national producers of artillery at the time, namely, Ansaldo's Genoa-Cornigliano artillery works and Odero-Terni-Orlando (O.T.O.), formerly Vickers-Terni, at its La Spezia works.

Translator's Note:

[1] The formula used by the Regia Marina to classify artillery pieces was as follows: '381/50 Ansaldo mod. 34', i.e. the calibre in millimetres/length of the rifled portion of the tube expressed in calibres (381 x 40 = 19,050mm, or 19.05 metres), the gun's manufacturer, and its year of adoption.



***Littorio* class. Arcs of fire practical with three, six and nine 381mm guns.**

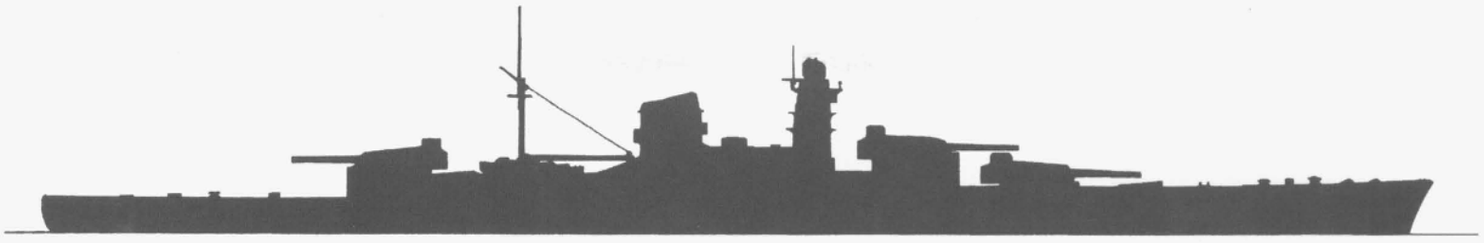
The relative weakness of the 381mm compared to the 406mm gun could be offset by mounting a greater number of guns, for more or less the same weight, than had originally been envisioned – first six and then eight – for the 406mm guns. Accordingly, the Admirals Committee, which was the advisory body of the Navy Ministry, and the General Office for Naval Weapons and Armaments (Direzione Generale Armi e Armamenti Navali, or Marinarmi) were charged by the Under-Secretary of State for the Navy to optimise the disposition of the main armament aboard the new battleships, co-ordinating with the design team working for General Pugliese.

When determining the proportion of displacement, within the overall weight limits, to be assigned to each of the three principal 'factors of power' (armament, speed and protection), the ideal solution would be that one that devoted the greatest possible percentage to armament, to meet the 'primarily offensive' criterion of the staff requirements.

For the technical reasons outlined above, in practice it remained impossible to fit the new Italian battleships with the maximum calibre allowed by treaty (406mm), so the 381mm gun was the closest in size to 406mm and furnished a clear-cut advantage over calibres that were compatible with standard displacements less than 35,000 tonnes, for example the 330mm of the French *Dunkerque* of 26,500 tonnes (her sister-ship, *Strasbourg*, had not yet been laid down). Therefore, although the choice of calibre was virtually obligatory, it reconciled well with the need for an adequate number of guns (at least nine) in order to provide the proper rate and volume of fire, salvo groupings and observation of the fall of shot. On the other hand, mounting 406mm guns would have increased the range that any given thickness of armour could be penetrated by about 2,000 metres, but would probably have resulted in a slower rate of fire, in addition to having to install one less gun because of the increased weight of the larger guns.

When presented by General Pugliese to the Admirals Committee at its meeting on 23 March 1934, the preliminary design drawn up by Maricomnav provided for a main armament of nine 381mm guns in three triple turrets, of which two were positioned forward and one aft, emphasising volume of fire during pursuit. The committee initially proposed examining the possibility of increasing the number of guns to ten, not only for greater overall firepower, but particularly to allow a more effective division of fire when engaging two different targets at the same time. This would mean disposing the main armament in two groups: one consisting of six guns forward (one quadruple turret and one superfiring twin turret, or two triple turrets) in order to retain the preponderance of fire on the bow arcs, and four guns aft (in a quadruple turret). The weight increase that would have resulted from this configuration could have been partially offset by a reduction in the main gun ammunition to fifty rounds per gun, down from the sixty called for by the design. The proposal was not adopted, probably because it would have entailed the design and construction of two different types of armoured turrets (either twin and quadruple, or triple and quadruple) instead of the triple turret originally proposed.

Consequently, the original configuration of nine 381mm guns in three triple turrets was definitively adopted. The choice of this type of turret derived from three main considerations: (a) its greater performance, per unit of weight, compared to twin turrets; (b) better



Probable profile of a 1933 preliminary study for the '35,000' class.

use of available space as it affected secondary gun positions and other topside installations; and (c) the opportunity for a better scheme of protection for the ship's vitals that led to a decrease in the weight of armour, providing an advantage in speed.

Of the three triple turrets, two would be placed forward (with one superfiring) and, in contrast to the arrangement on the British *Nelson* class and the French *Dunkerque* which had all of their main armament concentrated forward, one turret would be located aft in order to not completely deprive that sector of heavy guns and thus be able, if necessary, to engage the enemy even while withdrawing. At the same time, the after turret was to be positioned to allow the greatest possible unobstructed arcs of fire forward of the beam, in order to allow it to engage in tactical pursuits of an 'oblique' nature (that is, with a course that was 'open' with respect to the converging target ship), a scenario made possible by the high tactical speeds attainable. To this end, the turret itself was to be positioned higher than the long forecastle deck, and the breadth of all of the superstructures would be kept to a minimum, among other measures by replacing the traditional but cumbersome tripod mast aft that was characteristic of battleships of the period by a mast with a single leg (whose height was later reduced and at the base of which was a small, narrow superstructure on top of which the emergency steering station was placed). These measures would limit the masked 'dead zone' of the after turret to 20° each side of the centreline on forward arcs, so that in a pursuit fire from all of the main guns could be brought to bear much more quickly than was generally the case in similar foreign ships whose main gun armament was split fore and aft. As an example, in the battlecruiser *Hood*, at the time considered to be one of the Royal Navy's most powerful capital ships, the firing arc of its two twin 381mm after turrets was 300° compared to the 320° of the triple after turret of the new Italian battleships.

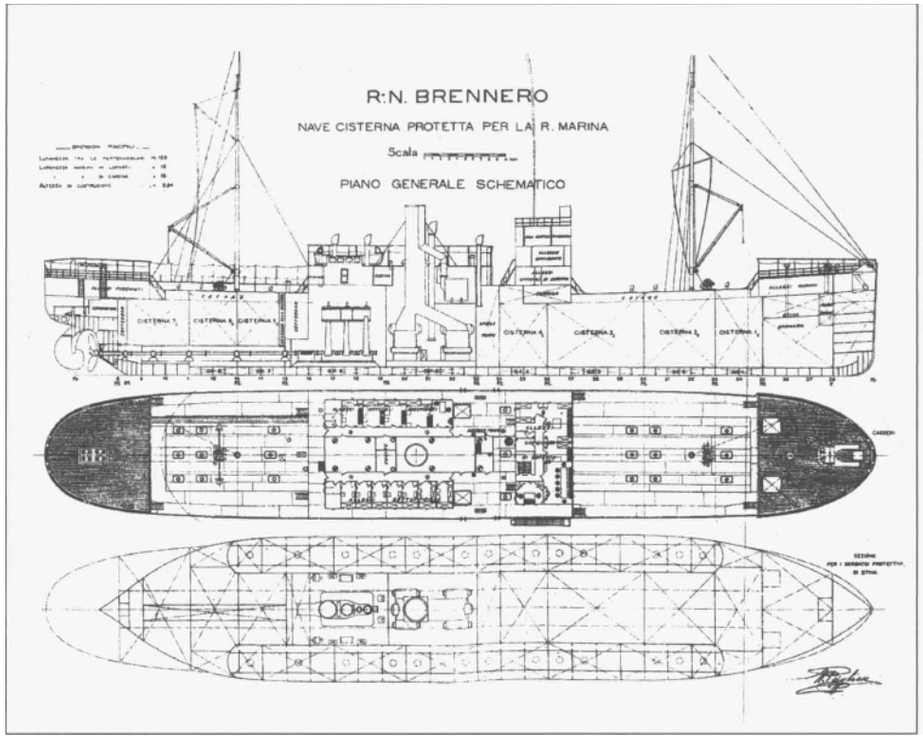
For secondary – at the time referred to as 'anti-torpedo boat' – armament the calibre chosen was 152mm, no smaller than that adopted by the most modern foreign capital ships of the line (152mm aboard the *Nelson* class and 138mm aboard *Dunkerque*) and fitted as main armament on light cruisers. The twelve 152mm guns were to be mounted in four armoured triple turrets, two to starboard and two to port, close to the main gun turrets. Their positions were dictated by the need for (a) a minimum of dead space for their fields of fire; (b) minimal interference from the muzzle blast of the main guns; and (c) direct and rapid ammunition supply from magazines via straight hoists that had as much protection as possible.

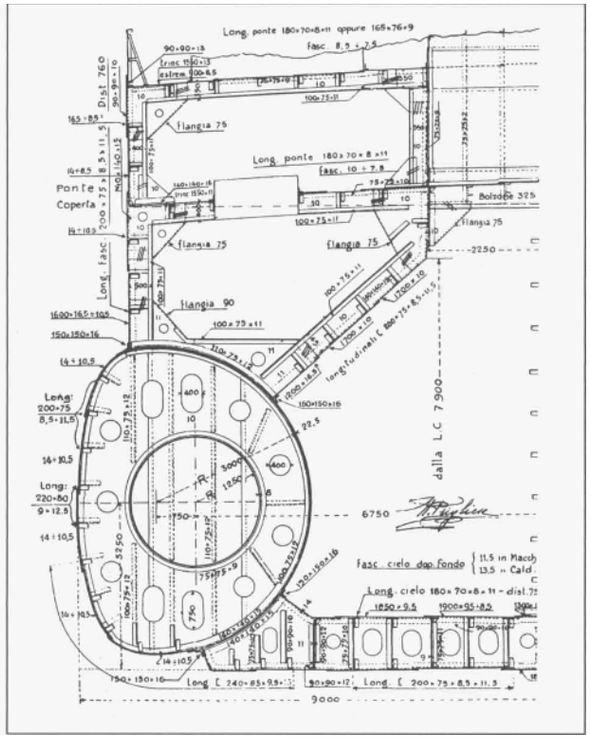
For anti-aircraft defence, both the heavy and light weapons initially chosen were those already in service with the Regia Marina in the early 1930s: O.T.O. 100/47 guns in 'RM' type shielded twin mounts on a variable-height axis (that could be used in a surface role as well), and Breda 37/54 guns and 13.2mm heavy machine-guns. They were to be grouped amidships on each side of the ship, with little interference from the fire of the main and secondary armament. In order to provide a greater concentration of automatic fire, it was hoped to develop new types of mounts: quadruple, in turrets, for the 37mm guns, and triple for the 13.2mm.

The preliminary design

General Pugliese, who had become President of the Committee for Ship Plans in January 1935, submitted a basic report the following May (see Bibliography), from which it appears that between the end of 1933 and the beginning of the following year the working group finalised a preliminary design. At that stage its principal characteristics represented little more than the initial design requirements, and can be summarised as follows:

Standard displacement 35,000 tons (35,560 tonnes);
Length at the waterline 230 metres; *width at waterline* 33 metres; *draught under light load* 9.3 metres;
Propulsion system: ten boilers grouped in five contiguous spaces amidships and leading to a single funnel; two groups of geared turbines ahead of the boiler spaces and two aft; four propeller shafts; one semi-balanced main rudder on the centreline aft;
Power: 150,000 horsepower for a *speed* corresponding to 30 knots at a trial displacement of about 39,200 tonnes;
Protection: 350mm composite armoured belt; armoured decks with a maximum combined thickness of 200mm; armoured tower (a truncated cone of Pugliese design adopted for the *Montecuccoli* class light cruisers then under construction) with a maximum thickness of 260mm;
Underwater protection: Pugliese 'absorbing cylinder' system, previously favourably tested on two large tankers (*Brennero* and *Tarvisio* of 10,600 tons displacement) built during the 1920s, and first planned for fitting during the radical modernisation of the battleships *Conte di Cavour* and *Giulio Cesare*;
Armament: Nine 381mm guns in three triple turrets (two forward and one aft); twelve 152mm guns in four armoured triple turrets, two per side; twelve 100/47 anti-aircraft/anti-ship guns in six shielded twin mounts; twenty-four 37/54 automatic guns in six quadruple mountings of new design and eighteen 13.2mm heavy machine-guns in six triple mounts, also of new design; two traversable catapults, placed along the sides amidships, with two hangars abaft the funnel (a configuration similar to that later adopted for the *Garibaldi* class light cruisers in 1936); four floatplanes.





Based on these preliminary characteristics, on 10 April 1934 the Navy Ministry invited tenders for the construction of battleships of 35,560 tonnes 'base' displacement from Ansaldo of Genoa, Cantieri Riuniti dell'Adriatico (C.R.D.A.) of Trieste and Odero-Terni-Orlando (O.T.O.) of Livorno, who were the only shipyards in Italy that had the proper facilities (length of the ways, etc.) to build ships of such size and complexity. However, O.T.O. was soon eliminated from the competition for the so-called 'platform' (the hull and propulsion system) but remained in the running, along with Ansaldo's artillery production division, for manufacturing the 381mm and 152mm guns in its plant in La Spezia.

By the end of spring 1934, Maricomnav had provided technical

The Pugliese absorbing cylinder underwater protection system

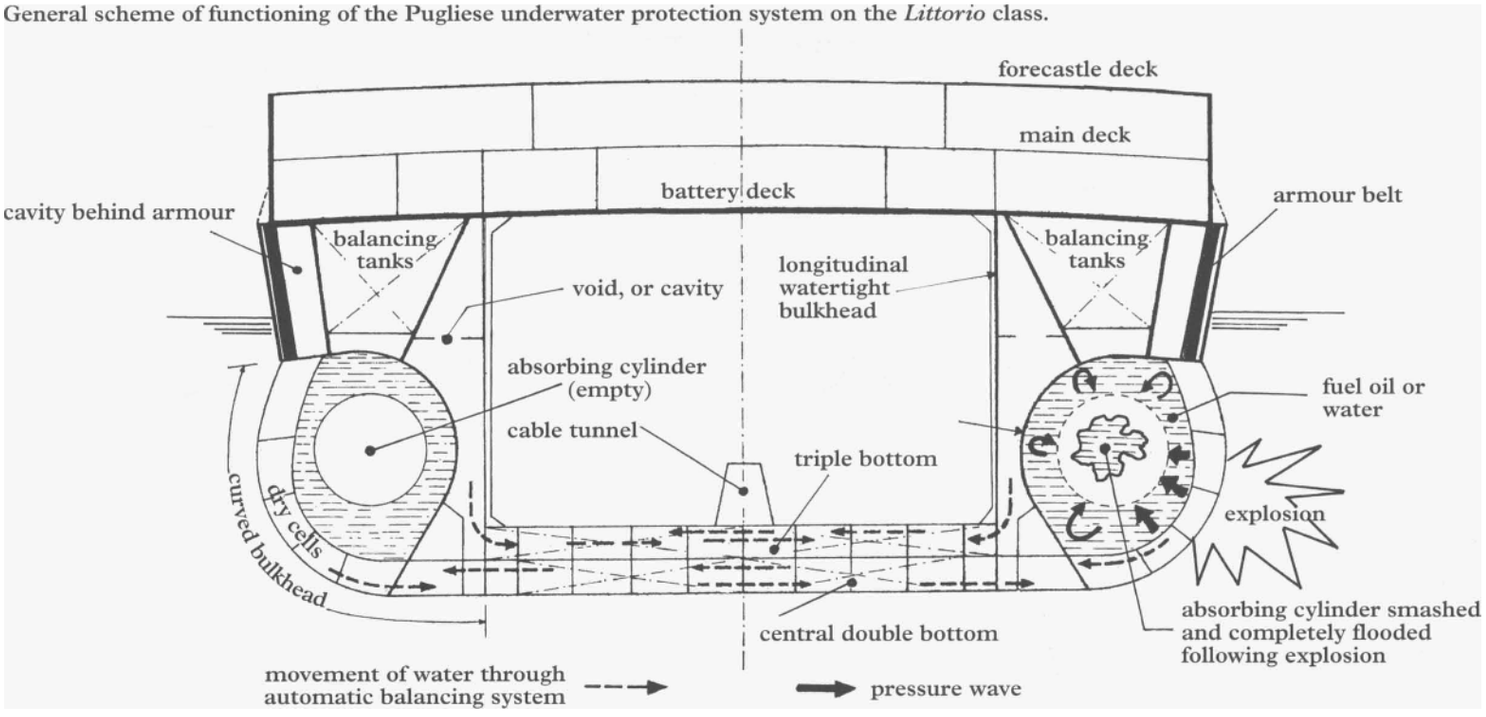
Conceived in early 1917, during the Great War, by then Lieutenant Colonel of Naval Engineering Umberto Pugliese, this was an 'energy absorbing' form of passive protection, and was specifically designed to contain the effects of explosion of torpedoes or mines against the underwater hull. In contrast to the large external bulges that were added to many large ships in that era to improve their underwater defence, adoption of the Pugliese system did not entail significant changes in the shape of the hull nor did it increase the breadth of the ship, and consequently neither altered the seagoing characteristics or transverse stability nor, above all, did it translate into a notable reduction in speed. Its arrangement, however, involved significant structural work, so much so that it was advisable to incorporate it only while the hull was being built or, at most, during the course of major modernisation, as in the case of the Italian battleships of the *Conte di Cavour* and *Andrea Doria* classes that were rebuilt during the 1930s. In addition, in order to be effective its dimensions required the kind of space that was available only on battleships or large cargo ships.

Relative to the weight of explosive, underwater detonations are very destructive because of the greater density of water compared to air. Therefore, from the very first systems designed to protect against torpedoes and mines, limiting damage to the ship was primarily effected by seeking to put as great a distance as possible between the source of the explosion and the vital parts of the ship. This was achieved either by application of large external hull bulges or, in new construction, creating deep and extensive cells, some of which were kept empty while others were filled with liquids (either fuel or water) which would enable the spread of the inevitable flooding to be limited as much as possible, generally containing the flooding outside an internal armoured bulkhead that almost always extended to the bottom of the hull, tapering towards the bottom.

The Pugliese system provided for the use of structures specially designed to absorb, via pre-calculated hydrodynamic and mechanical effects, the majority of the energy of an underwater explosion, thus reducing the residual pressure on the internal bulkhead. These structures ran almost the whole length of the two sides of the hull and, in particular for battleships, along the sides of the entire armoured citadel.

At the hull side, below the armoured belt, there was a light structure with only a slight bulge that blended well with the hull lines. At the turn of the bilge this formed a lateral extension of the double bottom whose upper and lower edges were connected by a robust curved protective bulkhead that extended towards the interior of the hull. In the space between the internal plating of the armoured bulkhead and

General scheme of functioning of the Pugliese underwater protection system on the *Littorio* class.



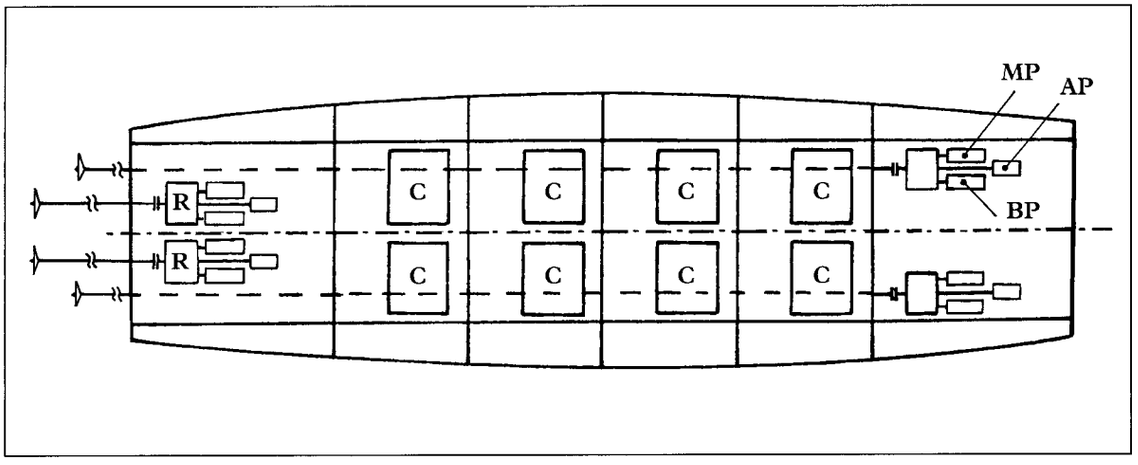
the double hull extension there was a so-called 'absorbing' cylinder, whose optimum diameter was 3.80 metres, supported every three or four frames by sheet-steel diaphragms placed transversally.

For the system to function effectively it was essential that both the cylinder and the lateral double hull (called 'dry cells') be kept empty. The space surrounding the cylinder, which constituted a sort of internal hull bulge, was always filled with liquids; they were in fact filled with both potable water and fuel, which as they were expended while under way were replaced by sea water as ballast. When subject to an underwater explosion, the pressure wave immediately destroyed the 'dry cells' and pushed into the liquids in the holding tanks (the internal bulge). As these liquids could not be compressed, they transmitted the pressure in all directions, acting mainly on the external surface of the cylinder which, being empty and purposely weak, collapsed, thus absorbing a large part of the kinetic energy of the blast and thus assuring the integrity of the bulkhead. Water would then rush into the hull through the rupture, flooding dry cells in the area of the explosion and all of the original volume of the absorbing cylinder that had been compressed; in the event of damage to the curved bulkhead, it would even flood the void spaces between the internal bulge walls and the longitudinal watertight bulkhead on the side that had been damaged. To reduce the degree of listing that the ship would inevitably suffer as a result of the amount of water shipped, 'automatic balancing channels' were provided that connected the dry cells and the void spaces on each side through the double and triple bottom so that, in accordance with the principle of connecting vessels, the weight of the water would be equally distributed on both sides of the ship, which would return to its correct trim in a matter of a few minutes. In the event that the automatic shifting of the water was not enough to maintain the ship in a proper transverse or longitudinal attitude, the system also provided for 'controlled balancing' by pumping sea water – at a slower rate – into the ballast tanks situated above the two bulges.

The Pugliese system was tested at length at an artillery proving ground with positive results and was adopted experimentally in two auxiliary units: the naval tankers *Brennero* and *Tarvisio* built respectively at Riva Trigoso (Genoa) in 1919–21 and at Castellammare di Stabia in 1921–8. During their period of service, neither unit was subjected to damage by mines or torpedoes, and thus it was not possible to evaluate the true effectiveness of their underwater protection.

Although fitted in the two modernised *Cavour*s and the two *Doria* class ships, the effectiveness of the system was reduced because the space available on those elderly battleships restricted the dimensions of the main components. Such shortcomings did not apply to the modern *Littorio* class ships, not just because they were larger but, crucially, because the system was integral to the original design. On the various occasions between 1940 and 1942 when *Littorio* and *Vittorio Veneto* were hit by torpedoes in way of the citadel, the system's performance was generally considered good, but for a detailed analysis and evaluation the reader is referred to Appendix 2.

Positive opinions about the effectiveness of the underwater protection system of the *Littorio* class were also expressed by other countries, but it should remembered that the Pugliese system was effective only against torpedoes fitted with traditional contact fuses that exploded upon impact with the hull. It did not offer any protection against torpedoes with magnetic influence detonators that were designed to explode slightly *below* the hull of the target; the serious damage suffered at Taranto in November 1940 by the *Conte di Cavour* and *Duilio*, each hit by an explosion of this type, demonstrates this.



Arrangement 'in blocks' of the propulsion machinery of the *Littorio* class. (C: boiler; R: reduction gear; AP: high-pressure turbine; MP: medium-pressure turbine; BP: low-pressure turbine).

specifications to the Ansaldo and C.R.D.A. yards, each of which had been had been assigned the construction of one unit. This data was used by the two firms, working together, to formulate proposals for improvements, especially with regard to optimising the hull form of the new battleships within the dimensional limits established by the preliminary specifications (the decisions reached were later issued as amendments the following July). In June 1934 the basic contract terms were drawn up for battleships of 35,000 tons standard and 40,000 tonnes trials displacement, to be submitted to the two yards.

The Italian government formally approved construction of the two new battleships on 10 June 1934 and the official announcement was released to the press the following day; at the same time, the notifications required by international treaties on naval disarmament were forwarded through diplomatic channels.

By June scale models based on information provided by the two builders' yards were being tested at the Vasca Navale Nazionale (National Naval Test Basin) in Rome (Marivasca, at the time directed by General of Naval Engineering Giuseppe Rota). In this initial phase the hull that furnished the best results, at a towed speed of 29 knots, was the one proposed by Ansaldo for a ship of 39,200 tonnes in trials configuration, 230 metres in length at the waterline, 33 metres in breadth, and with an average draught of 9.3 metres.

During the same month, General Pugliese proposed several significant modifications to the preliminary design, the most important of which was reducing the number of boilers from ten in five groups of two, to eight in four groups, with the consequent reduction in maximum power of the propulsion system from 150,000 to 130,000 horsepower and maximum speed from 30 to 29 knots. At the same time, the number of funnels increased from one to two, but of smaller dimensions, each venting the smoke and gases from one of the two boiler groups. The object of reducing the number of boilers was mainly to reduce the total length of the propulsion machinery (from 26 per cent of length at the waterline to a more acceptable 24 per cent) resulting in a higher safety factor in combat as well as benefiting other major on-board systems; reducing the length of the armoured sections by about five metres would lead to a significant savings in weight in the horizontal and underwater protective bulkheads. On the other hand, work that was progressing to increase the output of the modern high-pressure boilers gave hope that the improvements would result in a significant margin of power offset, which in fact was later borne out.

These substantial alterations marked the beginning of a phase of overall changes to the whole design, with Pugliese being designated as officially in charge by Maricomnav decision on 5 October, the same month that a new series of tests was carried out at the Vasca Navale with slightly modified hulls (for example, the breadth of the hull was reduced by about a metre and displacement was indicated as 40,000 tonnes). During these tests, the hull that offered the best performance at a speed of 29 knots was the 'C.119' proposed by C.R.D.A. (for a ship displacing 40,000 tonnes, 230.23 metres long at the waterline, 32.31 metres wide with 9.49 metres draught), and this was definitively chosen, subject to later adoption of all of the changes relative to the new stern and rudder arrangements that were still in the design stage. Once finalised and incorporated, these systems would later represent one of the most distinctive and effective features of these battleships.

Initially, the preliminary design had provided for a semi-balanced main rudder with a 40-square-metre surface positioned on the centreline astern of the two inner propellers, and of an independent auxiliary rudder with a surface area of 20 square metres also positioned on the centreline about ten metres forward of the main rudder. This system replicated that of the earlier battleships of the *Cavour* and *Andrea Doria* classes and, with a greater distance between the axes of the two rudders, of the arrangement that had been designed for the uncompleted *Caracciolo* class. The relatively short distance between the two rudders, however, gave no guarantee that both could not be hit and damaged by a single underwater explosion; in addition, in the event that the after rudder were to be locked in position, unless the forward rudder was oversized (which would thus result in a significant increase in resistance to the ship's forward movement), it would not have been able to overcome the effect of the locked rudder. After having analysed and for various reasons excluded other options (for example, two side-by-side stern rudders) the choice fell upon a centreline stern rudder and two smaller independent lateral rudders positioned abaft the two outboard propellers, a full 25 metres from the main rudder. This was intended to avoid the possibility that both the main rudder and the auxiliary rudders could be damaged by the same underwater blast; in addition, the arrangement of the two auxiliary rudders in the 'wake cones' of the outboard propellers increased their effectiveness so that, if necessary, they could counteract the action of the main rudder in the event that it jammed at a considerable angle.

Under normal operating conditions, the two rudder groups, even