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THE WORK OF THE SURVEYORS OF THE NAVY DURING THE PERIOD OF THE ESTABLISHMENTS

A comparative study of naval architecture between 1672 and 1755

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ABSTRACT

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THE WORK OF THE SURVEYORS OF THE NAVY DURING THE PERIOD OF THE ESTABLISHMENTS.

A comparative study of naval architecture between 1672 and 1755.

This study examines two aspects that have hitherto been largely ignored or misconstrued by historians. Firstly it provides an evaluation of the design of British ship design compared with that of their opponents during the period when regulated dimensions were in force; a time-scale that has been interpreted to include the major shipbuilding programmes of 1677 and 1691. The second objective is to provide biographical information on the Surveyors to the Navy and the work is structured around their periods in office, starting with the appointment of Sir John Tippett in 1672, and ending with the retirement of Sir Joseph Allin in 1755.

The study proposes the hypothesis that, contrary to received opinion the Establishments were not productive of stagnation, but that until the War of the Austrian Succession, the period was one of steady progress and experimentation. It investigates the different roles of the Executive, Admiralty and Navy Board in the procurement process and their changing relationship. It demonstrates the effects that economic, political and strategic circumstances had on ship design, traces the origins of a radical new approach to design first adopted in the 1730's, and offers a new thesis for the development of the 74-gun ship.

In collating the information contained in the study, use has been made of the documents held at the Public Records Office, the British Library, the National Maritime Museum, the Bodleian Library Oxford, and the Pepys Library at Magdalene College, Cambridge. In evaluating ship performance, extensive use has been made of the collection of drawings held at the National Maritime Museum, and a representative selection of draughts has been redrawn for analysis using traditional dimensionless coefficients.

The conclusion of the study is that, given the limitations imposed by the procurement system under which they had to operate, British designers evinced a greater degree of sophistication than did their rivals, and provided a balanced fleet that was able to meet the varied strategic requirements of naval warfare over this period.
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Thanks are also due to the members of the Naval Dockyards Society and particularly to Dr. Peter Le Fevre for sharing his knowledge of the contents of PRO Adm. 106 series in the Public Records Office.

Finally, I am grateful to the National Maritime Museum and the British Library for their permission to reproduce the drawings and illustrations used in this study.
AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the Regulations of the University of Bristol. The work is original except where indicated by special reference in the text and no part of the dissertation has been submitted for any other degree.

Any views expressed in the dissertation are those of the author and in no way represent those of the University of Bristol.

The dissertation has not been presented to any other University for examination either in the United Kingdom or overseas.

SIGNED: J. P. HEMINGWAY

DATE: 10 June 02
ABBREVIATIONS.

C.S.P.D. Calendar of State papers, Domestic.
I.J.N.A. International Journal for Nautical Archaeology.
M.M. Mariner’s Mirror, The journal of the Society for Nautical Research.
N.M.M National Maritime Museum.
N.R.S. Publications of the Navy Records Society.
PRO. Adm. Public Record Office, Admiralty.
PRO. TI. Public Record Office, Treasury papers.
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INTRODUCTION

This study proposes to examine two aspects of naval administration that have hitherto been either neglected or misconstrued by historians. The first aim is to reveal something of the life and work of the Surveyors to the Navy Board during the period known as the “Establishments”. Little has been written about the men who made such a major contribution towards British naval supremacy during the late seventeenth and eighteenth centuries and they have not been distinguished by inclusion in the Dictionary of National Biography. The second aim is to make an evaluation of the ships of the British navy and to compare them with the fleets against which they were arrayed, the generality of opinion amongst historians being that they were inferior to those of other nations and particularly to those of France and Spain. This view appears to have resulted from a lack of interest in naval affairs by the more respected historians and their consequent reliance on early writers on naval architecture such as Charnock (1800-02), whose work is aptly described by Gardiner (1992) as ‘rambling, opinionated, and often wrong’. Many students of eighteenth century naval history will be familiar with his resounding indictment of the ships from that era:

...No one at the period possessed a fleet, the ships composing which were, as far as the structure and theoretical part of the science extended, worse contrived for the service of their country. Destitute of almost every principle that could constitute a ship of war...they were crank, generally heavy sailers, of ill stowage, confined and inconvenient in the hour of battle; the larger ships frequently incapable of employing their lower-deck guns, in the use of which their most efficient force consisted, except in the most moderate weather (Vol. 2, p. 107).

Albion, whose much quoted work Forests and Sea-power (1926) discusses the timber problems faced by the navy, is even more scathing in his criticism of the ships of the eighteenth century and of the men who designed them. The fault, he suggests,

lay in the fact that that the English Surveyors of the Navy could scarcely be called naval architects. Building by rule of thumb, they scorned those elaborate treatises of the French on stability and resistance (p.78).

Concerning the Establishments, he says,

Meanwhile, the duller shipwrights, tied down by the rigid building rules of 1719, were responsible for a century without progress (p.80).

The degree to which these statements are both superficial and erroneous will be demonstrated, but, as with many sweeping statements, they contain that element of truth without which they would not have achieved such widespread acceptance. Examples can be found of ships, and particularly French ships, that were individually superior in their sailing qualities as compared to their British counterparts. However, in a recent study Glete (1993) warns against basing analysis on a small sample of well known ships; he points out that if a ship lacks certain
qualities it may simply be a failure and that an unusually successful warship may be equally untypical. Unfortunately, it is exceptional ships that attract historical attention, notwithstanding the fact that it is the average standard of quality that is more relevant to naval superiority. Both Charnock and Albion attribute British naval success to the superiority of British seamen, but for the major part of the period covered by this study, this is demonstrably lacking. The elements of naval supremacy are at once both simpler and more complex than this.

On the simple level it is a question of getting a superior number of the right kind of ships to the right place at the right time. This raises the question as to what were the right kind of ships and who should decide the number and specification of the ships in question? Naval procurement is a neglected subject and the study will attempt to follow the changes in who bore responsibility for this aspect of administration. It will also show the fluctuating influence of the Navy and Admiralty boards in the procurement process and the latter body’s eventual assumption of control of the shipwrights during the latter part of the study. Baugh (1965; 1977) has illustrated the relative sophistication of British naval administration for the period of the “Whig supremacy”, as did his mentor John Ehrman (1953) for that of the War of William III. Nevertheless, they both demonstrate a lack of detailed knowledge concerning shipbuilding and as a result there are some fundamental errors. To quote just one example, Baugh (1977: 200), describing English ships at the time of Walpole, states that,

because deep-draughtedness and sharpness were traditional characteristics of English men of war, conservatism prevented hulls from becoming sufficiently full bodied.

Baugh’s description is anachronistic and more applicable to French than English ships, which were comparatively bluff-bowed, full bodied, and shallow drafted at that time. Their besetting sin was not their shape but lack of size for the number of guns carried.

Much information on ship design can be gleaned from the work of more recent “ship historians” who provide detailed technical data on the “when and how” of shipbuilding even if they do not always explain the “why”. This study attempts to combine these two approaches in order to discover why national differences existed. It has its origins in a dissertation submitted by the author to fulfil the requirements for the degree of Master of Arts at the University of Bristol in 1997. That work studied the career of Sir Jacob Acworth and the ships of those Establishments for which he was responsible as Surveyor to the Navy between 1715 and 1749. It was necessarily brief, but it became apparent that the late seventeenth and early eighteenth century was a seminal period in the development of administration as regards naval procurement and would benefit from further research. In order to trace the changes that took place a liberal interpretation has been put on the definition of the word “establishment”. Prince George of Denmark inaugurated the first official establishment of dimensions in 1706 while Lord High Admiral. These however, had their roots in the 30-ship programme of 1677 when
dimensions were set for ships of 100, 90, and 70-guns and this was followed by the 27-ship programme of 1691, when dimensions for ships of 80 and 60-guns were added. The date when they ended has been taken as 1752, at which time permission was sought and obtained to depart from the dimensions set by the 1745 Establishment.

In the broader sense establishments were administrative tools to regulate and standardise the manning, armament and maintenance of the fleet and they were initially concerned solely with the numbers of men to be allocated to the various ships and the victuals they were to be allowed. This was soon followed by the standardisation of armament and ordnance stores for each of the various rates of ship insofar as this was possible given the disparity of size within each rate at that time. During the period covered by this study they attempted to set the dimensions of the ships themselves and it is with these “establishments of dimensions” that we are particularly concerned. They generally followed on from a revised establishment of guns¹ and were intended to standardise on stores such as masts, yards, sails and rigging in order to facilitate repair and refitting. They were also intended to provide firm design guidelines to the Master Shipwrights of the dockyards who were drafting and building the ships, enabling those responsible for procurement to better predict and control costs. During the relatively peaceful period between the War of the Spanish Succession and that of “Jenkin’s Ear” they were to become an important part of procurement policy, being used to maintain the number of ships in the fleet. They were, therefore, both an administrative and a design tool.

Establishments of dimensions were not confined to England, and in France, Jean-Baptiste Colbert (1619-83) laid down prescriptive regulations that were not officially abandoned until 1765.² English naval administrators during the reign of Charles II greatly admired Colbert’s reforms and it is possible that these were influential in the setting of dimensions for the 1676 programme. Pepys had a copy of Louis’ 1673 Reglement pour la Construction de ses Vaisseaux de Guerre and Charles Sergison, who was Clerk of the Acts between 1690 and 1719, had a copy of the revised 1689 edition.³ As far as France was concerned however, strict application of the regulations lasted only so long as there was strong central control. They were never totally effective and after the death of Colbert’s son and successor Colbert de Seignelay (1651-1690), they were largely ignored.⁴

Naval power is dependent on a number of factors, the first and foremost being finance, and this is subject to the priority given to the navy by the government concerned. Britain was

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¹ Gun establishments were laid down or proposed in 1677, 1703, 1716, 1734, and 1743. See L. Carr-Laughton (1925): 8.
² J. Boudriot (1993): 18. A new, less proscriptive establishment was laid down in 1766 for ships of 64, 74 and 80-guns.
³ Charles Sergison’s copy can be seen at the National Maritime Museum, ref. NMM. SER/119.
fortunate in that all shades of political opinion felt the need for a strong navy. Their strategic objectives sometimes differed however, and the effect that this had on naval procurement forms part of this study as do the economic changes that made sustained growth of the navy possible. Another factor was that of manning and there was a symbiotic relationship between the merchant marine and the navy. Increased trade and the wealth that it created called for a more powerful navy to protect it, but that navy's personnel were necessarily drawn mostly from the merchant fleet and this led to a conflict of interest in wartime. This was not a problem while naval warfare was largely seasonal as the crews could then be released to serve in merchantmen during the winter, but as the period and theatre of operations became extended, competition between the navy and the merchant marine became more intense. In Britain and the United Provinces a core of regulars was supplemented in time of need by impressment, ostensibly of those that "used the sea" and by volunteers, many of who could be "landsmen". The Dutch, with a small population and a large merchant fleet, hired many of their seamen from neighbouring Baltic States. 5

In France, manning received the studied attention of the bureaucracy, and between 1668 and 1673 Colbert and his cousin Colbert de Terron, Naval Intendant at Rochefort, introduced a system of conscription that was to become known as the Inscriptio Maritime. Based on Richelieu's Code Marchaud, it relied on a register of all seamen from the Maritime Provinces who could be called up by rotation for a year's service. Excellent in theory, with many admirers among British naval officers and administrators, it frequently failed to meet that country's requirements in time of war due to widespread evasion. 6 Nevertheless, it did on occasion allow France to mobilise a fleet more rapidly than her opponents. Attempts to introduce a similar system to Britain failed and impressment remained a major source of naval recruitment until the close of the Napoleonic Wars, not being finally removed from the statute books until 1854. The manning problem was disproportionately more serious for Britain than for other nations and became more so as time progressed. This had an effect on ship design and will be shown to explain some of the differences between British ships of the larger rates and those of France. Associated with manning was the quality and training of the men who officered the ships, either by commission or warrant. While the background and training of warrant officers changed little over the period of this study, that of the commissioned officers evolved into the form that would see little change for the rest of the age of sail. The officer corps had an influence on warship development both in Britain and elsewhere and while this influence was not always beneficial it requires consideration.

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The third factor and the one most central to this study, is the design of the ships themselves and the priorities laid on the different qualities required in a sailing warship. Whether a nation’s naval policy was essentially aggressive or defensive affected the design of ships to some degree but for all the maritime nations the number and strength of its ships that were fit to lie in the “line of battle” defined naval power. These were the only ships capable of seizing the local naval superiority that would enable the execution of wider strategic objectives. They varied in size throughout the period of this study from Fourth-rates of 40 guns to First-rates of 100 guns or more and ships were to become increasingly specialised to deal with changing tactical and strategic requirements. There were a number of essential properties that made a ship fit to lie in the line of battle. These were: strength, both to sustain the battering imposed by enemy shot as well as the strains imposed by the discharge of her own artillery; a steady motion, with a slow even roll and minimal pitching in order to enable them to discharge their guns with accuracy; good windward performance to enable the ship to weather an opponent in order to dictate the course of an action; sufficient buoyancy to allow the lowest tier of guns to be carried high enough to be used in rough conditions; the ability to stay and wear quickly and surely, and lastly and perhaps least importantly, speed. The job of reconciling these different requirements was a difficult one, demanding a high degree of skill on the part of the designer.

The changing nature of naval warfare over the period of this study had a major impact on ship design. This was not so apparent among the line-of-battle ships as among the specialist cruisers that developed to meet the growing war against commerce that resulted from conflict with France. The impact of this guerre de course led to a sustained development of ships of the Fourth-rate and below and this continued even through the supposed stagnation of the “Walpole years”. In this type of warfare all the advantages lay with the French. They could choose when and where to strike and their ports gave them potential control of both ends of the English Channel. Their cruising ships, largely financed by the private sector, were not concerned with durability or long life; they could be light and cheaply constructed and speed and windward ability were the sole criteria governing their design. The guerre de course was always a gamble and there were more losers than winners among its participants, but this speculative atmosphere led to experimentation in ship design and it was inevitable that some of these experiments would be successful. How this major threat was contained forms a significant part of this study.

Until the middle of the eighteenth century, ship design was in the hands of the Master Shipwrights of a dockyard and chiefly of the Royal Dockyards belonging to the navy. However, during the latter part of the seventeenth century, private shipbuilders played an important part in warship development. Their expertise was recognised by their frequent
consideration for senior posts in naval administration and at that time they often drifted between employment in private practice and the Royal Dockyards. After the Establishment of 1745, design would rest almost entirely in the hands of the Surveyors of the Navy and this system would remain in force for the rest of the age of sail. From 1672 the Surveyor was usually recruited from among the Master Shipwrights of one of the principal royal dockyards and it was understood that he would be the Administration’s expert on design matters. Initially this only applied to major ship building programmes and his job description did not change from that promulgated by James in 1662. It was not until 1715 that the Surveyor was formally required to assume overall responsibility for ship design; a changing role that has hitherto been largely unexplored.

The Surveyor was one of four Principal Officers of the Navy Board that was founded by Henry VIII in 1546 to take responsibility for the “civil economy” of the navy. All were what might be described as professional civil servants although only the Surveyor had any formal training. All the positions were more or less permanent and Baugh (1965: 40) has suggested that ‘only voluntary resignation, death, or superannuation in the event of extreme senility could remove a man from the Board’. It will be shown that this only applies to the “age of Walpole” and not to the period of political turmoil that prevailed between the Revolution of 1688 and the Hanoverian succession. The pre-eminent body for naval administration was the Admiralty. The King, a Lord High Admiral (also known as the Lord Admiral or High Admiral), or “Commissioners to execute the office of Lord High Admiral”, variously wielded its power and all three forms of naval government were exercised during the period under review. However, from 1689 onwards, apart from the period from January 1702 to November 1709 when the office of Lord High Admiral was revived, a Commission governed Admiralty affairs. This consisted of a First Commissioner (later to be known as the First Lord) and commonly six Junior Commissioners, one or two of who would usually be experienced sea-officers. Operating through the subordinate Boards, it was responsible for the preparation of fleets and the selection of their commanders, subject to Cabinet approval and the royal assent. It was only marginally responsible for the conduct of naval operations and was not responsible for naval strategy except in an advisory capacity. Although the Board of Admiralty had constitutional supremacy over the other Boards, it was subject to political appointment and therefore transitory

7 Edmund Dummer and William Bately were exceptions to this rule, having been promoted to Assistant Surveyor from the post of Assistant Master Shipwright.
8 See page 42 below.
9 Throughout the period of this study and until the opening years of the nineteenth century, what are now called naval officers were known as sea officers. The term naval officer referred to those senior personnel of the Navy Board and Dockyards mentioned above.
in nature and lacked the continuity that the Navy Board achieved as it distanced itself from politics in the years following the Glorious Revolution. Its actual power to influence events depended largely on the political stature of its members and this varied greatly over the period of this study. Co-operation and cordiality between the two Boards likewise varied and one should not be misled by the term “your affectionate friends” that ended letters from the Admiralty to the Navy Board, or by the “your humble and obedient servants” that was the invariable response.

Ships were either built in one of the Royal Dockyards or by contract with a private shipbuilder, usually at an established yard but occasionally on a temporary slip set up for that particular contract. A senior shipwright employed by the Navy Board normally supervised work outside the naval yards and the contractor could expect an occasional visit from the Surveyor or his assistant. However, except when major building programmes were being undertaken, the navy preferred to build the larger ships in its own yards as it considered that they worked to a higher standard. In 1742 the Comptroller of the Navy Board wrote that,

We should judge it the best economy to perform all his Majesty's works in his own yards, on account of the goodness of them. ¹¹

That there was some justification for this view will be seen as the study progresses.

A dockyard, as the name implies, was distinguished from other naval installations by having at least one dry-dock for the construction, or more usually for the repair and cleaning of ships. (Ships were usually built on slips in order to avoid tying up valuable dock space for long periods). ¹² The organisation of the Dockyards changed little over the period of this study and has been well covered by Ehrman, Merriman (ed. 1949, 1961), and Baugh. Apart from the resident Commissioner, whose role was concerned with liaison with sea-officers and the Navy Board, the Master Shipwright was the most important member of the dockyard hierarchy and enjoyed precedence over the other senior officers of the yard. He was responsible for all ship and dock building activities and for supervising the work of the junior officers such as the Master Caulker, Master Boat builder, Master Mast-maker and Master Block-maker. He was also responsible for ship design and often employed one of the more promising shipwrights as an assistant to help in the preparation of draughts and models. The lives and work of the Master Shipwrights of the dockyards is even more obscure than those of the Surveyors, but some were men of considerable ability whose work made a major contribution to naval architecture and in this context their work will be considered below.

¹² NMM Adm. B/109, 2 August 1739 and B/120, 12 November 1742 refer to the practice of repairing or dismantling ships in dry-dock and rebuilding them on a slip, sometimes at a different yard.
Shipbuilding techniques changed little throughout the period of this study, but changes there were, and, although small in detail, they sometimes had a considerable effect on the economics of shipbuilding. The cost effectiveness of ships pre-occupied the minds of eighteenth century naval administrators and was a major factor in the struggle for naval supremacy. The materials used in shipbuilding also changed very little and were much the same from country to country; nevertheless, there were national differences in construction techniques and regional differences within countries. This was particularly true of the United Provinces, which were administered by five separate Admiralties and where three entirely different shipbuilding techniques were practised during the first half of the eighteenth century. There were differences too between the various regions of France and during his visit to English Dockyards in 1737, Blaise Ollivier detected differences between the methods used at Chatham, Deptford and Woolwich despite these being only a few miles apart. 13

If construction techniques changed little, there was more progress in design. As the seventeenth century drew to a close, the use of drawings became more common and the drawings themselves more sophisticated, enabling the designer to “prove” his design on paper before construction commenced. Models were also used; these were not the elaborate framed models that grace many museums today, but “solids” used to explain the design to the more technically illiterate members of the client body. 14 By the second decade of the eighteenth century, drawings in Britain had reached a degree of sophistication that was to improve little over the rest of the century and it is the collection of these drawings held at the National Maritime Museum in Greenwich that forms the basis for much of the comparison made in this study. Unfortunately, the drawing record for other countries is not so complete. The United Provinces were late in the use of drawings and some of the Dutch Admiralties scarcely used them at all during the first half of the eighteenth century. 15 The French used both draughts and models in accordance with Colbert’s règlement of 1671, but few have survived the ravages of time and continental war. Those that do, show drawings of a simpler nature than those of the English, being concerned solely with defining the shape of the hull, construction being left to the builder and decorative features to specially commissioned craftsmen. These were often celebrated artists and they would produce their own drawings for the head and quarter galleries. 16 There are however, many Admiralty drawings of captured French ships in the National Maritime Museum’s collection.

14 See page 235 below for other possible uses of models in the design process.
The Admiralty draughts shown in the figures (pp. 235-64), have been redrawn to show both waterlines where these are absent and buttock lines, which were not part of eighteenth century drafting practice.\(^{17}\) This enables the "fineness" of the hulls to be evaluated in both planes and the tangential angles made by both waterlines and buttock-lines have been recorded at selected points. The comparison of hull shapes is analysed in two of the traditional ways used by naval architects. The first is the "mid-section coefficient" which is the proportion of the actual mid-section area below the load waterline to the area of a rectangle formed by multiplying the waterline beam by the draft at the mid-section. This is an indicator of the capacity of a hull form and its relative buoyancy, rather than its speed. The second is the "prismatic coefficient", considered to be the most useful of the dimensionless proportions for indicating speed potential.\(^{18}\) This is the proportion of the hull displacement to that of a prism formed by the mid-section area below the load waterline multiplied by the length of the load waterline. It gives an indication of the degree of fineness of the ends of the hull with regard to the size of the immersed mid-section.

As well as drawings, a number of other sources have been used to evaluate the qualities of the ships under consideration. Firstly, there are the opinions of the users themselves, expressed in letters to friends, the Navy Board, or political patrons. For the earlier part of the study the Portland manuscripts and those of George Finch, published by the Historical Manuscripts Commission have been of value, as have the Harilian manuscripts and Additional manuscripts formerly held at the British Museum and now part of the collections in the British Library. The main source of information for the period before 1688 is Pepys, but he must be used with caution as his strong personal antipathies and political bias make some of the uncorroborated material unreliable. Nevertheless, its volume and diversity makes it valuable if used with discrimination. Much of the material used in this study has been taken from J. R. Tanner's (1903) descriptive Catalogues of Pepysian Manuscripts held in the Pepys library at Magdalene College Cambridge as well as the papers themselves. Use has also been made of Tanner's (1925) Naval Minutes that contain Pepys' notes for his unfinished history of the navy. This must also be used with caution as he draws on many disparate sources for his information and some of it is contradictory. In addition, Pepys' personal papers held in the Bodleian library in Oxford have been consulted as well as the Diary itself, which covers the years from 1660 to 1669.

Secondly, an assessment can be made as to how the ships actually performed in

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\(^{17}\) A French draught of the Mignon, drawn by C. Saussilon in 1765 shows them, but this seems to be an isolated example.

\(^{18}\) H. Chapelle (1967): 44.
practice. This is part of the historical record and some understanding can be reached by studying the reports of the sea-officers concerned, although an evaluation of the qualities and character of these men is necessary to temper some of the criticism of the ships they commanded. Sailing quality reports are valuable sources of information but these were only formally adopted in 1743. They contain data on the performance of a wide variety of ship types including some of those captured from the French and Spanish and form part of the Comptroller’s Office miscellanea held at the Public Record Office; all have been examined and some sixty of them analysed in detail. The way in which the questions are phrased reflects the priorities placed on the various qualities of sailing warships and they contain results that serve to confute much accepted dogma. They cannot, alas, be taken as an infallible guide. Some Captains were unduly protective of their charges and were probably unwilling to admit that they could not achieve speeds obtained by the commanders of similar ships and consequently may have tended to exaggerate their performance. Also, evidence contained in the Navy Board and Surveyors Office letter books, as well as in the sailing quality reports, shows that two ships built to ostensibly the same lines might have a totally different performance. The state of trim was of prime importance and there are conflicting opinions in the reports as to what this should be. Another factor was how the ship was rigged. A small change in mast rake would have a considerable effect on the centre of effort of the sail plan and hence on the balance and ease with which a ship could be steered. Furthermore, a ship’s shape started to change from the moment it was launched and “hogging” or dropping of the ends was accepted as inevitable. Surprisingly, this did not always lead to deterioration in performance although it did indicate structural weakness that would tend to leakiness; a full-ended ship could sometimes benefit from the flattening of the buttock lines resulting from a drop in the stern.

The most valuable single source for a comparative assessment of the merits and demerits of shipbuilding practises in France, Holland and England is the report written by Blaise Ollivier in 1737. Ordered by Minister for the Marine Maurepas and carried out by the leading French shipwright of the day, the report followed a five-month visit to the dockyards of the countries concerned. It was never made public and only two copies are known to exist, but it has recently been translated by David Roberts and published by Boudriot Publications. Although Ollivier was not infallible and may on occasion have been deliberately misled, the contents are surprising and must bring about a revision of some widely held beliefs.

19 See appendix 9, p. 229 for the format of a standard sailing quality report.
20 An example has been found of a 20-gun ship trimmed over 2 feet by the head. The design called for 1 foot by the stern. PRO Adm. 95/24, f. 36.
21 The contemporary term for this was “cambring” or “cumbring”.
The work of the small number of multi-lingual historians who have spent time researching French and Dutch archives has been of value. Prominent among those referred to in the ensuing text are the late J.S. Bromley (1987), J. King (1949), G. Symcox (1974) and J. Pritchard (1987). Respectively, these writers give a unique insight into the guerre de course, scientific endeavour, naval strategy as viewed from a French perspective, and French naval administration.

Information on the lives of the Surveyors themselves is sparse. The aforementioned Surveyor's Office letter books would have been invaluable but for the fact that only those for the years between 1688-1693 and 1738-1745 survive. Details of their work have been obtained by examining the Navy Board and Admiralty letter books, Admiralty minutes\(^23\) and the Sergison material\(^24\) held at the Public Record Office and the National Maritime Museum. The study is structured around the terms of office of the various Surveyors to the Navy except where a cataclysmic event such as the "Glorious Revolution" of 1688 makes a break at such a time more logical. However, the work would not be complete without some comment on Anthony Deane, who, while never officially Surveyor of the Navy, had a major influence on ship design. He acted as assistant to Sir John Tippetts and was de facto Surveyor during the period of the "Special Commission" which replaced the Navy Board between 17 April 1686 and 13 October 1688.

Apart from the opening chapter, which introduces the reader to the historical situation and the state of shipbuilding in the years leading up to 1672, the remainder of the work follows a similar pattern. Each chapter contains a section on the historical background of the period, particularly as it effected naval administration; such biographical material on the Surveyors that the research has uncovered, and an appraisal of developments in ship design compared with those of other nations. Inevitably comparison has concentrated on the navy of France. The United Provinces ceased to influence ship design before the end of the seventeenth century and their navy began a steady decline from the end of the War of the Spanish Succession onwards\(^25\). British shipwrights ran the Amsterdam dockyard from 1727 to 1779 but their products were inferior to those of either Britain or France, being both smaller and of shallower draft.\(^26\) The design of Spanish ships at this time was largely derivative and they did not begin to create a

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\(^23\) The information contained in these is sometimes duplicated by the Admiralty out letters to the Navy Board (Adm./A) and Admiralty in letters from the Navy Board (Adm./B), held at the National Maritime Museum. A full list of those documents consulted is listed as appendix 1, pp. 207-212.

\(^24\) These are the survivors of those documents kept by Charles Sergison when he was abruptly discharged from office in 1719 and which R.C Anderson acquired in 1914.


\(^26\) Thomas Davis was appointed Master Shipwright in 1727 and was succeeded by Charles Bentham in 1735 who was succeeded in his turn by John May in 1758. Remarks: 203.
powerful navy until the end of the period covered by this study. Historians have, nevertheless, used the construction of large 70-gun ships by Gastañeta from 1720 onwards as evidence of a superior shipbuilding industry. These were built for the specific purpose of servicing their South American Empire, were defensive in concept, and had little or no influence on the procurement policy of other nations. The construction of 74 and 80-gun ships by Juan Navarro in 1746 and 1749 respectively imitated French practice, did not impact on the period under review, and has therefore, been ignored. 27

Finally, there is a chapter containing the conclusions that have been reached, together with suggested areas for further research. The spelling and punctuation of quoted correspondence has been kept as near to the original as possible to provide information about the correspondent. Dating is in the Old Style or Julian calendar until the change to the Gregorian calendar in 1752, but the start of New Year has been taken as the 1 January rather than the 25 March, which was its official start until the changeover.

27 G. de Artiñano (1914): 351-4.
CHAPTER 1. Background information.

1.1. Hull shape and performance.

Water is a viscous medium whose resistance to motion is 816 times greater than that for air, and this imposes certain problems for those designing ships, the two main constraints preventing a vessel from travelling rapidly through smooth water being form resistance and wave making. Wave making is the product of a ship’s length and it follows that a long vessel will be faster than a short one, all other factors being equal. Form resistance can be divided into two related heads; firstly, the shape of the hull and the ease with which it can penetrate the water, and secondly, frictional resistance, which is a product of the area of the surface of the hull in contact with it. Considering hull shape first, it is evident that there is a build up of pressure at the bow as it tries to force its way through the water; pressure is negligible or negative along the sides of the hull but increases again at the stern.\(^1\) With regard to frictional resistance, it can be demonstrated that the layer of water in contact with the hull is carried along with it, a rough hull pulling along more water than a smooth one, so that this “boundary layer” is thicker and this creates more drag. In ideal circumstances the water is parted by the bow, runs down the sides of the hull and unites smoothly at the stern, and this can only be achieved by having fine ends.

Too full a bow increases the pressure ahead of it while too abrupt a run aft causes the water to separate from the hull, creating eddies that are dragged along behind, resulting in increased resistance called “wake drag”. Surface irregularities such as those caused by marine growth or a hull that is not fair make their own turbulence and act as a further brake on progress. The cleanliness of the hull is more important than its shape and it was appreciated from an early date that regular cleaning and effective anti-fouling was essential to optimise performance. The problem of fouling was not to be overcome until the introduction of copper sheathing and although this was proposed in 1708 it was rejected on the grounds of cost and was not considered again until 1761. During the reign of Charles II, lead sheathing was tried, initially with some success but problems with electrolysis soon forced its abandonment.\(^2\)

If a ship’s body were to be totally submerged, there would be no evidence of the disturbance that it creates. In a hull floating on the surface, however, these forces are liberated to form wave systems and these modify the pressure distribution over the hull. The propulsive

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2 See pages 60-61 below.
force created by the wind acting on the sails must overcome the resistance of the hull and maintain this wave system. The maximum theoretical speed of a heavy displacement hull is about $1.34 \times \sqrt{\text{LWL}}$, where LWL is the length of the load water line. This creates supporting waves at the bow and the stern with a single trough in between and would allow a theoretical maximum speed of 13.4 knots for a hull 100-ft. in length, although such a speed would be unattainable in practice as it would assume completely flat water and no leeway. The sea is rarely flat, however, and has its own wind-induced wave systems that will cause the ship to pitch, alternately increasing and decreasing pressure on the bow. Larger waves will force the ship to climb upwards towards the crests and fall into the troughs further decreasing the speed.

From the earliest times it was generally understood that for speed, a long narrow hull was desirable and this was confirmed by tank testing of models undertaken by members of the Royal Society in the early years of the Restoration. Sir Henry Shere conducted the first known testing of models by towing shapes through an 80-foot tank by means of weights that descended into an 80-foot well, the time taken for the model to reach the end of the tank being recorded. The shapes were reduced to the same area and corresponded to the waterlines of a number of different types of ship. These were of the Greyhound, a reputedly fast, English Fifth-rate; an Algerian frigate; a Venetian frigate; a full-bodied English ship; a Dutch built ship and a Mediterranean galley, the shapes being compared with an “ellipsis”. Perhaps not surprisingly, the galley gave a fastest time of 100 seconds while the Venetian frigate was next at 112 seconds. Equal third were the Greyhound and the Algerian frigate at 128 seconds. The full-bodied English ship took 140 seconds and the Dutch built ship 152 while the ellipsis took 130 seconds. The experiment was almost meaningless however, as the models were two dimensional, being carved out of two-inch thick pieces of walnut, and the results merely served to endorse contemporary opinion.

This did not end argument as to what shape that the ends of the hull should be; Pepys described a discussion and further experimentation on this subject made by members of the Royal Society and recorded,

Nor are we agreed what figure of a ship’s body moves best through the water; Mr. Shere contending (with the generality) for a body sharp at both ends, while Sir William Petty and Sir A[anthony] D[ene] think as well of its being sharp before and blunt aft, proving the same very far by a sudden experiment unaccurately made in a pond at Sir William Petty’s house whose particular notion and assertion [it is] that the run or shape of a ship abaft is not designed to give swiftness but only to bring the water the quicker to the helm.

4 H. Chapelle (1936): 116. Chapelle considers that a figure of 1.25 would rarely be exceeded, although he states that there is some evidence that extreme clipper ships of the mid nineteenth century attained a figure of 1.45 for short periods.
5 BL. Add. Mss. 2754, 1667.
6 Minutes: 204.
Pepys notes that the test was “unaccurately” made but modern research shows that at low speeds, fineness aft is more important than a sharp entry. Mathew Baker appreciated this at the beginning of the seventeenth century when he transposed the body of a fish on to the lines of a galleon. Nevertheless, it soon became apparent that the immersed areas of the bow and the stern should not be too disparate if excessive pitching was to be avoided. Furthermore, the ideal shape of the waterlines changes as the speed increases. At speeds of $V/\sqrt{L} < 0.5$, a full bow is no disadvantage and it is drag caused by separation aft that is the predominant element of resistance. This is the classic “cod’s head and mackerel tail” that was popular among working craft for so long. When $V/\sqrt{L}$ reaches about 1, the part played by wave making resistance in comparison to total resistance increases very rapidly and this justifies the use of sharp waterlines at the entry. This form is nearly the opposite of that described above.

Shere’s experiments failed to appreciate that the fineness or fullness of a body is not just a product of its shape on plan but is a three-dimensioned entity. It is possible to have a shape that is more or less square on plan and yet has easy lines in the vertical plane. An example would be a scow-shaped bow or a wide round-tuck stern and there were many cruisers that adopted this form during the first half of the eighteenth century. The over-riding principle is the avoidance of sudden changes in direction that would cause a breakdown in the smooth flow of water over the hull. Designers would have found it extremely difficult to judge the “fairness” of the lines until “waterlines” were introduced to their drawings in about 1670; a better tool was the use of diagonals and these were used from the last decade of the seventeenth century. They were particularly important because a ship’s hull is rarely upright and they could give an indication of the fairness of the lines of the hull when inclined. They usually coincided with the position of the ribbands used in constructing the hull and would also show the ease with which it could be planked. Buttock lines would have been of great value but surprisingly, they appear to have rarely been used during the eighteenth century. The weakness of tank testing was that it could not reproduce the effects of wave action or heeling or of the sideways movement induced by leeway. More sophisticated models would have been of greater value and the construction of scale models was proposed by Edmund Dummer in a letter to Pepys written in 1684.

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7 Pepysian Ms. 2820. Fragments of Ancient English Shipwrightery in the Pepys Library, Magdalene College Cambridge. Examination of the drawing makes it evident that what Baker’s diagram is actually showing is the rising line of the floor which conforms to the belly of the fish. The effect however, would be similar.


9 See page 9 above.

10 Pepys Library. Sea Ms. 1074. Dummer advocated the use of scale models to record the trim of ships rather than to analyse their performance as suggested by Lavery and Stevens (1985: 110). There is no evidence to suggest that it were ever done.
In respect of the shapes comprising the body plan, it is obvious that V-shaped sections produce the least wetted area for a given breadth, while square sections produce the greatest. A mid-ship section approaching a V shape, that is with a great deal of "dead-rise", can be seen in Bermuda sloops and English cutters dating from the second quarter of the eighteenth century and in some French ships from its beginning. One of the problems with a vessel with this form of hull is that they tend to heel excessively; also, because the hull lacks volume, it is unable to carry much in the way of ordnance or stores. A compromise favoured by many eighteenth-century French frigate designers was to produce what was almost a hexagonal hull. This had a short floor of low dead-rise followed by a sharp turn in the bilge leading to a steeper rising section, followed by another sharp turn near the waterline, often with a great deal of tumblehome. Some of them proved to be very fast sailers but such shapes found little favour in England. However, if sections of the same immersed volume are compared, it is evident that a semicircular shape gives the least wetted area. For this reason a midship section closer to a semicircle with more or less dead-rise was the most common hull form for all but the smallest naval ships as this provided a reasonable compromise between carrying capacity and wetted area.

Designing a hull with low resistance was solving only part of the problem; it also needed to have sufficient stability in order to carry enough sail to perform well and to enable the ship to use its guns in blowing weather. Harland (1984: 48) suggests that attempts were made to restrict the angle of heel in those ships intended to lie in the line of battle to about 7° in fresh conditions, a factor dictated by the limited vertical adjustment possible in the naval gun. There are two ways of achieving stability; one is by the shape, "form stability", and the other is by the addition of weight or ballast. An example of the first would be a box and of the second, a hollow cylinder floating on its side, which would be unstable until weight was added to that side. Since the underwater shape of a ship's hull would be closer to the latter than the former, it is evident that weight was more important than form and ballast was added in the form of shingle, usually with the addition of iron. The problem faced by the designer was to provide sufficient underwater volume to allow enough ballast to be loaded for stability and yet to keep the lower tier of guns a reasonable height above the water with all the stores on board.

11 Notably in the work of Biaggio Pangalo, better known as Maitre Blaise. Remarks, 14.
12 See chapter 5, section 10 below.
13 This was because gun carriages were kept as low as possible for stability and this precluded a vertical adjustment of more than about 12°. Evidence suggests that it were rarely achieved in the smaller line of battle ships.
14 The ship's stores, particularly the many tons of water and beer, were kept as low as possible, but even if the barrels were full, they would contribute little to ballasting the ship, being little heavier than sea water. It was for this reason that Acworth continually reiterated that care should be taken not to bury the ground tier of water barrels too deeply in the shingle, so displacing and raising it.
During his visit to British dockyards in 1737, Blaise Ollivier observed that few English shipwrights calculated the displacement of the ships they were building.\textsuperscript{15} This has led some writers to assume that they were unable to do so,\textsuperscript{16} but Deane explains his method of calculating displacement in his \textit{Doctrine} and implies that such knowledge was readily available.\textsuperscript{17} Indeed, the development and use of logarithms by dockyard officers made displacement calculations possible from the early years of the century.\textsuperscript{18} Nevertheless, early in the eighteenth century most English shipwrights seem to have abandoned the lengthy displacement calculations in favour of empirical rules for estimating tonnage based on past experience. This would have been made easier by the adoption of established dimensions.\textsuperscript{19}

However widespread the use of displacement calculations, there was no mathematical way of calculating the stability of ships before they were launched until Pierre Bouguer wrote his \textit{Traité du Navire} in 1746. Bouguer's work introduced his concept of the metacentre, which provided a practical method of determining stability. The metacentre is the point around which the changing centres of buoyancy rotate as the ship heels; determining the distance between this and the centre of gravity gives the metacentric height; the greater the distance, the greater the stability. Bouguer stated that,

\begin{quote}
We ought not to render the resistance an absolute minimum but to render it the least that we can, regard being had to the moment of the weight of the ship in relation to the metacentre; because the quantity of sails that the ship can carry depends on the greatness of this moment.\textsuperscript{20}
\end{quote}

The calculations were complex and time consuming and a large metacentric radius did not necessarily produce a good warship. Too stiff a ship could have an abrupt roll that put too much strain on the rigging and made for an unstable gun platform; significant though it was, Bouguer's work was little used until the latter part of the century. Fincham observed that,

\begin{quote}
The Royal Academy of Sciences in France continued year after year to offer its prizes to the best writers on definite subjects connected with naval architecture... yet their writings show but a very small amount of results in the improvement of the art... One inference out of two is forced upon us, either the works were not read, or that the education of the naval architects of France was very slender.\textsuperscript{21}
\end{quote}

As well as the sharpness or fullness of the ends of the hull and its wetted area, resistance

\textsuperscript{15} Remarks: 159.
\textsuperscript{16} For example, J Glete (1993): 1, 74.
\textsuperscript{17} Anthony Deane's \textit{Doctrine of Naval Architecture and Tables of Dimensions, Material, Furniture and Equipment appertaining thereto}, written in the year 1670 at the Instance of Samuel Pepys Esq. This can be found in the Pepys Library at Magdalene College, Cambridge, Mss. 2820. The edition quoted here is that edited and annotated by B. Lavery (1981).
\textsuperscript{18} F. Fox (1992): 287.
\textsuperscript{19} In 1743 Thomas Simpson introduced an improved method of calculating displacement, which shows that there was a demand for such a system at that time. "Simpson's rule" was used by naval architects until recent times.
\textsuperscript{20} Quoted in J. Fincham (1851): xxiv.
\textsuperscript{21} Ibid.: xlii.
to leeway had to be considered. The primary means of resistance was the depth of the keel and false keel but its effectiveness was influenced by the shape of the bottom of the hull in contact with it. If the floors were too flat, much of the effectiveness of the keel would be lost when the ship heeled to the wind, although this problem could be overcome by using dead-rise or by incorporating a reverse curve at the garboards, a form more favoured by French than English designers until about 1720. Fine waterlines and a prominent gripe to the forefoot also helped windward ability. There was also a general belief, particularly among the French, that a deep hull was necessary to provide weatherliness and this meant that a compromise had to be made between windward ability and outright speed. It follows from this that few ships were fast on all points of sailing, i.e. on the wind, reaching, and running and that the shape best suited for one was not necessarily the best for another.

Unfortunately for the designer, speed was not the only criteria that had to be met. Sir William Petty correctly informed Pepys that,

> ...If a facility of passing through the water without any other consideration was all we aimed at therein, the greatest length and least breadth of the floating body were indisputably the only best figure for it, and that as such the most ordinary wherry is the figure to be preferred before all others.\(^{22}\)

Speed was the major factor in cruising ships and the generic family of advice boats and sloops that attained importance from the War of William III onwards, but all ships had to be able to carry and fight their armament and load sufficient stores for their theatre of operations. Another complication was that many small ships of the Fifth-rate and below needed to perform well under oars as well as sail and for this a narrow and shallow hull was preferable. When it came to the larger ships, load-carrying ability was paramount, while the smaller ships of the line often had a dual role, and from William’s War, these were more often used as convoys and cruisers than in the line of battle. This meant that their designers had to strike a delicate balance between speed, windward ability, and stability. Falconer (1764) stated that,

> To make a ship carry her guns well out of the water. A long floor timber, and not of great rising, a very full midship frame, and a low tuck, with light upperworks.

But he also said that,

> To make a ship keep a good wind and drive little to leeward. A good length by the keel; not too broad but pretty deep in the hold which will occasion her to have a short floor timber and a very great rising.

For ships where gun-power was the main consideration, fine lines fore and aft meant a corresponding lack of buoyancy and a consequent inability to carry guns close to the extremities. A lack of buoyancy in the ends could also lead to excessive pitching and to the danger of being pooped in a large following sea. The hull of a ship acts like a beam that is

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\(^{22}\) Minutes: 202. Petty was an ingenious amateur designer, producing two sailing catamarans with asymmetric hulls and a paddle tug operated by a horse powered capstan.
sometimes supported at the ends and sometimes in the middle and the construction of wooden warships was ill-suited to this role, being relatively weak in a fore and aft direction, making distortion inevitable. The ship designer had therefore to exercise considerable skill in reconciling these conflicting requirements in order to build a strong and durable ship with a good performance.
1.2. Ship Design and the Master Shipwrights

The records of English marine drafting begin with the manuscript entitled *Fragments of Ancient Shipwrightery*, tentatively dated to about 1586. The major part of this work is attributed to Mathew Baker and it describes methods that are probably Venetian in origin. It is likely that draughts were rare before 1650 and that draughtsmanship was a skill possessed by few. In his *Compleat Shipwright* written in 1664, Edward Bushnell complained that only the most favoured apprentices were trained in the design of ships. By the time that was written however, the Navy Board required drawings for its approval prior to the commencement of building although it may be assumed that many of them were drawn freehand and were of little practicable value. In 1665, Daniel Furzer, father of the future Surveyor, apologised to the Board for the poor quality of the draughts submitted for a contract he was supervising in Bristol, explaining that, They would have presented them in a better form but that there are no workmen about there that understand the manner of doing it.

By the Restoration, drawings were usually prepared on cartridge paper rather than on parchment and were being finished in Indian ink. Compasses, dividers, steel pens, scale rules and splines were all in use by the end of the seventeenth century and some designers were producing their own set of curves or "patterns" made of box or pear-wood and which were similar to those still in use.

Excepting one or two talented amateur and merchant builders, until 1745 ship design was exclusively in the hands of the Master Shipwrights of the Dockyards and the Surveyor of the Navy who came from their ranks. To reach that position he served a seven-year apprenticeship as a servant to either a qualified shipwright or a dockyard officer. The patronage of a senior dockyard officer was necessary to ensure advancement and this tended to encourage a self-perpetuating hierarchy in the trade. When considering promotions in 1709, the Navy Board wrote that, We must not forget the sons of the three shipwrights at Deptford, Chatham and Portsmouth...being represented to us as promising young men in their profession.

This nepotism and patronage was not a wholly negative influence for it meant that the recipient could receive a better than average education, although this was not always thought necessary.

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26 Deane's doctrine of Naval Architecture provides an insight into the state of design in 1670 as well as the design processes of one of the leading shipwright's of his generation. Similarly the Keltridge draughts of 1684 held in the National Maritime Museum show the degree of sophistication in drafting that had been attained towards the end of the century.
27 NMM SER./87, 5 August 1709.
during the seventeenth century. Lack of it however, would debar the Master Shipwright from rising to the post of Surveyor to the Navy, who had to be capable of cogent communication with both the Admiralty and his associates on the Navy Board. By 1680 at the latest, it was necessary for potential Master Shipwrights to have good drafting skills. At the end of 1681, Sir John Tippets and Sir Phineas Pett provided the Admiralty with an account of the qualifications of William Stigent, Zachary Medbury and William Bagwell. The Board ordered their Secretary to re-examine them,

either by making each of them draw draughts of their own or upon draughts not made by any of them, that none should have advantage of the matter.

Many shipwrights spent time at sea as ship's carpenters, but very few of those who reached the higher ranks of the profession did so. It was not considered a necessary part of the training of those who would later design ships and Sir Jacob Acworth was the only Surveyor of the Navy to serve at sea in that capacity. Pepys however, thought otherwise,

... believing that some years practice at sea is no less than necessary to confirm a shipwright in the principles of the theory he learned on shore, as also to qualify him thoroughly for a land employment afterwards in the King's Yards.

The training and background of Continental shipwrights was similar to those in England. During her navy's formative years France had imported shipwrights from England, Holland and Venice, but there were many shipbuilding dynasties of long standing in France and these had re-established their pre-eminence by the time this study commences. The importance of family connections was equally evident in French dockyards and nearly all the master shipwrights were inter-related. They were referred to as Surveyors, from the apprentice student surveyors to the Surveyor-General, the equivalent of the English Surveyor to the Navy. Unlike English shipwrights, they were required to spend six months at sea, preferably on a ship of the line and to produce a comprehensive report as to its sailing qualities. However, the repeated re-iteration of this regulation suggests that it was probably widely ignored and in 1727 captain Langeron was writing that,

'It seems to me that our Master Constructors, who do not know the sea, should go to sea to render themselves more skilled in their trade'.

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28 E.g. the choice of Furzer in preference to the more experienced Fisher Harding. See page 112 below.
30 Edmund Dummer was officially carpenter of the Hampton Court in 1685 but Joseph Allin, father of the future Surveyor actually filled that post while Dummer was employed elsewhere. Knights (1932): 414.
31 A. Bryant (1938): 132.
1.3. Shipbuilding materials and Construction.

A ship was constructed using materials from many different countries but the main timber used by all nations was oak (*Quercus Robur*). It was widespread across Europe and offered a good compromise between durability and workability and was available with the contorted shapes necessary for knees, breasthooks and standards, as well as the long lengths needed for stern posts.\(^{34}\) It was used for the structural frame, the majority of the hull planking and the planking of the gun decks. Elm (*Ulmus procera*) was used for the keel as it could be obtained in long straight lengths and elm or beech (*Fagus sylvatica*) was often used for underwater planking. Both were significantly cheaper than oak and early survey reports suggest that more beech was used than officially recorded.\(^{35}\) From 1670, much of the oak plank used by English shipwrights came from Danzig, partly because of a scarcity of native timber but also because of cost. Ample local supply, cheap labour, and wind-powered sawmills meant that despite high transport costs, “Dantzig plank” was still cheaper than the native product. German and Baltic oak was used exclusively by the Dutch and occasionally by the French, despite the latter having ample supplies of native timber. Oak’s only disadvantage was its propensity to corrode iron fastenings due to its high acid content; nevertheless, no sooner were ships constructed than they started to deteriorate, sometimes before they were launched. The timber was subject to fungal attack by wet and dry rot above and from the marine borers, gribble (*Limnaria*) and shipworm (*Teredo Navalis*) below.

The size and strength of its component parts limited the size of a ship. The main horizontal structural support came from the keel and keelson, which in the larger ships was made up of four or five pieces bolted together,\(^{36}\) from the thick external and internal planking known as the wales and spirketting,\(^{37}\) and from the planking itself. The structural members were fastened together with iron bolts, much of the iron for which came from Sweden. Spanish iron was considered superior but was more expensive and was reserved for high stress items such as anchors. There were three kinds of bolts; drift bolts,\(^{38}\) which acted entirely by means of friction, ragged or rag-bolts, which were similar but had a jagged end to give more grip, and through-bolts. The latter either had their ends turned or flattened over washers like rivets, or

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\(^{34}\) B. Lavery (1984): 2, 28, suggests that elm was used for stemposts. This is unlikely as elm is subject to rapid decay if intermittently immersed “between wind and water” and the author has found no cases of it being specified in this location.

\(^{35}\) PRO Adm. 106/456, Commissioner Tymewell to the Navy Board, 15 September 1694.

\(^{36}\) Ollivier remarked that ‘some French shipwrights’ considered that the keel contributed relatively little to the structural strength of a ship (*Remarks*: 45). French and Dutch keel components were scarphed together horizontally while English keels were joined vertically, which, while less easily made watertight was probably structurally stronger, particularly since the scarph was “tabled”.

\(^{37}\) These were known as “spirkett risings” until the middle of the eighteenth century.

\(^{38}\) “Drift” was the contemporary term for “driven”.

had steel wedges driven into slots which allowed them to be tightened, threaded bolts not being used at this time. In English and most Dutch ships, planking was fastened entirely by wooden "treenails" made from young oak while the French and Spanish used a mixture of iron nails and Holm oak (Quercus Ilex) treenails.

The longer and shallower the hull, the greater were the stresses imposed upon it and the greater the propensity for it to distort. It therefore follows that three-decked ships were inherently stronger than were those with two, and two-decked ships to those with one, but as well as the shape, the rigidity of the structure depended on the integrity of the fastenings and on the friction between the planks created by the tightness of the caulking. The limits set by the materials and the methods of construction meant that, during the period covered by this study, a keel length of about 150 feet and an overall length of about 180 feet was the most that could be achieved. The French and Spanish were always more willing to explore the limits of what was possible than the British, the result often being the early distortion and short life of their ships.

There were national differences in construction techniques, but surprisingly, there was little inclination on the part of constructors to imitate the practices of their rivals, even when they could be shown to be superior.

Softwoods were used for masts and spars, linings and "quickwork", and decking where guns were not deployed. All softwoods were referred to as fir although most was pine (Pinus Sylvestris) and came predominantly from Sweden and Norway although the English imported "fir" (Pinus Rubia and Pinus Alba) from her colonies in North America for the lower or "standing" masts and bowsprits. Spruce (Albies excelsa), commonly from Norway, was often used for topmasts and yards. Both France and the United Provinces used Baltic timber for masts although the French could use the admittedly inferior timber of the Auvergne or Pyrenees at need. Tar, pitch, resin and turpentine were used in the preservation of timber and rigging. These products were all derived from coniferous trees, and much of it came from Sweden or its dependency of Riga, although North America supplied much of Britain's needs from the early eighteenth century.

Other materials included brimstone used in the preparation of anti-fouling, most of which came from Italy, tallow used in anti-fouling and as a general lubricant, and flax for the

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40 Tippetts and Dummer both used iron bolts to fasten the butt ends of planks but this practice seems to have died out during the early part of the eighteenth century. PRO Adm. 91/1, f.112, 26 February 1692.
41 These are graphically illustrated throughout Blaise Ollivier's Remarks, D. Roberts (ed. 1992). See chapter 7, section 5 below.
42 See appendix 2, page 215.
44 Ceded to Russia at the treaty of Nystadt in 1721. For the repercussions of the Great Northern War on Baltic trade see D. Ogg (1967).
manufacture of sailcloth. Both the latter were home produced but Britain relied on imports for much of her sailcloth until well into the eighteenth century and the best came from France.\textsuperscript{45} Light canvas, suitable for topsails and studding sails came from Noyalles, while heavier canvas for courses came from Vittery. Holland’s duck from Germany and the Low Countries was second best, and during the seventeenth century, English canvas came a poor third. Rooke commented after a stormy passage across the Gulf of Lyons in 1704 that, ‘many sails split, our English canvas, as usual, flying away like dirt’.\textsuperscript{46} The home product, either from the area around Ipswich or the Somerset levels, improved as the eighteenth century wore on but was probably never as good as that of France. On the other hand there is some evidence that English sails were better cut and less baggy than were those of her continental rivals.\textsuperscript{47}

Since so many of the shipbuilding materials came from the Baltic, the development and protection of this trade was an important component in a nation’s naval strength. During the early part of the seventeenth century it had been dominated by the Dutch due to the superiority of their financial institutions and their large fleet of cost-efficient fluit ships. The navigation Act of 1651 initiated wider competition and securing the domination of this trade became the policy of successive English governments, the most important source of naval stores being Sweden. Poland, with its port of Danzig, was a major centre for the export of North European oak as were the North German states, the chief of which was the Electorate of Brandenburg.\textsuperscript{48} Denmark exported mast timber through its sister state of Norway but she also exerted a powerful influence on northern affairs due to her control of the “Sound” and her ability to levy dues on ships entering or leaving the Baltic. The maintenance of this trade was important to all the naval powers and occasioned much diplomatic and sometimes military intervention to ensure the continuation of supplies. During the eighteenth century Britain came to dominate the market due to the volume of her trade, the efficiency of her trading companies and her ability to pay cash for most of her transactions.\textsuperscript{49} The fact that she could fall back on North American supplies also gave her a strong bargaining counter, although the Navy Board resisted political pressure to use colonial produce due to their objection to paying high prices for inferior goods.\textsuperscript{50}

\textsuperscript{46} J. Owen (1938): 88. However, Pritchard (1987): 171, states that between 1715 and 1740 France imported the heavier grades of canvas from Holland due to the inferiority of the native product.  
\textsuperscript{47} Remarks: 167.  
\textsuperscript{48} This became the kingdom of Prussia in 1700.  
\textsuperscript{49} D. Baugh (1965): 276.  
\textsuperscript{50} Ibid.: 281.
1.4. The development of the warship during the seventeenth century.

Early in the seventeenth century, Raleigh, in his “Observations on the navy”, enumerated the most desirable qualities to be looked for in a man of war. He listed these as being: strong build, speed, stout scantlings, the ability to fight the guns in all weathers, the ability to lie to easily in a gale of wind, and the ability to stay (tack) well. These were qualities inherent in the Elizabethan “race-built” galleons espoused by Drake and Hawkins but that were to be notably absent from the larger ships-of-war throughout most of the next century and a half. The reason for this was the changing nature of naval warfare brought about by the increasing efficiency and importance of the gun; ships became floating batteries where sailing qualities were sacrificed in the interest of gun-power.

Under the early Stuarts, English naval power reached its nadir, both in terms of leadership and the quality and quantity of their ships. Nevertheless, the launch of the Sovereign of the Seas in 1637 marked a watershed in the evolution of the warship. Designed by Phineas Pett, she was the first ship to carry three full tiers of ordnance, and although originally designed to carry 90 guns, the king insisted on 100 and she was launched with 102. Costing £40,833.8s. 1%d, when first built, she was mocked by expert opinion as being an expensive and largely useless status symbol, the view of Trinity House being that, ‘A ship of this proportion cannot be of use, nor fit for service in any part of the king’s dominion’. Nevertheless, she was the precursor of the “great ships” of the Restoration navy and the harbinger of an international arms race that was to follow.

Apart from the Sovereign of the Seas, the majority of the ships of Charles I’s ship-money fleet were small, containing only three ships of over 50 guns. During the first half of the seventeenth century, the depredations of privateers from the Spanish Netherlands and organised piracy from North African states preoccupied the minds of those responsible for naval procurement and it was to try to counter this threat that specialist cruiser classes were developed. An early attempt was a series of ten pinnaces of about 120 tons burthen, supposedly designed with ‘the most advantage that may be for sailing and rowing’. These were the Lions Whelps launched in 1627 and despite the involvement of Phineas Pett they were a total failure. Ship rigged and heavily armed, they were over-beamy, slow, and unseaworthy, the majority being lost through accident or stress of weather.

It was not until 1636 when the Dunkirk privateer Nicodemus fell into English hands that

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31 Father of the Phineas Pett who was a Master Shipwright and Commissioner of the navy during the Restoration.
33 A. Johns (1932): 258.
34 M. Oppenheim (1896): 256.
there was an improvement in the native product, two enlarged versions being built in the following year.\textsuperscript{55} It is a common misconception, arising from an over-credulous acceptance of Pepys, that the \textit{Constant Warwick} was the first English "frigate"\textsuperscript{56} but these two ships, the \textit{Expedition} and the \textit{Providence}, predated her by eight years. The main characteristic of the Dunkirk frigates was that they were relatively long, narrow and shallow, lightly built, and capable of being rowed as well as sailed.\textsuperscript{57} Their origins lay in the Mediterranean where they were principally oared boats but circa 1590 the Spanish bought them to the Netherlands where they evolved into mainly sailing craft. The \textit{Nicodemus} had a 63-foot long keel with a beam of 19 feet and the two English ships were not copies, being relatively longer and shallower. Nevertheless, if the \textit{Constant Warwick} was not the first English frigate, she was destined to have the greatest influence on future development. With over 13-feet depth in hold and 26 feet 5-inch beam on a keel length of 85 feet she was at once both broader and deeper than the Dunkirk models and was accounted a very fine sailer. Pepys commented that,

\begin{quote}
He (Peter Pett) aimed at nothing but sailing, and therefore would have but so many men and so few guns, and those light ones, never a standing cabin... To carry but little provisions, nor did care how long she lasted; and therefore she was but very weak of timber, trembling in the sea as the Turkish privateers do.\textsuperscript{58}
\end{quote}

The end of the English Civil War did not mean the end of hostilities. An unofficial naval war existed with both the Dutch and the French, whose privateers continued to harass English shipping and whose ports gave assistance to Prince Rupert's small fleet. To counter this threat the Commonwealth built a further twelve frigates during 1649. These ships continued the trend towards larger size and heavier armament, and, with one exception, each was larger than the one before, increasing from 423 to 556 tons. Most carried between 34 and 38 guns on a single complete deck and armed quarterdeck, but the last two were launched with 40 guns on two complete gun-decks. All would be given two decks by 1650 and there was a steady increase in the number of guns carried as the threat shifted away from small privateers to the numerically superior Dutch navy.

As well as the above, two larger ships, the \textit{Speaker} and the \textit{Fairfax}, were built to act as flagships. These were two-decked ships of 727 and 743 tons respectively, initially carrying 50 guns but eventually mounting 62. Although they retained the fine lines of the frigates, they were classed in the Third-rate and were as large as the biggest ships in the Dutch fleet. A further twelve ships of this class would be built by the end of the First Dutch War and they can

\textsuperscript{55} R. Winfield (1997): 8.
\textsuperscript{56} Minutes: 18.
\textsuperscript{57} N. Rodger (1997): 390 states that Hawkins chased one in 1593 and reported that `she was long and snug, and spread a large clew'.
\textsuperscript{58} Minutes: 15. Peter Pett built the \textit{Constant Warwick} in 1645 as a privateer for a consortium that included the earl of Warwick, the Surveyor of the Navy, William Batten, and admiral William Penn.
be seen as being the progenitors of the ship of the line. The Commonwealth provided a rare example of a carefully reasoned procurement policy and on the eve of that war a Venetian diplomat observed that, 'the Rumpers were ignorant mechanics but possessed the finest navy in the world'.

Although fleets of up to a hundred ships took part in the First Dutch War, the majority of them were small, a large proportion being merchant ships. James I had divided his ships into four ranks, designated as Royal Ships, Great Ships, Middling Ships and Small Ships. Charles I divided them into six rates but these were categorised by the number of crew carried rather than the size of ship and they were used to calculate the captain's pay. During the Commonwealth, ships were rated on the number of guns carried, ranging from 100 guns for the largest First-rates down to 12 guns for the smallest Fifth-rate. Despite having only twenty ships of the first three rates, English ships were generally larger than were the Dutch, who, following a series of hard fought battles, were forced to accept peace on English terms.

After the Restoration there was little money for new construction but the war had done little to resolve the differences between the two countries and a new conflict began in 1664. In the meantime Charles had built two new Second-rate ships along the lines of those built by the Protectorate although most of the ships that would face the Dutch were those that had been built for the first war. One Second-rate, five Third-rates and four Fourth-rates would be added during the second, and in an attempt to make them more stable gun platforms, the new Third-rates were beamier and deeper than the earlier ships. Nevertheless, despite an average increase in tonnage from 750 to 850 tons they were still criticised for their inability to fight their lower tier of guns in heavy weather, being unfavourably compared with the new 80-gun, two-decked ships that the Dutch launched during the latter part of the war. The adoption of line-of-battle tactics meant that small ships were at an even greater disadvantage than hitherto and the Second Dutch War saw a reduction in the number of Fourth-rates and merchant ships in the battle-fleet. As a result of the lessons learnt, post-war construction, with the exception of two Third-rates, consisted entirely of three-decked ships of between 90 and 100 guns.

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59 B. Lavery (1983): 21. Lavery discusses the evolution of the ship of the line in considerable detail in the two volumes of this work. The term "ship of the line" did not come into general use until William's War. Before about 1690 they were generally called "capital ships": J. Ehrman (1953): 6.
60 Quoted from B. Capp (1989): 72.
61 First-rates carried 80 guns and upwards; Second-rates between 52 and 80; Third-rates between 44 and 60; Fourth-rates between 32 and 50, and Fifth-rates between 12 and 32.
1.5. The French navy prior to 1672.

It was not until the revolt of the Huguenots under the Lords of Rohan and Soubise that France turned its attention to the creation of a national navy. In 1626 Cardinal Richelieu (1585-1642) made himself Grand maitre, chef et surintendant général de la navigation et commerce de France and laid the foundations for a modern navy. He established the major dockyards of Brest and Toulon and secondary ports at Le Havre and Brouages. Although the navy was to suffer under the regency of Mazarin, much of the infrastructure remained, and this formed a foundation on which Colbert was able to build when he became Intendant de la Marine in 1663. His appointment as finance minister following Fouquet's downfall in 1661 heralded a new era for French finances; during his ministry the French economy was transformed and by the time of his death in 1683 France had become the world's leading industrial nation. The measure of his success was that revenue stood at around 23 million livres at his appointment and had risen to over 70 million at his demise. The expansion of industrial output led to an increase in trade and commerce and the development of the colonies, particularly those in North America. This gave both the justification and the means for an expanded navy that could be used to advance his belligerent mercantilism.

The fleet that Colbert found in 1663 comprised some 20 ships excluding galleys, barques longues and fireships that were largely the survivors of Richelieu's navy. As the king evinced little interest in naval affairs, Colbert was left to direct them according to his personal wishes and his first priority was to rebuild the neglected infrastructure. The naval dockyards at Brest and Toulon were enlarged and improved, Brouages was abandoned and a new facility was constructed at Rochefort. By 1667 the dockyards were ready for a major building programme; imported shipwrights stimulated latent local craftsmanship and native shipwrights soon dominated shipbuilding. The annual state expenditure on the navy increased from about 300,000 livres at the end of Mazarin's administration to an average of about 10 million livres between 1663 and 1682.

Although the Compagnie du Nord was founded in 1669 to purchase naval stores from Denmark and Norway, Colbert aimed for virtual self-sufficiency in naval supplies. France had an advantage over other maritime powers in that she had large tracts of forest of suitable shipbuilding timber, much of which was close to navigable rivers to assist transport to the

64 C. Cole (1939): 1, 292.
65 J. King (1949): 189.
67 J. King (1949): 252. The exchange rate was about 14 livres to the English pound at this time. See appendix 11, page 233.
dockyards, and laws were passed for its protection. Inspection of the forests started as early as 1661 and regulations were in force from 1669, particular attention being paid to the preservation of fir and pine trees of the Auvergne and the Pyrenees that could be used for masts. Selected trees were impressed with the King’s arms by inspectors who were authorised to examine all forests, regardless of ownership. Despite all its good intentions, this system of Martelage had little effect; local communities continued to despoil the forests as they had always done and there was obstruction from local gentry to the impositions of the inspectors. Nevertheless, France was to remain self-sufficient in structural ship-timber until the Revolution, although the transport of naval materials to the dockyards, which, given the state of the roads, was necessarily carried out by sea, was open to attack in time of war and Brest was particularly vulnerable in this regard. It was partly for this reason that Colbert commenced the construction of the Languedoc or canal du Midi in 1666. This linked the Atlantic coast to the Mediterranean and was completed in 1681 at a cost of 17 million livres.

The Inscription Maritime was perhaps Colbert’s most notable impact on his country’s naval administration. An enrolment of sailors in the Atlantic ports was started in 1665 and in September 1668 this was extended to all the Maritime Provinces. Despite its Draconian overtones, it theoretically conferred many benefits on its subjects; service was set at one year and wages were to be paid directly to the families; there was free schooling for children and hospitalisation and pensions for the sick and wounded. It was not universally accepted however, and while popular in the relatively poor Brittany region it was opposed elsewhere and there were riots in Navarre, Rochefort, Dieppe and Marseille. The system potentially added some 60,000 sailors, or around 15,000 men a year to the service but financial difficulties meant that this target was rarely met. There was widespread evasion by the mobile maritime population and impressment and embargoes on merchant sailing were needed in times of war. Like the forestry regulations, failure was due to the Royal government’s ineffectiveness at the local and provincial level, although it did on occasion allow France to enlist a proportion of its men with less trouble than its rivals.

By 1670, France had become a major naval power. At the heart of the fleet was a series of three-decked ships that had been completed at Brest and Toulon during the previous two years, the largest being the Soleil-Royal, which with a length of 175 and a breadth of 47 feet was the largest ship afloat at the time. Towards the end of the Second Dutch War, six large two-

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70 Henry IV’s minister, Sully, had made a start on the canal but it was abandoned on Henry’s death in 1610. D. Ogg (1965): 63.
71 J. King (1949): 181.
72 G. Symcox (1974): 17. This was a major factor in its success over the Allies in 1690.
decked ships were purchased from Holland and two more from Denmark although it appears that they were not much liked by their new owners. Colbert's intention to imitate and then surpass the shipbuilding and logistical practices prevalent in England and the United Provinces and in 1670 he wrote to Le Sieur Monceaux, Ambassador to England, asking him to examine,

...all that is done in England, whether in construction of ships and docks, or for the purification of water, and even the order which is observed in the arsenals for the conservation of the merchandise serving for the armament.

De Pomponne, the Ambassador to Holland received similar instructions and Hubac, the Master Shipwright at Brest, was sent to England, Holland and Venice to study their shipbuilding methods. 

Conseils de Construction were established at the arsenal ports to act as centres of expertise where information on ships of all nationalities could be collated and evaluated with a view to improving the native product.

'The King of France in his Règlement de Constructions the 22 March, 1671, directs that the measures and proportions, or gabarris, of all ships of war and trade used by the English, Dutch and other strangers, be constantly kept in the place of their meeting as well as his own ships'.

The same regulation laid down the general procedures to be adopted in the design of ships, stating that,

Ships of war are to be made longer and less broad than in the past; the lower tier of guns must be kept high out of the water, in order that they may be served in rough weather, which in the past has often been in the water, from not being high enough; the height between decks to be diminished, to reduce the great height of ships on the water.

These regulations were an attempt to curb some of the excesses apparent in earlier ships but how far Colbert was successful in achieving this is open to doubt, for the larger ships continued to carry an excessive amount of decoration for some years to come. A system of rating ships began to emerge in 1669 and a regulation of 4 August 1670 laid down the principal arrangements and number of guns for each of the 5 Rangs and the unrated Frégates Légères, and these underwent periodic revision. There was also a fleet of galleys at Marseille but these were administered separately from the rest of the navy and their operations were at this time confined to the Mediterranean. They were intended to counter similar fleets of other Mediterranean powers as well as acting as prisons.

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74 J. King (1949): 143. Brest was the "senior" French dockyard, the equivalent in England being Deptford.
75 Minutes: 353. Gabarris; from gabarit, the French for moulds used in lofting the sections.
76 Quoted from J. Boudriot (Trans. D. Roberts 1993): 16.
77 For the regulation of 1674, see page 66 below. Frégates Légères were the equivalent of English Sixth-rates.
78 See P. Bamford (1973). Galleys accompanied Tourville's fleet in the Channel in 1690 and were present at the battle of Malaga in 1704, where they acted as tugs.
1.6. The Dutch navy prior to 1672.

The Dutch were the leading maritime nation for much of the seventeenth century. This supremacy was based on an efficient shipbuilding industry that could build ships rapidly and economically, and a sophisticated banking system that provided the cheap credit that enabled them to dominate foreign markets.\(^7\)

They had been responsible for many advances in the design of ships and the introduction of the Buss early in the fifteenth century and of the Fluit late in the sixteenth gave them an early advantage over the rest of Europe. The invention of a wind-powered sawmill at Vitgeest in 1592 was to lead to an industrialisation of the building process that would make the Dutch predominant in shipbuilding despite having to import all their raw materials.\(^8\) They were also the leading proponents of the fore and aft rig in northern Europe and the gaff-sail became common around 1600, partly replacing the more unwieldy sprit. Staysails were used in Busses even earlier and had been introduced to larger ships by the middle of the seventeenth century, while striking topmasts had been invented at Enkhuizen around 1570.\(^9\) The Dutch contribution to shipbuilding had therefore been great and the success of the mainly fore-and-aft rigged sea-beggars was largely responsible for Spain finally accepting her independence in 1648. Nevertheless, Dutch pre-eminence in ship design as opposed to construction had ceased with the introduction of the Fluit and by the middle of the seventeenth century conservatism had set in, with development being subordinated to economy and the interests of trade. Early warship construction followed merchant building practice and hulls were usually built plank first up to the turn of the bilge.\(^10\) Compared with those of France and England they were lightly constructed and extremely plain with no gun-port wreaths or elaborate carved brackets at the head and hances, the only significant area of decoration being the stern. They were objects of function rather than prestige.

Dutch pre-eminence in trade was established well before her final separation from Spain and was largely a result of her long struggle for independence. Barred from using Spanish or Portuguese shipping, the Dutch East India Company (VOC), founded in 1602, pioneered its own trading routes and had established factories in Batavia by 1619. The West India Company was active from 1621 and established bases in Africa, the West Indies, America and Brazil. To protect this trade, the Dutch needed a large navy and by 1640 it was the most powerful in the world. Most of the ships were small with wide, flat floors, which was as much to do with the

\(^{8}\) R. Unger (1978): 5.
\(^{9}\) Ibid.: 28.
\(^{10}\) R. Anderson (1921): 172; D. Harslöf (1963). It is likely that this practice had died out by the end of the seventeenth century and was confined to the flat-floored ships of the "Northern tradition".
ships being hired out for use as cargo carriers when not needed for the navy as for the need for shallow draft. Pepys' opinion that, 'The Dutch built no very large ships, on account of their scantiness of water' was partly true, but there were two separate shipbuilding traditions in the United Provinces at this time. One was based on Amsterdam and the Northern regions as described above but there was a southern tradition based on Rotterdam and Flushing whose design and construction was closer to the French and English model. Pierre Arnoult confirmed the relatively weak construction of Dutch ships, when he was carrying out one of the periodic "espionage" missions that France sent to the dockyards of neighbouring States. In his report, he stated that,

Dutch ships are very lightly built, so that a shot which would hardly make a hole in an English or French ship would go right through both sides of a Dutch one.

The planking above the sheer rail was often clinker softwood, which would explain Arnoult's observation.

The efficiency of the Dutch navy was hindered by the fact that from its inception in 1597, five separate Admiralties administered it, these being in order of importance, Amsterdam, Rotterdam, Middelburg, Enkhuizen / Hoorn, and Harlingen. Co-operation between the various Admiralties was sometimes lacking and this could lead to delays in mobilising a combined fleet. There was the added complication that the most powerful region, Amsterdam, tended towards republicanism, while the northern areas and Zeeland traditionally supported the House of Orange. Dutch ships were divided into eight Charters, the first four being considered fit to lie in the line of battle although the largest ship at the start of the first war against the English was the Brederode, a two-decked ship of only 59 guns. At that time the navy was essentially a cruiser fleet but following its defeat in that war, the Dutch built larger ships, and at the start of the second war their flagship was the Zeven Provencien with 80 guns on two decks. Eleven of this type was built in the years immediately following the war and they were similar to the six ships sold to France in 1668. Despite their traditional Amsterdam shape, they were relatively broad in the beam and since they had wide flat floors, they had a good reserve of buoyancy and carried their guns well. In battles where both combatants were determined to fight, such ships would prove successful and they were to have some influence on future English ship-design. This was especially true of the three largest ships, the Gouden Dofijn (86), Gouden Leeuw and Witte Olifant (82), which had decked over but unarmed waists and so were technically three-decked."
1.7. The early Stuarts, the Commonwealth, and the Navy.

At the accession of the Stuarts in 1603 England did not possess a single colony, its merchant fleet was small and the Spanish and the Dutch dominated maritime trade. The small amount of sea-going commerce was mostly concerned with the coal trade and the fishery, and a good deal of coal was carried in Dutch bottoms. Naval prestige, which had been high in the aftermath of the Great Armada, sank to an all time low early in the reign of Charles II with Buckingham’s ill-fated expeditions to Cadiz in 1625 and La Rochelle in 1627. The final indignity was the destruction of a Spanish fleet in the Downs by Marten Tromp in 1639 while admiral Pennington was forced to look on, an impotent witness to this violation of territorial waters. It was, nevertheless, a time of expanding trade and the prosperity that came with it and between the time that the Susan Constant, Godspeed and Discovery set sail for America in 1606 and the Restoration, English mercantile tonnage had increased from around 70,000 to over 250,000 tons. It serviced colonies that stretched from Newfoundland to the West Indies, including Bermuda and much of the eastern seaboard of North America. There were also trading stations on the West Coast of Africa, India and the East Indies, although here the massacre at Amboyna in 1623 reinforced Dutch supremacy in the region and fuelled an antagonism that would make future colonial conflict inevitable.

Charles’s naval expenditure has sometimes been given as a cause for the Civil War but it was a small one compared to the clash between the acceptance of an absolute royal prerogative preached by Arminianism or “Anglo-Catholicism”, and the growing desire for personal responsibility and religious freedom espoused by Puritans. In 1629 Charles found himself unable to work with Parliament and thenceforth ruled without one. The arbitrary taxation needed to sustain the monarchy without the support of parliamentary grants was a major factor in the conflict but of these the extension of ship money to inland boroughs was probably the least contentious as the need to protect the merchant fleet was appreciated. The poor performance of the navy was largely due to insufficient financial support for the infrastructure, which led to erratic pay and bad provisioning causing the widespread dissatisfaction that resulted in the major part of the fleet siding with Parliament during the Civil War.

Naval growth was also necessary for the survival of the Commonwealth. In 1649 it had established the principle that convoy protection should be provided without charge.

recognising the need for an extended mercantile marine to help pay for the increased cost of the military and to provide a greater sea-faring population to man the burgeoning navy. It was for these reasons that the Navigation Act of 1651 was inaugurated, and, while there had been navigation acts since the reign of Richard II, "Cromwell’s Act" had the most impact on other maritime nations. It stated that,

...No goods or commodities whatsoever of the growth, production or manufacture of Asia, Africa or America should be imported into either England or Ireland, or into any of the plantations of Great Britain, except in British-built ships, which were owned by British subjects, and of which the master and three-quarters of the crew belonged to Great Britain.\footnote{W.L. Clowes (1897): 2, 114.}

This is often seen as a major cause of the war with the Dutch that was to follow but in the short-term there was insufficient British or colonial shipping to meet the terms of the act and consequently evasion was widespread.\footnote{D. Hannay (1909): 445.} A greater cause of resentment was England’s claim to the “sovereignty of the seas” and the enforcement of salutes to the English flag. This, and the inspection of Dutch ships trading to France, with whom England was engaged in undeclared naval warfare, was repugnant to Dutch pride as the predominant naval power in Europe. The symbolic significance of the salute is hard to understand from a modern perspective; Cromwell had initially ridiculed it ‘as a story fitter for women and children to wonder at than for statesmen to contend about’,\footnote{Quoted in H. Richmond (1953): 98.} but later insisted on its observation. It was to assume even greater importance under the later Stuarts and Pepys wanted Mathew Aylmer, a future Admiral of the Fleet, hanged for lowering his flag to overwhelming force in Cadiz, despite the fact that failure to do so would have meant the loss of his ship and his men.\footnote{E. Chappell (Ed. 1935): xxxvii.} It was an attitude that was universal; Colbert insisted on similar respect for the flag and a French ship was sunk in a Spanish port under similar circumstances.

During the Interregnum the English navy was continuously in action. It fought French and Royalist privateers between 1649 and 1655, the Portuguese in 1650, the Dutch between 1652 and 1654, and the Spanish and Flemings between 1655 and 1660. Apart from the victory of the New Model Army at the Battle of the Dunes in 1658, the Republic’s foreign prestige was based entirely on respect for its navy and it placed England among the first rank of European powers. There were financial benefits as well; the Dutch monopoly of trade with the Baltic States was broken and the many Dutch prizes swelled the merchant fleet. Nevertheless, at the Restoration, Charles II inherited a debt of £1.2 million along with the fleet of 161 ships,\footnote{B Capp (1989): 6.} a sum that could have been more easily managed had suitable financial mechanisms been
in place to do so.

The Restoration settlement ensured that the control of the national finances was vested in Parliament. Charles was granted the yield from a number of taxes that were estimated to give an annual yield of approximately £1,200,000, a figure that was neither met nor adequate to his needs. Reaction to the confused and autocratic rule of the “major-generals” following the death of Cromwell in 1658 had swept Charles to power on a tide of popular enthusiasm but it was not long before old arguments about religion, taxation and arbitrary government began to reassert themselves. The severity of the repression of non-conformist religions legislated for in the “Clarendon Code” contributed to the ‘nervous and violent state of public opinion’ that lasted throughout Charles’ reign and while it was both necessary and expedient to employ men who had served the Commonwealth, for it was they who had engineered the Restoration, there were inevitably tensions between them and those of the restored “Cavalier” party.

The Second Dutch War, like the first, was fought over trade and was confined to the belligerents’ navies and on the whole the English had the better of the war at sea. However, financial exhaustion and mismanagement, exacerbated by plague and fire, led to the king’s fatal decision not to commission a battle fleet in 1667, and, while peace negotiations dragged on, the Dutch forced the boom on the Medway, burnt four ships of the line and towed away the Royal Charles (ex Naseby). An enquiry revealed the extent to which the government had mismanaged its resources but despite evidence of gross incompetence and malversation, no one was punished and little changed; as a result, the Commons became increasingly unwilling to trust Charles with money. The peace signed at Breda was not unfavourable to England; there was some relaxation of the navigation laws but New Amsterdam was retained, unifying the eastern seaboard of North America. Nevertheless, in June 1670, Charles committed himself to an alliance with France by the Treaty of Dover, the secret clauses of which called for a further war against the Dutch and Charles’ conversion to Catholicism at an appropriate time. In return, Charles was to receive subsidies amounting to £741,985 and the support of French troops should his subjects prove recalcitrant. It was a dangerous policy that would cause the break up of the ruling cabal and lead to a strong religious and political reaction against Charles’ policies. The control of the naval administration would prove to be an important part of this struggle.

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98 K. Felling (1924): 113. The report of the enquiry, produced in 1669 disclosed peculation in the region of £1,500,000.
99 Named after its members that comprised Clifford, Arlington, Buckingham, Ashley and Lauderdale. The secret clauses in the treaty were known only to only to the first two and were violently opposed by Ashley (later Lord Shaftesbury) and Buckingham when they were revealed.
100 See page 45 below.
1.8. Naval administration prior to 1672.

At the Restoration, naval administration more or less reverted to what it had been before the Civil War and the Duke of York became Lord High Admiral with Sir William Coventry as his Secretary. By an Order in Council dated the 4 July 1660, a reconstituted Navy Board was formed with Colonel Slingsby as Comptroller, Sir George Carteret as Treasurer, Sir William Batten as Surveyor, and Samuel Pepys as Clerk of the Acts. In addition, in imitation of Commonwealth practice, three “Extra Commissioners” were appointed to supervise the dockyards. These officers were known collectively as the Principal Officers and Commissioners of the Navy and were jointly responsible to the Lord High Admiral for its civil administration. Both Carteret and Batten had served on the Board before the Civil War, Batten having been a part owner of the Constant Warwick and a Parliamentary Admiral before defecting to the Royalists in the aftermath of “Pride’s Purge”.

James issued the instructions under which the Navy Board operated in 1662 in accordance with suggestions made by Slingsby in his *Discourse for regulating the Navy Office*. James is often considered to be the founder of modern British naval administration but his instructions were largely a re-issue of those published by the Earl of Northumberland in 1640, which with minor additions and revisions were to remain in force until 1832. The Surveyor’s principal duties were defined as being the supervision of the building, the fitting out and repairing of ships, the maintenance and extensions to the dockyards, the purchase of naval stores, and the leasing of naval vessels. Of these, the purchase of stores was the most onerous as he had to keep an audit of what was in stock at each of the dockyards and negotiate for a years supply of a wide variety of goods with the traders concerned. The Treasurer was nominally the senior member of the Board but occupied separate offices and rarely attended the meetings held by the other members. He was responsible for controlling naval expenditure in terms of “wear and tear”, wages and victualling, dispensing the money allocated to the navy by the Treasury and representing the navy’s requirements to that body. The Comptroller was second in the hierarchy but received the same salary as the rest of the Board, acting as chairman and as the general auditor of the activities of his colleagues. He also had overall responsibility for balancing the accounts and was often present at the payment of wages to ships that were “paying off”. The Clerk of the Acts was traditionally the junior member of the Board and originally received a slightly lower salary. He acted as the recorder of meetings and dealt with the correspondence and administration of the Navy Office. It was not long however, before the

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101 Slingsby died in September 1661 and was replaced by Sir John Mennes, a Cavalier naval officer.
energy of Pepys advanced the importance of the post and henceforth it enjoyed parity with the other Principal Officers. The Navy Board was also indirectly responsible for the health and subsistence of seamen through the agency of the Commissioners of sick and wounded seamen and after 1684, the Commissioners of Victualling. Nominally independent, they usually carried out their business through the Navy Office and their activities had some bearing on the role of the Surveyor, as he was sometimes involved in the design and construction of their buildings.

Little work was done in the Navy Office in the two years prior to the issue of James’s Instructions; Pepys admitted that he had no clear idea of what the duties of Clerk of the Acts entailed. The former incumbent of the post, to whom Pepys paid a proportion of his salary, was unable to enlighten him \(^{103}\) and even after the issue of the instructions the Principal Officers were only required to meet twice a week as a Board. It appears that the relaxed style of Charles’ government spread its enervating influence throughout the whole of the administration and during the critical year of 1667, shortly before De Ruyter’s incursion into the Thames, Pepys confided his feelings to his diary.

To Spring Garden, and there eat and drink a little, and then to walk up and down the garden, reflecting upon the bad management of things now, compared with what it was in the late rebellious times, when men, some for fear, and some for religion, minded their business, which none now do, by being devoid of both. \(^{104}\)

Pepys owed his position to the patronage of his cousin the Earl of Sandwich but unlike many of the other officers had no personal social standing to sustain him in it, and, perhaps for this reason, he began to make himself invaluable by becoming both expert and hard working. In this he was successful and he became one of a small but growing number of men who began the process of forging a professional civil service that would eventually largely transcend the interests of court and political patronage.

\(^{103}\) A. Bryant (1943): 133.

\(^{104}\) *Diary*, 3 June 1667.
1.9. Naval tactics and Fighting Instructions.

At some stage during The First Dutch War, the line of battle was adopted in place of the charge, counter-charge and confused mêlées that had occurred theretofore. This tactical innovation is generally ascribed to the discipline imposed on the English fleet by the generals at sea Blake and Monck and received opinion inclines towards the latter.\(^{105}\) It was the logical outcome of the preponderance of broadside gunnery and was to have a major effect on the composition of the fleets. The adoption of a regular line meant that it was no longer possible for ships to choose an opponent of similar size. As a result warships became larger, acquiring two decks and heavier guns and hired merchantmen with their lighter build were placed at a disadvantage and henceforth played a diminishing part in naval warfare. The first record of the line being used is provided by an eye-witness account of the battle of the Gabbard, fought on the 1 June 1653, when it was observed that the English under Monck,

\begin{quote}
Stayed upon a tack, having the wind, within twice cannon shot about half an hour, to put themselves in their order they intended to fight in, which was in file at half cannon shot, from whence they battered the Hollanders.\(^{106}\)
\end{quote}

The other point illustrated above is the importance of the weather gauge or "having the wind", which conferred the power of giving or refusing battle with the additional advantage of choosing the method of attack. This had been appreciated as early as 1530 when Audley's instructions required that,

\begin{quote}
If they meet with the enemy, the admiral must apply to get the wind of the enemy by all means he can, for that is the advantage.\(^{107}\)
\end{quote}

Furthermore, the smoke from the guns would be blowing away from the windward ships allowing both the target and the admiral's signals to be seen more clearly. "Weatherliness", or the ability to sail closer to the wind than an opponent, was therefore, an important criterion in ship design.

The line of battle predominated during the Second Dutch War and thereafter became the accepted tactics for the rest of the age of sail. Being essentially defensive in nature, it had a significant influence on ship design, with a preference being shown for three-decked ships that would act as strong points in the line. During the Dutch Wars it became the practice to crowd as many guns as possible into the smaller ships in order to make them suitable for the line of battle in the face of the more numerous but generally smaller enemy ships. These changes had obvious repercussions on the performance of the ships in question. This was of little

\(^{107}\) J. Corbett (ed. 1905): 15.
consequence in the Dutch Wars, where both sides were determined to fight, but war against the French was to bring different tactical requirements and a reassessment of design criteria.

Detailed written instructions were used to control the evolutions of the fleet and to maintain discipline and the first written instructions in England were those of Sir Thomas Audley referred to above. The orderly and collective defensive qualities of the line were clearly laid out in the Duke of York’s “Fighting and Sailing Instructions” of 1665, 1672 and 1673 and these formed the basis of Russell’s instructions of 1691. They stressed the sanctity of the line and forbade leaving it until the main body of the enemy had been defeated, but, while this was sensible enough in an undisciplined age, they were defensive in nature and unduly restrictive. The system of signalling by flags meant that instructions had to be kept simple and ensured that there would be no decisive battles at sea unless one side had an overwhelming preponderance of numbers to allow a “general chase”.

Father Paul Hoste had spent twelve years at sea under d’Estrees and Tourville before writing the treatise that was to influence French tactics for much of the next century. Hoste studied the tactics of Tromp, de Ruyter, Blake and Rupert before publishing his L’Art des Armées Navales in 1697. Like the English instructions, they stressed the need for a close hauled line-of-battle whether in attack or defence but advocated a leeward position under certain circumstances. This had certain advantages; it guaranteed the use of the lower-deck guns and allowed damaged ships to fall away to leeward rather than on board the enemy. De Ruyter had taken up the leeward position when faced with heavy odds, but in the French service the tactics were to become excessively defensive, leading to an inability to obtain a decisive victory when the opportunity offered. They stressed the advantage of “doubling” on the enemy in order to destroy a section of his fleet, while avoiding being doubled oneself but the evolutions that he developed and the signals that went with them were complex and often broke down under battle-conditions. They were suited to a commander as precise and disciplined as Tourville but were over complicated for lesser minds. Tunstall suggests that French fleets would form their line six points (68°) from the wind while the British steered seven (79°). This might have said something about the windward ability of the two fleets except that Hoste himself stated in 1690 that a French fleet could not beat to windward as a formed body for, “although many of the ships were weatherly enough to do this, a good number were not”.

1.10. Comparisons and conclusions.

The period from around the time of the Second Dutch War onwards saw a gradual change in the navies of France, England and the United Provinces from being predominantly "cruiser fleets" for the protection of trade, to battle-fleets contending for mastery of the seas around the combatants coasts. As a consequence ships grew larger, with a greater proportion of armament to tonnage, thereby restricting the operational range of the largest ships and leading to the growth of specialisation for different strategic purposes.

In anticipation of the Third Dutch War, France launched 17 ships a year between 1667 and 1671 and by 1672 had the navy that was so admired by Charles and his circle for the size and splendour of its ships. It is evident that much of this admiration was misplaced; most of the larger French ships of the period were built on the Dutch model with wide, flat floors and a sharp turn to the bilge. This should have given them a large immersed volume and hence stiffness, but it was reported by Père Hoste that several ships, including the Royal Louis, had to be girdled before they could put to sea. The same can also be said of many English ships but claims by some modern writers that French ships were better sailers than the English are unlikely to be true. Structural weakness caused by inadequate connection of the decks to the sides was reported, while fundamental errors such as placing adjacent tiers of gun-ports one above the other were not uncommon. Seignelay considered that French ships were too heavy, too high out of the water, and that they should imitate the proportions of English ships, "qui est forte bonne". The three-decked ships were built for prestige and were heavily encrusted with sculpture by eminent artists such as Pierre Puget. This not only added weight but also was a potential battle hazard due to flying splinters and it is reported that Duquesne ordered his men to hack much of it away from his flagship before the battle of Stromboli.

Neither were the two-decked ships of the Second-rate purchased from the Dutch any better. Some years later, Pepys was to report that,

...The ships built by the Dutch for France were after their own Dutch built, some of which were in the French fleet here but not good sailers; the French not making the most of them, not minding their trim, as not being indeed satisfied with their accommodation.

Colbert's enquiry into the condition of the fleet in 1673 found the Dutch-built ships the worst,

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113 Quoted in J. Fincham (1851): xvi.
115 R. Anderson (1921): 172.
117 J. Laughton (1887): 92.
118 Minutes: 234.
being criticised as 'n’est pas fin de voile'. However, Pepys also observed that,

In 1663 and 1664 it was observed that Dutch and French built two-deckers of from sixty to seventy guns, carried their lower tiers four feet above the water, and could stow four months provisions; whereas our corresponding vessels, copied from Dunkerque models, carried their guns but little more than three feet above the water and stowed provisions for only ten weeks.

Pepys is probably referring to the new ships of between 60 and 70 guns built for the Dutch fleet after 1664. His reference to French ships is anachronistic for apart from those ships purchased from Holland the national product was not particularly large until after 1667. English ships, with their Commonwealth frigate antecedents, were relatively narrow and sharp at this time, and, while faster and more weatherly, also found difficulty in using their lower tier of guns. Seignelay confirmed that English ships were ‘plus frégates que les notres’. Pepys claims that as a result of this, the Warspite and the Defiance, two of the ships of the 1664 programme, built in the private yards of Johnson and Castle respectively, were built to carry six months stores and their guns four and a half feet from the water. Pepys divides the credit for this change between himself and Deane, an accreditation that is extremely unlikely at that time.

The French played only a minor role in the Second Dutch War and clashes with English ships were few. Nevertheless, a number of ships were captured and taken into the navy, the most important of these being the Rubis, built at Brest in 1644, captured in 1666 and renamed the French Ruby. In the French navy she was classed as a Third-rate of 50 guns but was given numbers which, according to Pepys’ Register of Ships, varied from 72 to 80 in English service. She was similar in size and tonnage to Deane’s Resolution (70), so one can assume that in order to have sufficient buoyancy to support such an increase in armament she was designed on the Dutch model. She also had a very short keel for her overall length and this was typical of Dutch ships of the period. It is known that the Brest shipyard tended to follow Dutch practice and de Seignelay confirmed in his report written in 1672 that ‘French sections were more like Dutch than English because the earlier French ships were built by Dutchmen’. Nevertheless, she remained in English service for sixteen years before being wrecked off Jamaica and so must have been reasonably successful. This is in stark contrast with the many Dutch prizes, nearly all of which were sold or given away. The conclusion seems to be that Dutch ships in general, were rather slow and poor sailers on the wind due to their wide, flat midship section, but reasonably good gun platforms being stable and stiff. However, what evidence there is

120 Minutes: 241.
122 W.L. Clowes (7 Vols. 1897-1903): 2, 242; F. Fox (1992): 289. Their contracts called for only four-foot of freeboard
123 R. Anderson (1921): 173.
suggests that the larger Dutch ships were inferior to those of either France or England. French shipbuilders at this time were still in the process of learning their trade and James was almost certainly correct when he expressed the opinion that 'he did not look upon the ships of war of France to be really such good sailers as ours'.

124 Minutes: 37.
CHAPTER 2 Sir John Tippetts (1672-1692) and Sir Anthony Deane (1685-1688).

2.1 Historical Background 1672-1688

On 5 September 1672, John Tippetts was made Surveyor to the Navy, the first shipwright to be appointed to a position that would be their preserve for the next 160 years and one that marked a major step in making the administration of the navy more professional. His appointment came six months after the start of the Third Dutch War, the last to be waged against that nation until the American War of Independence, and one which unlike the previous two wars, aimed at their total destruction. It was fought in order to satisfy the commercial and territorial ambitions of Louis XIV and Charles II and to that end the main French effort would be a land campaign led by the most celebrated generals of the day, Condé and Turenne. The major part in the naval war would be born by Charles who agreed to supply two-thirds of an allied fleet of 98 “Great ships and Frigates”; a deliberately provoked insult to the English flag was used as a casus belli and war was declared in March 1672. Like the previous Dutch wars, it was the battle-fleets that predominated, the main object being to seize a bridgehead to support the French army. In this it was unsuccessful and none of the naval actions proved decisive, success being denied by De Ruyter whose skilful handling of his numerically inferior fleet denied the Allies the necessary local naval superiority.¹ The French role in the naval campaign was ambivalent and Louis may have ordered d’Estrees to conserve his new French navy.² He had good reason not to place complete trust in his ally, for following revelation of the secret clauses contained in the Treaty of Dover, English public opinion turned against continuation of the war.

Peace was signed between England and the United Provinces in February 1674 but their war with France was to last for another four years. The theatre of naval activity shifted from the North Sea to the Mediterranean and the Baltic where Dutch fleets supported their new continental allies Spain, Austria and Denmark. While The Dutch and the Danish under Tromp inflicted a heavy defeat on the Swedes in the north, the French under Duquesne were victorious in the Mediterranean where De Ruyter was mortally wounded during a minor action off Agosta. In these battles the resurgent French navy showed that it could fight, and when in 1677 Chateau-Renault with six of the line met and defeated a Dutch squadron of eleven under Evertzen off Gibraltar, it was apparent that the French navy had come of age. The Dutch had been the leaders in this first coalition against France but the war ended their position as the leading

² A.T. Mahan (1890): 155.
maritime power. During the four years before the peace of Ny’mwegen was signed on the 11 August 1678 much of her European carrying trade was lost to a neutral England. This and the need to subsidise allies and keep a large army in the field meant that she could not afford to maintain the large fleets of the earlier wars, leading ultimately to naval defeat.³

England was not entirely free of war after the treaty of Westminster. Between 1674 and 1688 there was intermittent conflict with Tripoli, Algiers, and Sallee, all of whom had taken advantage of the European conflict to prey upon the Levant trade. The wars with the North African States were to have two main results, the re-emergence of specialist cruisers and the creation of a corps of gentleman officers who would attain a degree of professionalism under the harsh conditions engendered by this intermittent warfare. The fleets involved were small, consisting mainly of ships of the Fourth and Fifth-rate, but Arthur Herbert, Edward Russell, George Byng, and Cloudisley Shovell, all learnt their trade in this theatre under the direction of Sir John Narbrough. Having clean ships was of paramount importance in these operations and Tangier, which had come to Charles as part of the dowry of Catherine of Braganza, proved unsatisfactory as a main base due to its exposed position. Use was made of Lisbon, Leghorn, Cadiz and Malta, but in 1680 Herbert anticipated future events by bribing the governor of Gibraltar to allow its use as a cleaning station and as a base for stores.⁴

The English volte-face caused a temporary estrangement between Louis and Charles and this, combined with a fear of the growing naval strength of France, led to a vote of supply for the construction of thirty large ships of war. Charles expressed the nation’s fears when he voiced his concerns to Louis about the growth of the French navy at this time,

This is so great a cause of suspicion with us, who can possess importance only by our commerce and our naval force, that every step that France takes in this direction will perpetuate the jealousy between the two nations.⁵

Charles’ pragmatic, if temporary acceptance of the changed diplomatic situation, found expression in the marriage of the Duke of York’s elder daughter Mary to William of Orange on the 4 November 1677, an event that was to profoundly change the constitution and the alliances favoured by the Stuart kings.

1679 witnessed the mass hysteria of the Popish Plot. This fiction, which purported to be a plan to assassinate Charles and put his Catholic brother on the throne, led to the condemnation of some thirty five innocent victims and disrupted the administration of the navy by driving both Pepys and Deane from office. It also saw the fall and impeachment of Danby, the exile of James to Flanders and a general election that brought the leading opposition

³ A. Lambert (2000): 76.
⁵ Quoted in A.T. Mahan (1890): 60.
figure of Shaftesbury into the government as President of the Council. Shaftesbury’s attempts to bring in a bill to exclude the Duke of York from the throne failed and Charles was able to rally his supporters in the interest of the hereditary succession. The dissension between the exclusionists and the “abhorrers” who supported the natural succession exposed the violent divisions that found expression in the derogatory titles of Whig and Tory and created an animus that was to profoundly effect politics over the next 40 years.  

The naval administration was a particular target of the exclusionists who feared that, because of the duke of York’s influence over it, the navy might become the instrument of French and Catholic designs. The Admiralty was placed in commission between 1679 to 1684 and the king took no interest in the navy during this period, being content to leave matters in the hands of his political opponents, ‘sporting himself with their ignorance’, as Pepys indignantly observed. Charles’ constitutional experiment of letting the members of the opposition run the country led him to neglect his executive responsibilities, and in this air of ennui both the navy and the country as a whole suffered. It is likely that bringing the admiralty into the political arena was an attempt by Charles to gain the support of moderate men of both parties but it appears that dissension amongst its members contributed to its ineffectiveness. Nevertheless, by the end of his reign Charles had out-maneuvered his opponents and by gerrymandering his supporters into the corporations had paved the way for James’ smooth succession when he died on the 6 February 1685.

While Charles died a Catholic, few outside his immediate circle knew it; conversely, one of James’ first acts on his accession was publicly to celebrate mass at Saint James’ palace. Nevertheless, James was initially able to take advantage of a new wave of loyalty to the crown, strengthened by Monmouth’s abortive rebellion, notwithstanding the brutality that Judge Jeffries and his “bloody assize” visited on the West Country. The loyalty of the Tory majority was expressed in the vote of a generous supply to repair the neglect that the navy had suffered in the last years of the previous reign. H had none of the pragmatism and political judgement of his brother however, and deluded by the support of a few sycophantic followers, pressed home his attack on the Anglican monopoly of court and military places in the interest of his co-religionists. The vice-admiral of England Arthur Herbert was turned out of his offices and replaced by the Catholic Sir Roger Strickland, while the growth of an army largely recruited from the Catholic Irish caused increasing alarm.

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8 Cat.1: 60.
While many were prepared to accept an ageing James while there was a Protestant successor in view, the production of an heir on the 20 June 1688 was the final straw and in July Herbert delivered the invitation to William of Orange to take over the reins of government. William’s bold gamble with the weather was rewarded and while Lord Dartmouth lay wind-bound in the Thames Estuary, William landed his forces at Torbay. Dartmouth’s enforced inactivity caused by the “Protestant wind” was probably fortuitous for he must have been aware that many of his captains would not support him if it came to a fight. John Berry, Lord Berkeley, George Churchill, Mathew Aylmer, Cloudesley Shovell and Anthony Hastings were all of doubtful loyalty.¹⁰ There was also to be no intervention from the French; William had delayed his invasion until Louis was committed to his campaign on the Rhine; the fleet that was largely James’ creation played no part in the struggle and was handed over to the victor intact.

2.2. John Tippotts, the early years.

Details of Tippotts’ date of birth, ancestry and early life are not known, but he came from a reasonably wealthy mercantile non-conformist family from the Portsmouth area. During the reign of Charles I he studied ship design and construction in Denmark and Pepys noted that,

Sir Anthony Deane tells me that besides Mr. Day that went to Denmark in the late times, one Robin was sent there by the late king; by the same token he would have carried Sir John Tippotts (who was then a young man) along with him.11

The “Robin” referred to was almost certainly James Robbins, who went to Denmark with his son late in 1641 or early in 164212 and who in 1651 built the Sophia Amalia (86/100) at Christiana in Norway, then part of the Danish crown.13 Robbins came from Hampshire where he was a purveyor of timber and had been Assistant Master Shipwright at Portsmouth.14 It seems reasonable to assume that Tippotts was apprenticed to him and accompanied him to Denmark either during or shortly after serving his time. Since apprenticeships officially started at sixteen years of age, this would suggest a date of birth shortly before 1620.

Robbins remained in Denmark until his death, but towards the end of the Civil War Tippotts returned to England to resume his work at Portsmouth and by 1650 he was Master Shipwright there. While the right political and religious attitude would have been important, he must have shown considerable ability to reach that position at an early age. He built or rebuilt a number of warships for the Commonwealth and Protectorate, including the Bristol (48/42) in 1653, and the Lyme (62/54) and the Dartmouth (32/30) in 1655.15 Wrecked off the Isle of Mull in 1690, the remains of the Dartmouth were investigated from 1973 onwards by Colin Martin in conjunction with the Bristol Undersea Archaeology Branch of the British Sub-Aqua Club. The archaeological evidence suggests that she had been at least partly built in the northern Dutch manner with the bottom planking being laid prior to framing.16 This would be consistent with Tippotts’ period of study in Denmark, as Dutch shipbuilding techniques were practised there at that time.17 The remains suggest a fine hull with a great deal of dead-rise and an unusual depth of keel. This was replaced in 1678 but as investigated was 13 inches deep with a further 8 inches of false keel, rather more than twice the depth of keel normally given to Fourth or Fifth-rates at that time. With a keel length of 80 feet and beam of only 25 feet and given her dead-rise

11 Minutes : 223.
and depth of keel she should have been a fast and weatherly ship.\textsuperscript{18} That she was chosen to carry out the difficult task of suppressing Jacobite sympathisers in the confined and treacherous waters of the Inner Isles would tend to support this but there are no other known examples of this form of construction in British naval ships. Tippetts rebuilt another Fifth-rate, the Richmond, ex Wakefield (28/26) in 1656 and built the Monk (60/52) in 1659. His other small ships were not particularly successful, the Martin, a Sixth-rate built in 1658 was sold in 1667 as ‘useless’, while a ketch rigged yacht named the Portsmouth built in 1665 was converted into a pink in 1670\textsuperscript{19} and was captured by the Dutch in 1673. Nevertheless, in 1666 he was chosen to rebuild that icon among English frigates, the Constant Warwick. After the rebuild, which increased her armament from 26 to 46 guns, it must have come as no surprise that she had ‘lost her nimbleness’ and was turned from ‘an incomparable sayler to a slugg’.\textsuperscript{20}

In September 1659 he was elected mayor of Portsmouth, further evidence of his considerable standing in the local community. He served in that capacity for only a year but remained a member of the Borough Council as a “gentleman member” and seems to have quarrelled with his successor.\textsuperscript{21} Like most of those who had worked for the Protectorate, he was confirmed in his position of Master Shipwright and was chosen to build one of only two Second-rates to be constructed during the early years of the Restoration. Launched in 1664 as the Royal Oak (74), she was 121 feet on the keel, 39 feet 10 inches broad and had a burthen of 1021 tons. She had a brief career, being burnt by the Dutch in their raid on the Medway in 1667 but was well thought of and it was reported that,

\begin{quote}
The King is much pleased with the new frigate built at Portsmouth and has ordered Tippetts, the shipwright who built her, to build just such another, and not to mend her in any part, being assured that anything that is not just so cannot be so good.\textsuperscript{22}
\end{quote}

The additional ship was not built due to a lack of money.

In February 1668 Tippetts was appointed as the Commissioner at Portsmouth in place of Colonel Thomas Middleton who became Surveyor of the Navy on the death of Sir William Batten,\textsuperscript{23} the position being equivalent to that of an officer of the Navy Board and commanding a similar salary. Although supposedly resident at Portsmouth, Tippetts spent much of his time in London where his opinions were much sought after by the rising Clerk of the Acts. In 1669 he built the St. Michael (96), which at only 125 feet on the keel, 40 feet 8½ inches beam and

\textsuperscript{18} See fig.1, page 236.
\textsuperscript{19} A pink was normally the English equivalent of a fluit. Here it means conversion from a ketch to a simple ship rig.
\textsuperscript{20} A.W. Johns (1932): 254-266.
\textsuperscript{21} Portsmouth Borough Session Papers, from information kindly supplied by Portsmouth City Museum Service.
\textsuperscript{22} CSPD, 9 March 1665, quoted in B. Lavery (1983): 31.
\textsuperscript{23} A. Johns (1925): 179.
1101 tons was the smallest ship of the period to rank as a First-rate. Fox (1980: 95) suggests that this was an experimental design built to explore the maximum ratio of armament to size (and hence cost). Her armament of 96 guns was only achieved by using short, lightweight guns but even with these she was overburdened and was soon reduced to a 90-gun Second-rate. She was girdled in 1674, increasing the beam to 41 feet 8 inches and the tonnage to 1154 and Sir Robert Holmes, one of her commanders, thought her a fine ship, being handy and economical. He was probably alone in his opinion, as the experiment was not repeated in such an extreme form, although the policy of providing the maximum gun-power to tonnage was to be a persistent feature of British ship design over the next seventy-five years.

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2.3. Sir John Tippetts and English naval administration. 1672-1688.

By 1672, Tippetts was acting as Middleton’s assistant and the advisor to the Cabinet on shipbuilding matters. Pepys concluded that it would more logical to have a shipwright in the role of Surveyor and in April he suggested to the Duke of York that Middleton be made Commissioner at Chatham and that Tippetts be elevated to his place.\(^25\) Pepys repeated his suggestion in August and on the 5 September 1672, Tippetts received his patent as Surveyor of the Navy. Henceforth, the Surveyor would act as the Admiralty’s expert on shipbuilding and orders for new ships would be placed through him rather than going directly to the shipwrights. Officially there was no change in his “job description” which contained no mention of the supervision of ship design and this responsibility would not be officially vested in the Surveyor until 1715.\(^26\) Tippetts’ work was to be closely linked to that of Anthony Deane (1638-1721) and following his appointment, Deane was asked to assist him.\(^27\)

The imposition of the Test Act and the consequent departure of James from the Admiralty in June 1673 led to a shake-up in the naval administration and the Admiralty was put into commission with the king retaining the right to make appointments (advised by James). Charles chaired the majority of the meetings and in practice assumed the role that would later become that of First Commissioner. The Commission was a large one, providing places for most of the military leaders, the king’s favourites, and members of the Council. Pepys became its Secretary and it gathered three times a week at 8 a.m., holding a meeting with the Navy Board every Saturday morning.\(^28\) Its composition meant that many members could only attend infrequently and much of the business devolved on Pepys whose place as Clerk of the Acts went jointly to his brother John and his former clerk Tom Hayter.\(^29\) The naval administration of this era would later become the subject of a critical enquiry but Tippetts was the one member of the Navy Board to be commended by Rupert for his good work during the 1673 campaign.\(^30\)

At some time early in 1674 Tippetts and Deane produced a suggested establishment of dimensions and tonnage for ships of 100, 90, and 70 guns which it was intended to use as a basis for the construction of twenty new ships. Disenchantment with the war meant that Parliament was not inclined to grant money at this time and made the supply of £300,000 conditional on a proportion of the king’s income from the customs being appropriated for the express use of the navy. Pepys, who had become the Member of Parliament for Castle Rising in

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\(^26\) See page 142 below.
\(^28\) Cat. 1: 42.
November 1673, made several speeches in the House attempting to prove that the king was already spending this money on the navy, but without any accurate accounts, this was impossible to prove one way or the other.  

In October 1674, the Lord Treasurer asked Deane to report on the state of the navy together with a list of those ships needing repair and he produced a succinct and comprehensive account of the condition of each ship together with the cost of putting them right. The reason that Deane was asked to do this was because Tippetts suffered a period of illness over the winter of 1674/5, probably a spell of his recurring gout, which rendered him incapable of visiting the ships. The indisposition was long and serious enough to extract a letter of sympathy from the Admiralty Secretary. The report was completed by April 1675 at which time Pepys was directed to ‘bring into the House a true state of the present condition of the navy and of the stores and provisions thereof.’ As well as reporting Deane’s figures, Pepys provided Parliament with a breakdown of the relative strengths of the English, French, and Dutch fleets. This showed the extent to which the Dutch had increased the larger elements of their fleet and the alarmingly rapid growth of the French navy, which although inferior in tonnage and gunpower was now numerically superior.

<table>
<thead>
<tr>
<th>Ships</th>
<th>English</th>
<th>French</th>
<th>Dutch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Of 100 guns and upwards.</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>90 and under 100</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>80 and under 90</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>70 and under 80</td>
<td>7</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>60 and under 70</td>
<td>18</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>50 and under 60</td>
<td>22</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>40 and under 50</td>
<td>19</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>30 and under 40</td>
<td>10</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>20 and under 30</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>96</strong></td>
<td><strong>136</strong></td>
</tr>
</tbody>
</table>

Table 1 showing the relative strength of the fleets at the close of hostilities.

No decision was reached on the new ships however, and Charles prorogued Parliament from 22 November 1676 to 15 February 1677 in return for payments of £100,000 a year from Louis. The reason for the payments was to prevent any possibility of England joining the Dutch in their

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31 S. Hornstein (1991): x, claims that the funds allocated to the navy never fell below 18% of the king’s revenue.
32 Thomas, viscount Dunblane, afterwards earl of Danby.
33 Cat. 1:43.
34 Cat. 4:267.
35 Cat. 1:46.
36 Pepys’ list underestimates the number of large frégates légères and ignores those of between 10 and 16 guns.
continuing war with France and when the marriage of Mary to William of Orange threatened this arrangement, the payments ceased. In retaliation, Charles summoned Parliament, and, in an atmosphere of growing hostility towards France it voted £600,000 for thirty new ships instead of the twenty originally proposed.

Pepys put the tonnage and dimensions set out by Tippetts and Deane before the House; these were for First-rates of 1460 tons, Second-rates of 1400 tons and Third-rates of 970 tons. He argued strongly for three-decked Second-rate ships, and, comparing them with First-rates, he described them as being, 'as terrible to the enemy' since they 'are as lofty...playing down upon them'. Since the Second-rates that he was proposing were nearly as large as earlier First-rates the argument he was advancing probably had little effect. In a long and rambling speech, he advanced the desirability of building the ships in the Royal Dockyards and accurately forecast the difficulties that were likely to be met with in obtaining sufficient timber. The views put by Pepys concerning the size of the ships were doubtless those of his Admiralty colleagues and they reflected the experience gained in the Dutch Wars where strength in the line was the priority. More ships of the smaller rates were considered unnecessary as,

...they serve now only for convoys and to fight against the Turks...so that the 36 fourth-rates we have are fully as many or more than necessary.

This was an argument that failed to grasp the implications of a possible war with France and would subsequently have unfortunate consequences.

On 16 April 1677 Pepys was able to tell Tippetts that 'the money bill, blessed be God, passed this night'. After much debate, Parliament, the members of which would have to bear the major part of the cost, had voted for one First-rate of 1400 tons, nine Second-rates of 1100 tons and twenty Third-rates of 900 tons. The money was to be raised by means of a land tax or rate on property, a form of taxation much used during the Interregnum and a staple form of taxation during the succeeding century. A separate Bill was enacted in order to ensure that the money should not be diverted elsewhere, anticipating a system of appropriation of accounts that would become normal practice after the Revolution. Fortunately, the king was dissatisfied with the dimensions agreed in the Act and following a meeting of the Admiralty Board held on the 5 May asked the Navy Board to revise them upwards, disingenuously suggesting that the Act 'restrains not the burthens of the ships upwards but only downwards'. He promised to make good any shortfall in the money allocated by Parliament 'out of his own purse' rather than 'hazard wronging the ships for the want of it'. The additional money never materialised but the

37 Grey, Debates IV, quoted in A. Bryant (1935): 163.
38 Cat. 1:49.
41 Cat. 4: 413.
king's intervention was necessary since the dimensions set by Parliament were smaller than those of ships built between the Dutch wars and ignored developments that had taken place in France and the United Provinces. Nevertheless, the power of naval procurement had begun to devolve from the king to Parliament, a process that would continue under less well-informed and interested monarchs than Charles or James. At the same meeting Charles ordered that,

all the principal sizes and measures requisite to be observed in the building of a ship and fitting her with masts, yards, blocks, etc., be one and the same in every one of the new ships of the same rank.

The principal dimensions and tonnage were as shown below and set the royal authority to the first establishment of dimensions.

<table>
<thead>
<tr>
<th>Rate</th>
<th>Gundeck</th>
<th>Beam</th>
<th>Depth in Hold</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>165</td>
<td>46</td>
<td>19.2</td>
<td>1550</td>
</tr>
<tr>
<td>Second</td>
<td>158</td>
<td>44</td>
<td>18.2</td>
<td>1307</td>
</tr>
<tr>
<td>Third</td>
<td>150</td>
<td>39.8</td>
<td>17</td>
<td>1013</td>
</tr>
</tbody>
</table>

Table 2. Proposed dimensions of the 30 ships.

Most of the ships would be built in the Royal Dockyards but lack of space caused seven of the Third-rates to be built in private yards, four of them by Henry Johnson whose extensive yard at Blackwall was engaged in building East-Indiamen.

This was the largest single shipbuilding programme yet undertaken and the first to be laid down to an established set of dimensions that were to remain in effect until 1706. The Establishment aimed at achieving uniformity within each rate and as with subsequent ones the king's orders show that the Admiralty was looking to ease the supply problem by standardising on the sizes of equipment and stores. An Admiralty meeting held on the 22 March 1677 attended by Navy Board Officers, directed that board to consider 'the number and weight of the guns for each rate and the best principal dimensions and scantlings to be established therein'. By this 'solemn, universal, and unalterable adjustment of the gunning and manning of the entire fleet', the First-rate was to carry 100 guns; the Second-rates were to carry 90, while the Third-rates would carry 70 guns, an arrangement that would survive into the second half of the next century. Sir Richard Haddock, Colonel Legge and Anthony Deane decided the number and type of guns.43

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42 Later Lord Dartmouth.
43 Cat.4: 407.
The king also asked that each builder's draught be 'well viewed and approved before they be put in execution'. The reference to scantlings is of interest because no further attempts were made to standardise these until the Establishment of 1719, which is usually considered as being the first to do so. At a meeting of the Admiralty held on the 22 July it was ordered, ... that for the better ascertaining and justifying the scantlings of the said ships and the charge that shall attend the same, the Officers of the Navy, with the advice [of] his majesty's master shipwrights (besides those of his own number) do cause a table to be drawn and presented to my Lords of the several scantlings fit to be established for a ship of each of the rates ordered to be built by Parliament, and calculated according to his majesty's dimensions, to be confirmed by this board and enjoined for practice as well upon the ships to be built by contract as what shall be built in his majesty's own yards.

According to Pepys, Deane 'drew up the scantlings of the new ships, which are the best ships in the world', but the foregoing would suggest that it was a collective effort by Tippetts, Deane and others.

Despite the wish for standardisation, the ships varied widely in size and tonnage. Like the king, the shipwrights took the dimensions as being minima, and all the ships were larger than proposed. Even taking into account Sir Phineas Pett's view that 'no ship could be truly built according to plans' this upward drift must have been noticed if the draughts were "well viewed" and it must be concluded that the increase in size and the consequential departure from the Establishment was approved. The First-rate, launched in 1682 as the Britannia, measured 1620 tons and was longer (if of slightly less burden) than the Sovereign of the Seas, the largest ship in the fleet. She was designed by Phineas Pett and was a typical example of his work, being relatively narrow and of shallow draught; initially considered somewhat "crank" she was girdled in 1691 and thenceforth seems to have been reasonably successful. The Second-rates ranged from the 1369 ton Albemarle built by Isaac Betts at Harwich, to the Neptune of 1448 tons built by John Shish at Deptford, while the Third-rates ranged from Betts' Restoration at 1051 tons, to the 1114 ton Elizabeth built in the private yard of William Castle at Deptford. All the ships were considerably larger than those of a similar rate that had preceded them and their design was sufficiently advanced to occasion little change over the next forty years. They formed the major part of the fleets that faced the French in William's War and most of them would be rebuilt during the opening years of the eighteenth century. Pepys' description of them as the 'best ships in the world' was probably no exaggeration at this time.

Apart from building the thirty new ships, there was the repair of the remainder of the fleet to be considered. Deane had reported to the Treasurer of the Navy that fifty ships required

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44 Cat. 4: 407.
45 Cat. 4: 481.
46 Minutes: 227.
47 J. King (1949): 255.
repairs and that this would cost £98,765 but by the time Pepys presented his report to Parliament
the estimate had grown to £259,811, including £95,083 for eight months' stores and provisions.
Owing to the possibility of war with France, Parliament voted a supply of £1,448,681 to equip a
fleet of ninety ships for thirteen months⁴⁸ and this was done in the creditable time of three
months, demonstrating that Tippetts, Deane and Haddock had brought the Navy Board to a high
level of efficiency. This proved to be short-lived however, as the excitement of the Popish Plot
removed both Pepys and Deane from office and undid much of their work. In 1679 the
Admiralty Commission headed by Sir Henry Capel took over the affairs of the navy and an
enquiry under the partisan chairmanship of William Harbord⁴⁹ was initiated to look into alleged
miscarriages by the previous administration. Comprising the most extreme elements of Whig
opinion, its intention was to destroy the supporters of the Duke of York; Pepys was arrested on
charges of piracy, popery and treachery and charges of treason were levelled against Deane, the
accusation being that he had sold naval secrets to France.⁵⁰

While much has been said about the corruption and inefficiency of this Admiralty
Commission, its constitution was to set the pattern for future administrations. Davies (1989)
argues that the Commission was no worse than what had gone before and that its poor
performance was no more than a reflection of a lack of funds.⁵¹ It is likely that 'ignorance and
faction amongst its members allowed material obstacles to take charge',⁵² but most of the
accusations against it stem from Pepys himself, and having been displaced by its members and
tried for his life by its government, he was a less than impartial witness. Certainly, the navy
got into decline and in the atmosphere of retrenchment and mistrust there were insufficient
funds to maintain the fleet and carry on a war against Algiers. The personnel at the Navy Office
remained in place and it was said that,

...under the rule of the land admirals even experienced administrators such as Sir John Tippetts
and Sir Richard Haddock had sunk into a state of coma...leaving business to their clerks.⁵³

The records of the Admiralty and the Navy Office show that this was not the case; the
Commission maintained as many ships at sea as the previous administration and more than the
one that succeeded it.⁵⁴ Nevertheless, many of the ships "in ordinary" were in a state of
disrepair and this included the thirty new ships, few of which had been commissioned. How
much this was due to poor maintenance and how much to undue haste in building a fleet of

⁴⁹ A son of Sir Charles Harbord and a persistent critic of the Court and its adherents, especially Pepys.
⁵⁰ CSPD, 21 June 1679; Bodleian Library. Rawlinson Mss. A/173, ff. 69, 85, 87. The charge of piracy
arose out of the wartime activities of a privateer in which he had a share.
⁵³ A. Bryant (1938): 93.
unsound materials is impossible to determine. In a letter to Betts, now Master Shipwright at Portsmouth, Pepys himself wrote that it was ‘strongly urged by some’ that the decay was due to ‘want of care in the choice of their materials, as being built of East Country goods or doted and decayed English timber’. The use of unseasoned timber was a more probable cause and Albion’s view that the Administration ‘had exhausted the English forests to build of green timber a great fleet which seven years later was almost a total loss’ probably contains an element of truth. Pepys stated that,

I have with my own hands gathered toadstools growing in them, the most considerable of them as big as my fists.

Ehrman (1953: 43) suggests that this is dry rot but the growth described is not a manifestation of either wet or dry rot but of a fungus that is symbiotic with new oak.

In the aftermath of the Rye House plot Charles felt strong enough to dissolve the Commission and reassume control of naval affairs with the help of his brother. On 19 May 1684 Pepys was recalled as Admiralty Secretary at a salary of £2000, giving him a status equivalent to that of secretary of state for the navy, and at the beginning of 1685 he presented the king with his damning report entitled “The State of the Royal Navy of England at the Dissolution of the Late Commission of the Admiralty, May 1684”. It is the content of this document that provides most of the ammunition against that body but it was as much a political statement as unbiased fact and in view of its critical nature it is perhaps surprising to find that no member of the Navy Board was replaced. The king’s death in February meant that it would be left to James to act upon its recommendations. Monmouth’s rebellion delayed any remedial action and for detailed proposals Pepys turned to Deane, who was working as a shipbuilder in a private capacity, rather than to the Officers of the Navy Board. As a result of their joint deliberations a “proposition” was submitted to the king on 26 January 1686.

The proposal allowed for repairing all the ships in ordinary; furnishing them with six months stores; providing wages and victuals for 4200 men for three years, and building and equipping two new Fourth-rates each year for three years. The cost was estimated at £1,290,787, which was to be paid in quarterly instalments of £100,000. It was further proposed that a “Special Commission”, patterned on one established in James I’s reign, should supervise the work, and while three of the existing Navy Board would be employed on it, there would be no place for Tippetts, Haddock, or Southerne. They would be retained, but only to

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55 Cat. 1: 64.
56 R. Albion (1926): 229.
57 Cat.1: 64.
58 Pepys Library. Pepys Ms. 1490.
bring the old accounts up to date, a clear implication that they were considered incapable of undertaking the work. As a further humiliation they were required to quit their houses to provide accommodation for the new Commissioners. Pepys had already decided that Deane should lead the Commission, but when he stood out for twice the offered salary of £500, he was directed to compile a list of alternative candidates. Tippetts headed the list and of him he wrote,

One that, were he not already in the Commission of the Navy, his age and infirmities arising from the gout (keeping him generally within doors, or at least incapable of any great action abroad) would render him wholly unable to go through the fatigue of the work designed for Sir Anthony Deane of visiting and rummaging the yards, offices, ships and works.

The rest of his list itemised the disqualifications of the remaining candidates by means of half-truths and gross libels, following which Pepys urged the king to secure Deane’s services at any price,

...Whose talents for this service seem to me (through every part of it) so much superior to all I have yet met with in the navy that I take his service for one of the most essential securities to be aimed at towards the rendering your majesty’s purposes in this undertaking successful.

The work was completed in less time than that allotted and within budget. Inevitably, procedural corners were cut and toes were trodden on, but an enquiry carried out in 1690 found no fault with either the work of the Commission or the manner in which it was executed.

...The Special Commission did its work in six months less time than was expected...That during its term...three Fourth-rates were built, twenty ships re-built, and sixty more repaired, and a sufficiency of materials, money and workmen left at the determination thereof for the dispatch of four ships then under repair...and four others waiting to be repaired.

Also,

...That the said Commissioners...did also build 12 storehouses at Deptford, one at Woolwich, 21 at Chatham and 20 at Portsmouth, besides docks, dwelling houses, mast houses, boat houses, walls etc.

They concluded that,

...The ships built, re-built, and repaired by these Commissioners were fully and well performed, and the buildings and other works by them erected and made during the continuation of the said Commission were done with great exactness, sufficiency, and frugality of expense in the managery and conduct thereof.

The Special Commission was dissolved on the 12 October 1688 and the “old officers” were reinstated in their places (and their houses). They all managed to keep apart from the turmoil that accompanied the Glorious Revolution and retained their posts under the new regime, but Pepys and Deane, as unapologetic supporters of James, retired to private life. Both were to be incarcerated as possible Jacobite supporters during the troubled years that followed, but their imprisonment was without the partisan vindictiveness of the days of the Popish Plot and they were soon released.

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60 Pepys Library. Pepys Ms. 1490.
61 Cat. 1: 73.
62 Cat. 1: 96.
2.4 Sir Anthony Deane, 1638-1721

Born in 1638, he was the eldest son of Anthony Deane, a mariner of Harwich, and was related to the Commonwealth general at sea Richard Deane. He seems initially to have followed his father’s calling but by 1660 he was assistant master shipwright at Woolwich under Christopher Pett, to whom he had probably been apprenticed. William Acworth, the storekeeper at Woolwich, knew him at this time for in 1661 he gave Deane a warrant to arrest all persons caught stealing ironwork and he was made a captain of militia during the Second Dutch War. He first met Pepys in August 1662 and his friendship and patronage were profoundly to affect his subsequent career. In 1663 he was teaching him the rudiments of naval architecture and Pepys remarks that Deane showed him,

...his draught of a ship and the bends and the main lines in the body, very finely done, which do please me mightily and am resolved to study hard and learn of him to understand. I find him a pretty fellow in it, and rational but a little conceited, but that’s no matter to me.

Pepys claimed that he was,

the first that hath come to any certainty beforehand of foretelling the draught of water of a ship before she is launched.

Deane, who was never backward in promoting himself, did not claim to be the first and Pepys was perhaps over sanguine about the ‘degree of certainty’. In a letter written in 1666, he credits Deane with calculating the Royal Katherine’s ‘draught of water before she was launched’ while he was working under her builder, Christopher Pett. The ship was built to lines suggested by the Royal Society and proved dangerously crank, having less than three-feet of freeboard when her guns and stores were aboard. She had to be girdled before she could put to sea.

In 1664 Deane was sent to Harwich as Master Shipwright. This was an emergency dockyard used during the Dutch Wars but in 1666 he launched his first warship, the Third-rate Rupert (66) from there. This ship was commended by the Duke of York and seems to have been reasonably successful, being rebuilt as a 64-gun ship in 1703 but it is likely that the design was plagiarised from one of Castle’s draughts for when Pepys showed him Deane’s drawings he swore that the designer ‘had never built a ship in his life’. This of course was true and a worried Pepys forwarded a copy of Castle’s draught to Deane, suggesting that he use similar proportions. However, in the following year he built the Resolution (70), long considered one of the best-sailing Third-rates in the navy.

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63 D.N.B.: XIV, 251.
64 He is frequently referred to as Captain Deane, which refers to his militia and not naval rank.
65 Quoted in A.W. Johns (1925): 164-93.
66 Diary, 19 May 1666.
After the closure of the Harwich dockyard in 1668 he was appointed Master Shipwright at Portsmouth where in 1669 he built the *Nonsuch* (36) in collaboration with Captain van Hemskirke who claimed that he could produce a ship that would sail half as fast again as existing models. She proved to be a successful ship, but this probably owed more to Deane’s design than van Hemskirke’s “secret method”, which included having the grain of all the timber running in the same direction.69 Another well thought of ship was the *Saudadoes*, which he built in 1670 as a 10-gun Sixth-rate but which was converted into a royal yacht three years later.70 During his time as Master Shipwright he demonstrated inventiveness and an open mind in regard to ship construction and was an early exponent of the use of iron for knees and standards. This led to a rare rebuke from Pepys for making unauthorised experiments, admonishing him that he had,

... of your own head, without precedent, as well as without the advice ... of this Board ... presumed to lay aside the old secure practice of fastening your beams in your new ships with standards and knees, and in the room thereof taken upon you to do it in iron.71

Deane replied that,

Between you and myself, the king must build no more great ships, if nothing can be invented but knees ... we having not one knee in the yard.72

The king endorsed Deane’s view and supported his use of iron but it failed to find much favour among his more conservative colleagues and probably fell out of use on the grounds of cost once the timber supply position had eased.

While Commissioner at Portsmouth and later as assistant to Tippetts, he continued to build ships for the navy in a private capacity and the *Harwich* (70), *Swiftsure* (70) and the *Charles* yacht were all built in this way. The *Harwich*, built in 1674, seems to have been particularly successful and Pepys commented that she ‘carries the bell from the whole fleet, great and small’.73 Deane was not so successful with his large ships and his first *Royal James* (100) and the *Royal Charles* both needed girdling. Unusually, they were girdled with oak rather than fir, which can have provided little additional buoyancy, any small improvement coming from a marginal increase in their form stability (see page 16 above). In March 1674, Pepys wrote to Deane suggesting that printed forms be prepared and issued to ship’s captains:

...For the keeping and preserving a better and more certain and constant account of the condition, virtues, defects and trim of his majesty’s ships than this day seems to be found through the change and supineness of commanders in that particular.74

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70 A painting by Jacob Knyfe shows the *Saudadoes* in 1673, flying the Royal standard. A small ship-rigged vessel, she was described as the “Queen’s ship”. F. Cockett (1995): plate 16.
72 Bodleian Library. Rawlinson Mss. A/174, f. 179.
73 *Minutes*: 243. The term comes from Caroline horse racing parlance, the winner of a race being presented with a silver bell that was attached to its harness.
74 A.W. Johns (1925): 182.
This is the first evidence of “sailing quality reports” and it seems surprising that such a useful tool for comparative analysis should have fallen out of use for it was not until 1743 that they were reintroduced.\(^{75}\)

At the beginning of July 1675 the king visited Portsmouth to inspect the *Royal James* (100) and pleased with what he saw, knighted Deane along with Tippetts and Richard Haddock. Later in the year Deane’s role as Tippetts’ assistant was made easier by his being appointed a Commissioner for Victualling, his place at Portsmouth being filled by Sir John Kempthorne.\(^{76}\) This was not regarded as a full-time job and was partly a reward for his administrative efforts of the previous year and partly to allow him to devote more time to ship design. That this was the intention of the Admiralty is shown by their directive that,

> He should think of improvement in building and assist the Surveyor in the design and construction of warships.\(^{77}\)

Deane’s reputation as a designer rests on his small ships of which the *Greyhound* (16) of 1672 was a good example. She was frequently used as a royal yacht by Charles and it was reported that:

> ...Never was a stiffer ship of that burden. She steers singularly well, keeps a weather helm, and though there was a great sea she never missed staying...We believe she will be as good a sailer as was ever built in England.\(^{78}\)

He was both Mayor and Member of Parliament for Harwich in 1679 having first entered the House as the Member for Pepys’ old seat of Castle Rising in 1678. After being cleared of the charge of treason he resumed his private shipbuilding and must have done well to be able to turn down the proffered salary of £500 to join the Special Commission on the grounds that, ‘he had a family of fifteen children and not without expectation of more’ \(^{79}\)

Deane was deeply involved in the vigorous experimentation of the time. In 1669 he invented a gun, ‘which from its shortness and bigness they do call Punchinello’.\(^{80}\) He was also involved in the attempt was made to make the fleet more efficient by sheathing the ships with lead. This last innovation is supposed to have arisen out of the invention by Sir Philip Howard of a process for milling it in thin sheets, although the Spanish had used lead in the Caribbean since 1514 and it had been applied to some English ships in 1553.\(^{81}\) It was first tried on the

\(^{75}\) See page 152 below.

\(^{76}\) Cat. 2: 41.

\(^{77}\) A.W. Johns (1925): 179.

\(^{78}\) Quoted in B. Lavery (ed. 1981): 16. Lavery wrongly assumes that this was the *Greyhound* used in Shere’s tank tests (see page 14 above). Deane’s ship was built some five years after the experiments took place.

\(^{79}\) Quoted in A. Bryant (1938): 149.

\(^{80}\) *Diary*, 20 April 1669.

Fifth-rate Phoenix (42) built by Deane in 1671, swiftly followed by the Henrietta and the Harwich and an order of 20 December 1673 directed that ships, 'shall for the time to come be sheathed in no other manner without special order from the lords'. However, as early as June 1675, Sir John Narbrough was warning of the effects that the sheathing was having on adjacent ironwork although it was not until 1681 that the king began to take the warnings seriously. The Navy Board banned its use in 1682.

Deane's appointment as the leading technical member of the Special Commission made him de facto Surveyor to the Navy, and The Surveyor's Office letter-books show that he carried out the normal functions of that post as well as those related to the repair of the ships. Nevertheless, the claims of writers such as Charnock and Albion that he was uniquely competent as a designer are probably exaggerated and his reputation is largely founded on the eulogies that Pepys bestowed on his friends. Moreover, he was a successful self-publicist, as Sutherland observed:

I could never learn that Sir Anthony was much of a mathematician, or a very great proficient in the practice, but had the art of talking well, and gave good encouragement to those that was well known to [be] grounded in the practice part of building ships.

It was as an efficient and energetic administrator that he made his greatest contribution to the navy and the powerful fleet that was handed over to William after the Revolution was testament to his success.

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82 Cat. 2: 184.
The table on page 51 above shows the relative unimportance of ships of the Fifth and Sixth-rate at this time. The proportion of small ships suitable for cruisers and convoys in relation to those fit to lie in the line of battle reached its lowest level between the Third Dutch War and the start of the war with France that followed the Glorious Revolution. One reason for this was that many of the merchant ships engaged in the rich Levant or American trade were large and powerfully armed and could be left to fend for themselves. There were only seven ships of the Fifth-rate serving in the British fleet at this time, all but two of which had been built prior to the Restoration. Nevertheless, a constant cause for concern during the seventeenth century was the depredations made on merchantmen by the corsair states of Algiers, Tripoli, and Sallee. Those engaged in the Levant trade were particularly vulnerable to attack by oared vessels such as galleys and feluccas operating in summer calms when conventional warships could be of little use.

To counteract this menace, In 1671 Charles had two galleys built in Genoa and Leghorn respectively, both of which were based at Tangier, but they proved expensive to operate and were useless in rough weather. The combination of oar power with good sailing qualities had long been a feature of many small Mediterranean ships and in 1672 the French built a pair of large frégates légères at Toulon. These came to the attention of the Admiralty and Pepys records that,

In the year 176 Captain Wilshaw came from Toulon and was telling his majesty that they were building several galley-frigates to row with many oars but that 'he could not well describe them'.

The French had been building light frigates since 1658, but the probable subjects of Wilshaw’s attention were the Bienaimée and the Gracieuse, as these were the only light frigates to be built in Toulon, although Pepys has confused the date of Wilshaw’s visit with that when the Charles and the James galley were launched. At 300 tons and mounting 24 guns they were probably rowed from the lower deck as was the practice in the larger frégates légères. Details of the ships were apparently obtained through the agency of Anthony Deane.

We have also learned from the French their methods of galley-frigates at Sir A.D.’s request by the king’s command and the whole dimensions thereof sent him by the King of France’s Commissioner at Toulon, Monsieur Sausigny.

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84 See appendix 5, page 217.
86 In present day Morocco.
87 CSPD, 1671, p. 268; Cat. 4, 275.
88 Thomas Wilshaw, later a Commissioner of the Navy Board and acting Surveyor of the Navy during the suspension of Edmund Dummer.
89 Minutes: 244.
91 Minutes: 354.
Neither of the English ships bore much resemblance to the French, being much bigger at 436 and 492 tons burthen respectively. Davies (1992) suggests that they were derived from Venetian designs as a Captain Blagge, who served in their navy, was employed as a consultant. Given their dissimilarity to the French ships, this seems quite likely. However, Pepys stated that,

A.D.'s son drew the draught of the James galley-frigate, and Mr. Pett the Charles, upon the same principles, and thence came that improvement so useful to us against the Turks.

They had two decks, carried their main battery on the upper deck and had twenty oar-ports and three gun-ports a side on the lower deck, a feature not seen in frégates légères and which may have imitated merchant practice. It is possible that the demand for guns close to the waterline was motivated by the experience of fighting galleys and other low-freeboard vessels at close quarters in calm conditions.

They incorporated the latest technological innovations such as an “upright stem”, iron stoves instead of brick hearths, and the recently introduced lead sheathing. 160 unfortunate Thames watermen were pressed to man the sweeps, which were rowed two men to an oar. A third ship, named the Mary Galley was built in 1687.

<table>
<thead>
<tr>
<th>Name</th>
<th>Builder</th>
<th>Built</th>
<th>Guns</th>
<th>Loa</th>
<th>Beam</th>
<th>Depth</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charles Galley</td>
<td>Phineas Pett</td>
<td>1676</td>
<td>32</td>
<td>131.6</td>
<td>28-6</td>
<td>8.7</td>
<td>492</td>
</tr>
<tr>
<td>James Galley</td>
<td>A. Deane (2)</td>
<td>1676</td>
<td>32</td>
<td>28-1</td>
<td>10.2</td>
<td>436</td>
<td></td>
</tr>
<tr>
<td>Mary Galley</td>
<td>J. Deane</td>
<td>1687</td>
<td>34</td>
<td>116.9</td>
<td>29-6</td>
<td>462</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Dimensions of galley-frigates.

They had a hull that was both shallower and narrower than usual in order to make them easier to row. According to Pepys they were ‘extraordinary sailers, even coming up to the Katherine yacht when sailing large’ but since they were much longer and had a hull form suited to fast sailing off the wind, this is hardly surprising. They also seem to have been reasonably good sea-boats, the only complaint being the weakness of the rigging, which was shown up by bad weather encountered on the Charles Galley's creditable ten-day passage from Plymouth to Tangier. They were principally sailing ships carrying a full ship rig and they could at best

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93. Minutes: 228.
95. Dimensions taken from Cat.1, Pepys Register of Ships and R. Gardiner (ed. 1992): 44. There is also a model in the Pitt Rivers museum at Oxford, bizarrely labelled as a preliminary design for a 40-gun ship of 1702, that is almost certainly the Charles or James galley and probably the former. A Van de Velde painting of the Charles Galley is shown as fig 2 and a draught of the ship as fig.3, pp. 237-8.
97. Cat.3, Admiralty Letters Nos. 3658, 3705, 3848.
make about 2½ knots under oars for a short period compared to about 5 knots for a conventional
galley rowing five men to an oar, again for a period of about an hour.98

Although designed for use in the Mediterranean, most of their service was closer to
home and they were popular ships. Only three were built, probably because they relatively
expensive to man and conferred little advantage over conventional Fourth-rates amongst which
they were classed despite carrying only 32 guns. Nevertheless, the principles that they
embodied were to have an influence on future galley-ships, both naval and mercantile. The
advantage of having cruisers equipped with oars had long been appreciated. The Lion's whelps
have been referred to, but seven ships from the parliamentary shipbuilding programme of 1646
had oar-ports, as had some early Restoration Fourth-rates.99 Their small gun to displacement
ratio contributed to their good performance, a fact that was not appreciated by some sea-
officers. Pepys recorded that, 'Capt. Wybourne says our galley-frigates are and may be of great
use; but they want guns'.100

100 Minutes: 35.
2.6. The French and Dutch navies, 1672-1688.

Writing some considerable time after the event, Pepys made the following comments on the French fleet during the Third Dutch War,

In the years '72 and '73 the French brought a squadron of about 35 ships to the Spithead at Portsmouth... There were some excellent ships with 2 ½ decks that carried from 60 to 74 guns; more especially one called the Superbe ... which Sir A.D. observing, measured the ship and gave his majesty an account thereof, who was pleased to command A.D. to build the Harwich as near as he could to the Superbe's dimension, which was done according, with such general satisfaction as to be the pattern for the 20 Third-rates built by the late act of Parliament.\(^{101}\)

It is unlikely that the Superbe served as a model for the Harwich since work had already started on her but she might have influenced the dimensions of the 20 Third-rates. It seems that the Superbe did not overly impress Deane for in the prevailing atmosphere of royal enthusiasm he merely commented that 'I am silent in my observations and shall not commit it to view'.\(^{102}\) Neither was she as successful as Pepys and the king supposed, for after the 1672 campaign, she had her waist decked over to alleviate structural deficiencies.\(^{103}\)

Having made considerable progress with the organisation of the infrastructure and the manning of the navy, Colbert turned his attention to the ships themselves. His regulation of 4 August 1670 had introduced a new design philosophy that had improved the military effectiveness of the ships, but that of the 13 September 1673 went much further. It attempted to ‘regulate the various measures to be taken in the building of ships of war, so that they may be uniform’.\(^{104}\) By laying down exact proportions, the height between decks, and the distance between gun-ports, what was being inaugurated was an exact “establishment” and theoretically it imposed many more restrictions on the designer than subsequent English ones. By delimiting the rake of the stem and sternpost, the width of the floors, and the depth in the hold, the shape of the hull was defined in detail. The text was drawn up with the assistance of several of the country’s leading shipwrights but was over-prescriptive given the state of development of ship design at that time. Boudriot suggests that the dimensions were only partly implemented and as there is no surviving graphic evidence, the degree they were adhered to remains uncertain. The earliest surviving draught is a rather naïve drawing of a 40-gun frigate drawn by the Le Havre builder Chaillé in 1686.\(^{105}\) The proportions accord with the regulations apart from an “upright stem”, a feature that characterises the work of several French designers over the period under

\(^{101}\) Minutes: 243.
\(^{103}\) F. Fox (1980): 141.
\(^{105}\) See fig.4, page 239.
review and which were the subject of experiments in England at this time.\textsuperscript{106} Crude though the
drawing is, it provides the basic information necessary to define the shape of the hull.

It seems likely that as with many of Colbert’s beaurocratic ideals, the regulations were
largely ignored. This is suggested by the fact that they called for the adoption of the English or
round tuck stem, a feature that did not come into general use until the third decade of the
following century. There was also a wide variation in the size of ships of the various rates and
the manner in which they were armed. The Abbé Choisy observed that, ‘Colbert was always
magnificent in ideas, and always unfortunate in their execution’.\textsuperscript{107} Nevertheless, they were
measures after Pepys’ own heart and he asked that ‘the règlement of dimensions be translated,
and submitted to examination ‘whether we can mend them or no’.\textsuperscript{108} Pepys corresponded with
Seignelay and it is possible that it was Colbert’s regulations, rather than the Superbe that
influenced the dimensions of the 30-ship programme, as well as inspiring the desire for
uniformity. A further regulation of 1674 laid down the number and type of guns and ordnance
stores to be allocated to each rate of ship, measures also reflected in the Establishment of 1677.
In theory, the Règlement of 1674 established the following sizes.

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Rate} & \text{Size (tons)} & \text{Guns} & \text{Heaviest Guns} \\
\hline
1\text{st} & 1400-1500 & 80 & 24 pdrs. \\
2\text{nd} & 1100-1200 & 64 & 18 pdrs. \\
3\text{rd} & 800-900 & 50 & 12 pdrs. \\
4\text{th} & 500-600 & 40 & 12 pdrs. \\
5\text{th} & ca 300 & 30 & 8 pdrs. \\
\hline
\end{array}
\]

Table 4. Source: Mémain, Marine de Guerre, 816. Taken from Symcox (1974).

The only First-rate built at this time was the Victorieux, launched at Rochefort in 1677 and rated
at 1800 tons. She was never used in action and was condemned as structurally unsound after
just eight years in service. The list also shows that between 1680 and 1688 the French built one
First-rate, 11 Second-rates, 14 Third-rates, 6 Fourth-rates and one Fifth-rate; all were very
lightly gunned, carrying far fewer than equivalent English or Dutch ships.\textsuperscript{109}

The French scientific endeavour so admired by Albion dates from the time of the Third
Dutch War and starts with Father Pardies Traité de Statique, a highly theoretical study of
dynamics of no practical value. This was followed by Le Sieur Dassié’s L’Architecture Navale,
which, like Colbert’s Règlement, laid down the proportions for each type of ship. Fincham
(1851) rightly observes that,

\textsuperscript{106} Cat. 4: 468, 7 July 1677. The Keltridge draughts of 1685 show a similar bow form.
\textsuperscript{107} René Mémain, La Marine de Guerre sous Louis XIV. 968. Quoted in P. Bamford (1973): 64.
\textsuperscript{108} Minutes: 353.
such treatises could be of little use beyond that of making the best practice general; they could not go beyond the point which practice had already reached.

The first revolution in French ship design dates from the latter stages of the Third Dutch War when ships began to become much larger for their rate. At the end of the war, a report highlighted the heavy losses that had been caused due to ships that were, ‘mal conçu, mal construit’, and ‘inapte à la guerre’. Seignelay was instrumental in introducing improvements with the aid of admirals Tourville and Duquesne, together with Tourville’s protégé, the Neapolitan Biaggio Pangalo, also known as Maître Blaise. Between 1680 and 1682 Pangalo taught apprentices at the naval academy at Brest during which time he proposed new dimensions and rules of proportion for each rate of ship. At the end of 1682 he succeeded Étienne Hubac as Master Constructor there, becoming France’s senior shipwright, a move that heralded a complete departure from the Dutch inspired designs of the Hubac’s. Seignelay succeeded his father of Minister for the Marine in 1683 and in the following year created the post of Inspecteur des vaisseaux du Roi, whose job it was to visit the ports to show the master shipwrights how to prepare plans before the commencement of construction.

A significant technical development was the introduction of the bomb ketch or galiote à bombe, the first of which was built by Hendrik at Dunkirk in 1681. The idea of taking mortars to sea is ascribed to Renau d’Elîçagary who was a protégé of Colbert’s; five were built during 1681 and they first saw service at the bombardment of Algiers in the following year. While outside of the mainstream of warship development, they brought a new dimension to naval warfare, allowing ships to bombard coastal towns and shore installations from a safe distance, the mortars having a much greater range than conventional cannon. Edmund Dummer, who was to play a leading part in their development in England, observed the trials, but he also expressed his views on the French fleet at Toulon, stating that it was,

A good fleet, but in appearance ill built, or through some weakness in long living have generally put their wales a little straight in ye midships.

He also saw the Royal-Louis, which carried between 104 and 120 guns and was of similar size to the Soleil-Royal.

‘The Grand Lewis is a great shipp and glorious in her first carving noe doubt; but to my judgement not of good proportion nor good workmanship, her figure underwater I know not, nor is that above to be admired’.

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114 P. Villiers (1996): 184. The marquis de Langeron was the first post-holder.
116 Dummer’s journal entitled, A voyage into the Mediterranean, catalogued as King’s Ms.40 in the British Library.
They were built in 1668 and 1689 respectively, i.e. before Seignelay’s naval reforms.

Progress was also being made on the smaller ships. Below the French rating system were the frégates légères and below these barques longues, the equivalent of English sloops. Both were derived from open boats of the type known as the shallop or double chaloupe of the Mediterranean and Atlantic seaboard, a common ancestry that was recognised by Pepys.

... Touching the ram-berges (sic), it is to be considered whether it be not the same which the French have of late revived the use of, and we from them have now more lately borrowed in our galley-frigates.117

According to Chapelle (1967: 23), the rambargo or ram-barge was a relatively small open rowing and sailing boat. As they became larger, they acquired decks and fixed masts with topsails and a spritsail carried under a bowsprit; this was the barque longue proper of which the French navy built twenty between 1672 and 1678. Later to be called corvettes after one of their number, they replaced the earlier frégates d’avis and were were similar to English sloops or brigantines, being used for much the same purposes. Frégates légères were larger, had a quarterdeck and sometimes a forecastle. The règlement of 1670 laid down that,

light frigates of 8 to 16 guns shall have but a single deck, the larger of them may have a small forecastle to protect the galley fire and one aft to protect the officer’s quarters.118

There were two distinct types of light frigate, with either one or two decks, although in the case of the latter only one was armed. Few dimensions for them are given in French ship lists but those that there are suggest relatively long vessels with an overall length to beam ratio of about 4:1, barque longues being of similar proportions.

Exhausted financially by the war, the Dutch built no more large ships after the peace of Nymwegen until the 1680’s when as a result of English and French naval expansion they embarked on a programme of three-decked ships carrying about 90 guns. These were the only three-decked ships ever to be built by the Dutch and they were a development of the large 80-gun class which were lengthened by 7 feet and had the spar deck planked over to accommodate guns. Cardinael, the master builder of the Amsterdam Admiralty built the first five of these to a similar design and they proved uniformly unsuccessful, being crank and poor sailers. Although they had been lengthened, had no forecastle and only a short poop, there was no corresponding increase in breadth and they were some three or four feet narrower than equivalent English ships. In 1992, Admiral Van der Putte wrote that it was seldom possible to use their lower-deck guns and that they were only able to carry their courses when other ships could carry topsails.119

There is little detail of Dutch cruising ships from this period. Most of the small prizes are described as Doggers and carried a fore and aft rig. Some were used briefly by their captors.

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117 Minutes: 363.
but none were kept on after the war. Among the larger ships were Flyboats, which were armed
fluits, and pinnaces, which were large warships in miniature and often termed “frigates”. None
of these had a reputation for performance and they had no influence on the design of either
English or French cruisers. Unger states that Dutch shipbuilders ‘never excelled in the
construction of specialised warships’.

Nevertheless, in the later wars against France, they were to carry out a successful war against trade, although this was mostly pursued by privateers from Middleburg and Flushing, collectively known as the Commissievaart, in ships that were constructed on the Flemish or Dunkirk model.

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2.7 Comparisons and conclusions

The period between the start of the Third Dutch War and the Glorious Revolution was a dynamic one for ship design. In England, a lack of money and political turbulence was counterbalanced by the knowledge and enthusiasm of the royal brothers and by the administrative ability of Pepys. Designers such as Sir Anthony Deane, Phineas Pett, William Castle, and Jonas Shish bought naval architecture to a new level. Their combined talents contributed to the largest single shipbuilding programme carried out in peacetime and the ships were to set the pattern for the future development of the battle-fleet. The principle of standardisation was introduced in order to avoid the many inconveniences every day met within time of action from the disproportions and unsizeableness of the old fleet.\(^\text{122}\)

The thirty new ships were intended to counter the growing battle-fleets of France and the United Provinces but there were parallel developments in cruiser design engendered by the perpetual war against trade. The majority of cruisers were Commonwealth built Fourth-rates of between 40 and 50 guns but many of these were rebuilt over the period, usually to larger dimensions and increased armament.\(^\text{123}\) Pepys' view that English ships were 'out-done by the Turks'\(^\text{124}\) is palpably false. Narborough reported that the *Saphire*, a Fifth-rate built by Deane in 1675, much out-sailed the *Orange Tree*, a renowned Algerian corsair\(^\text{125}\) and gave it as his view that 'no ships whatsoever are better sailers than his majesties frigates when they are completely fitted'.\(^\text{126}\) Arthur Herbert, Narborough's successor in the Mediterranean, also reported that the Algerians found it 'hard to escape any of our frigates that once get a fair sight of them'.\(^\text{127}\) The fact that the Levant trade was not seriously disrupted over the period is testament to their success.\(^\text{128}\)

It would appear that the Dutch had already started to lag behind both the British and the French from the end of the Third Dutch War. Their full-bodied capital ships, especially those of 80-guns, were respected in the line of battle where gun-power was of greater consequence than speed or windward ability, but illustrations of Dutch ships show that they were comparatively old-fashioned, having long beak-heads, a shorter keel and more sheer than those of other nations.\(^\text{129}\) They were also smaller than were either French or English ships and rather more weakly constructed, making more use of softwood and having a greater distance between the

\(^{122}\) Cat. 4, 413-7.
\(^{124}\) Minutes: 240.
\(^{125}\) S. Hornstein (1991): 108
\(^{126}\) PRO. Adm. 106/ 337. Narborough to the Admiralty, 15 November 1678.
\(^{128}\) Ibid.: 252.
\(^{129}\) R. Anderson (1921): 40.
frames. Nevertheless, the Dutch were still a major naval power and would remain so into the next century.

The performance of contemporary French ships is harder to evaluate and rests on views that are often contradictory. After the Glorious Revolution there was a tendency among sea-officers to over-estimate the good qualities of enemy warships and to be over-critical of their own technology. Pepys related that,

Captain Gunman and Captain Saunders tell me that the French ships have always in their memory been as good as they are now, and that by fresh experience we have found them to sail and ride at anchor as well and carry as good a wind as ours (and their guns better), [and] only draw a foot or two of water more than we.

Since these comments were written in the 1690’s, it is likely that they are anachronistic. Drawings were still rare in France at this time and although Seignelay’s Ordonnance of 1683 made it obligatory to construct models of all ships built as a record, no early examples have survived. However, a number of national differences were becoming apparent, especially towards the end of this period.

Seignelay had considered it necessary to totally replace the navy created by his father, but the strategic need for numbers and the expense that would have been incurred made this impracticable. The ships that he espoused had finer lines and were deeper than those that had gone before, features that were recognised by Pepys, who recorded that,

The French build sharper and deeper in the water than we, because they value their ships’ qualities arising therefrom.

French ships of the higher rates were about 10% longer than English ships for a given number of guns as well as being deeper. This was necessary in order to accommodate their larger complement of officers and men and their attendant stores but was also needed because of the greatly reduced midsection coefficients and increased deadrise introduced by Pangalot and his disciples. Fine ends and large size would tend to increase the potential for high speed but it would also make for weaker ships with the tendency to hog that would shorten their lives. Lifetime cost implications were apparently not part of Colbert’s calculations, but France had an abundance of timber and cheap labour, and the initial cost of the ships per ton was probably less than that of England. Structural weakness was not something that would be seen by the casual observer although the tendency to hog was noticed by Dummer and was confirmed by Hoste and Ollivier.
In Britain, the period had been one of vigorous experimentation, supported by the king and backed by the scientific resources of the Royal Society. Some innovations like the use of lead sheathing had been unsuccessful, while others, such as the use of iron knees and cooking ranges would have to wait for decades to achieve general acceptance. Due to the pressure of war this spirit of enquiry would be largely lacking in the succeeding period although some gifted individuals such as the earl of Carmarthen would help to keep it alive.
CHAPTER 3 Edmund Dummer (1692-1699).


William's invasion had been motivated solely by his enmity to France and his accession heralded a period of alliance with the Dutch and the Empire that was to last for sixty years. He was as autocratic as were his uncles but nevertheless, the Bill of Rights signed in December 1689 established a number of important constitutional changes that were to affect all levels of the administration.1 Henceforth, Parliament could no longer be arbitrarily dismissed, and, as no taxes could be raised without its permission, supply and procurement came more firmly under its control. The old system of floating short-term loans failed to meet the unprecedented level of expenditure necessitated by this reversal of alliances with its consequential involvement in continental conflict, and alternative mechanisms had to be found to finance the growth of the armed forces.

The early years of the war were particularly disastrous for the navy as money was in short supply, causing difficulties with victualling, military stores and manning. Expenditure did not exceed the estimates submitted to the Treasury by the Navy Board but there was confusion on the part of William as to the financial responsibilities of Parliament and those of the Crown, who under the Stuarts had been responsible for the "ordinary" expenditure of the navy. During the first year of the war the Treasurer of the Navy received only £581,626 out of an intended £1,300,000 due to a shortfall between the estimated national revenue and the amount actually received.2 Consequently, the government relied on paying its creditors with tickets or tallies payable as money became available and 95% of payments were made in this way, the only difference being as to whether repayment was long or short term, depending on the tax or fund they were set against. Prices escalated because merchants had to allow for the high discounts required if they wished to dispose of the bundles of sticks with which they were paid.

By 1694 there was a complete breakdown of the system of short-term credit, with the Baltic traders refusing to tender for naval stores on foot of the tallies payable on long-term funds. The Treasury Commission responded by shifting its financial obligations from the immediate to the longer term by making tallies and bills negotiable, supported by a parliamentary guarantee of interest.3 The end of the year saw the foundation of the Bank of

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1 This confirmed the Declaration of Rights made the previous February.
3 Ibid.: 488.
England, which, while intended to solve a short-term financial crisis, had by the end of 1696, assumed responsibility for a major part of government debt. Nevertheless, by 1696 the country was technically bankrupt with insufficient assets to fund debt repayment and meet its current expenditure. However, in 1697 the bank was granted a monopoly to run until 1711, which allowed it to open its books to unlimited subscriptions from which loans would be made to the Government; it was paid 8% on its loans and no date was set for repayment. The foundation of an open-ended national debt removed the government’s nightmare of a day of reckoning and meant that henceforth there would be fewer problems in funding wartime expenditure or granting subsidies to allies. Nevertheless, supply to the navy was still dependent on money voted by Parliament and this was often insufficient for its needs.

The complexity of the alliances and treaties that William had forged around the league of Augsburg meant that of necessity he retained control over foreign policy and consequently the direction of the war. For the rest, he was content to leave affairs in the hands of his two Secretaries of State, Shrewsbury and Nottingham. The latter assumed the role of William’s advisor on naval policy, upon which he considered himself expert, having been a member of the Admiralty Commission of 1679 to 1684 and its head in 1683. His involvement in naval affairs was to prove far from beneficial and he was later to be satirised by Swift as Bolgolam, Lord High Admiral of Lilliput. With the departure of James, Arthur Herbert, who had commanded William’s invasion fleet, assumed the role of Lord Admiral until a new Commission was appointed on 8 March 1689. Herbert initially headed this, and the rest of the Board consisted of politicians representing a broad spectrum of parliamentary party interest. The wording of the patent under which they were appointed was the same as that of the Commission of 1679 and included four of the members that had sat on that body. However, conflict with Nottingham over the disposition of the ships at the government’s disposal resulted in Herbert’s resignation at the end of 1689, an abnegation of responsibility that was to contribute to the events leading to his downfall in 1690.

After Herbert’s departure, the Commission contained few men with naval experience and it struggled to find a role, merely passing on decisions that had been taken by William or his Council and occasionally protesting that it had been by-passed altogether. They were rarely
consulted on strategy and when in 1696, for the time since 1689, the Cabinet asked them for suggestions as to how the fleet should be used, they lamely replied that ‘they cannot propose any particular undertaking ... and have no opinion what is practicable’. Great faith was placed in coastal bombardment carried out by the newly developed bomb vessels and attempts were made to reduce the privateering ports of Dunkirk and Saint-Malo by this means, but despite the best efforts of John Benbow, Russell’s erstwhile Captain of the Fleet, these proved to be ineffective.

The Navy Board on the other hand carried on as before, taking on much of the character of a permanent civil service. The Comptroller was Sir Richard Haddock, who had first been appointed in 1682 and was to continue in office until his death in 1715. From a family that had served the navy either as administrators or at sea since the fifteenth century, Haddock was himself an Admiral of the Red, which made him second only to Herbert in seniority. Regarded by his contemporaries as being highly competent, he was a favourite of the “country” party but was quarrelsome and impatient of contradiction. The natural leader of a board that was often in conflict with the Admiralty, Davies’s view that ‘it was very much a subordinate body’, is not much in evidence at this time. On being offered a seat on the Admiralty Commission, Haddock contemptuously declined, stating,

I know well I am capable of doing his Majesty far greater service as I am, than if I were at that Bord.14

The Clerk of the Acts, appointed at the same time as the Admiralty Commission, was Charles Sergison, whose records now provide an invaluable source of information for this and the succeeding period. Sir John Tippetts continued as Surveyor but was suffering increasingly from ill health and much of the work of his office devolved on his assistant, Edmund Dummer.

Nevertheless, the Admiralty was instrumental in bringing about the rapid expansion of the navy that was necessary to counter the war against trade. This move towards the construction of a more balanced fleet was complemented by the construction of facilities intended to counter the threat to the Western approaches from the French Atlantic ports.

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11 The son of a tanner, Benbow rose through the ranks under the patronage of Arthur Herbert. He retired from the navy in 1681 and became a successful merchant but re-entered royal service after the Revolution. Master of Torrington’s flagship at Beachy Head, he was made a Rear Admiral in 1696. Died in 1702 while c-in-c West Indies, following the action with DuCasse celebrated in the naval ballad.
12 The exception to this was the highly paid position of Treasurer to the Navy, which in April 1869 went to Edward Russell as a reward for his part in the Revolution. He succeeded Anthony Cary, Viscount Falkland, who had held the post since 1681.
14 BL. Egerton Ms. 2521, f.75 quoted in J. Ehrman (1953): 495. Sir Cloudesley Shovell was also to turn down a seat on the Admiralty Commission in 1689; S. Harris (2001): 227.
3.2. The War at sea, 1689-1697.

The Nine Years War, otherwise known as the War of the League of Augsburg or of the English Succession, lasted from 1688 to 1697 and although France had declared war on the United Provinces on the 26 November 1688, it was not until the 7 May 1689 that England followed suit. Despite this, a state of hostility had in fact existed ever since William’s arrival on English soil and during March France had landed 5000 troops in Ireland in support of James.

William’s early involvement in naval affairs was not entirely beneficial. He was conscious that the fleet had been the special preserve of his predecessors and took no adequate steps to prevent James from landing in Ireland and of eight expeditions sent to Ireland, only one was intercepted. It was reported that when Danby suggested that a squadron be sent to those shores, he replied that ‘hee durst not trust the fleet’. Surprisingly, he seemed to lack knowledge about the limitations of his ships, which during the early years of the war were often kept at sea for too long and to little purpose at unseasonable times of the year. A dispersal of resources was largely responsible for Herbert’s strategic defeat at the hands of a superior French fleet in the Battle of Bantry Bay and only unwillingness on the part of Chateau-Renault to follow up his victory prevented worse consequences. His elevation to the peerage with the title of baron Herbert of Torbay and earl of Torrington was probably more an expression of William’s relief that the fleet had remained loyal than recognition of any tactical success.

Despite their temporary naval superiority, the French took no significant steps to stop William sending troops to Ireland and the landing of Schomberg’s army and the relief of Londonderry both went unopposed.

There were a number of reasons for the failures of the early years of the war. The disruption of the naval and civil administration was a factor, and, with uncertainty about the permanence of the new regime, men tended to look to their own affairs. Disease was rife in the fleet and both Torrington and Russell believed that bad provisions were to blame.

I cannot but think som neglect has bin in the provision. The beafe proves full of gaules; tho I do not know any harme in itt, the men fancy tis poysen, and in my one [own] shipp, severall men has throne over there provision, nor would they eate it till hunger made a necesety; and noe longer agoe then yesterday, in severall of the buts of beare, great heapes of stuff was found at the bottom of the buts not unlike to mens’ guts, which has alaramed the sea men to a strange degre, tho I do not belive any thing of this is occasioned wilfoley, itt must be negligence, which som times proves as fatall, as I feare it will to the present servis.

16 Quoted in J. Ehrman (1953): 225. Danby had been appointed President of the Council in 1689.
17 HMC Finch, vol. II: 246, Russell to Nottingham, 2 September 1691.
18 Herbert is henceforth named as Torrington.
Corruption and maladministration in the victualling commission were blamed and the Commissioners, who included Haddock, were imprisoned for a while. Haddock was soon released on the grounds that he was 'an able seaman and a good Protestant' but a new Commission was inaugurated under the direction of Thomas Papillon, a wealthy city merchant and a representative of their interest in Parliament. He seems to have brought about an improvement as complaints diminish after his appointment and in 1691 Russell was able to inform Nottingham that,

The victuallers have performed their part with great care for this summer's victualling, no fleet having been ever supplied with wholesomer provisions.

The nadir in the fortunes of the navy was reached on the 30 June 1690 (NS) when Torrington met a superior French fleet off Beachy Head under the command of the Compte de Tourville. Nottingham's dispositions and the orders of an ill-advised queen forced Torrington to fight on unfavourable terms and once again it was only French over-caution that prevented a complete victory. The financial crisis was partly to blame and had led to slow mobilisation; as early as January Russell had written to Nottingham,

For God's sake my lord, cast your eye sometime towards the next summer's fleet. I dread the French being out before us. If they are we shall run the hazard of being undone...I see all matters relating to the navy go on so slowly that I am in amaze.

It was a letter from Dummer giving his account of the numbers of the French fleet that had prompted Nottingham to advise the queen to order Torrington to fight the battle.

...'tis thought on very good grounds that the French are not so strong as my Lord Torrington makes them, for by a letter from Mr. Dummer the Commissioners of the Admiralty have advice that they are not more than sixty fighting ships and he says that he himself with two more went very near them and counted them twelve times.

Although Nottingham was culpable for believing a report from a civilian observer rather than his admiral on the spot, Dummer unwittingly contributed to the defeat. The battle was a classic case of interference in a military situation by politicians, in this case by Nottingham and the Queen's Council and it resulted in the loss of eight ships, all but one of them Dutch.

The ensuing panic led to the mobilisation of the militia and the incarceration of notables of the last regime such as Clarendon, Dartmouth and Pepys. It also led to the court-martial of Torrington on the capital charge of 'keeping back and not engaging and coming into fight and

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21 DNB. T. Papillon (1623-1702). M.P for Dover 1673-81, 1689-95 and London 1695-1700. He fled to Utrecht in 1684 to avoid a fine of £10,000 imposed for defending London's Charter.
23 From Le Fevre's examination of ships logs, the numbers were 34 English plus 22 Dutch ships against 81 French. P. Le Fevre (1996): 53.
24 HMC. Mss of Alan George Finch, 26 Jan 1690 vol. II: 269.
26 Conduct: 74. P. Le Fevre (1996): 72, gives the number as thirteen, a figure that probably includes expended fireships. It is unlikely that Nottingham would understated the losses.
not relieving and assisting a known friend in view’. He justified his action by stating,

Had I fought otherwise, our fleet had been totally lost, and the kingdom had laid open to invasion
... As it was, most men were in fear that the French would invade, but I was always of another
opinion, for I always said that, whilst we had a fleet in being, they would not dare to make the
attempt.

Torrington was cleared of the charges but was not employed again. The political consequences
of the battle were ameliorated by William’s victory at the battle of the Boyne fought on the
following day and it was the last major defeat to be inflicted on an English fleet for nearly
seventy years. Nevertheless, it was to have far reaching consequences for both naval strategy
and the composition of the fleet over that period.

There were many contradictions in Torrington’s character; Pepys, who hated him,
considered that,

Of all men living, Herbert is the only man that I do not know to have any one virtue to compound
for all his vices.

Macaulay (1863, vol. III: 501) describes him as being,

A man sunk in indolence, stupefied by wine, enervated by licentiousness, ruined by prodigality,
and enslaved by sycophants and harlots.

Nevertheless, he had many good qualities to offset his faults and he made a significant
contribution to the development of a navy that was just emerging from the chaos of revolution.
His fighting instructions formed the basis of those that would be better known as Russell’s
Instructions and they attempted to rectify some of the defensive clauses initiated by James. His
specification for the small cruisers needed to counter the French privateering effort were
sagacious and had a major impact on the future development of cruiser design. While in
command of the Mediterranean squadron he furthered the interest of Aylmer, Russell, Rooke
and Clodesley-Shovell; men who were to raise the standard of professional competence in
William’s war and help to make it dominant in the next. Furthermore, his concern for the
welfare of his men after Bantry did him credit and following his acquittal the seamen lined the
sides of the ships and cheered him back up river. His vices were no doubt popular ones but
perhaps the judgement of the ordinary seaman is more indicative of his qualities than those of
the offended bureaucrat, politician or historian.

An increasingly effective Navy Board rapidly made good the damage and material
losses but the French were neither prepared nor in a condition to follow up their success. They
confined themselves to cruising in the Channel and burning Teignmouth, then a small fishing
village and retired to Le Havre in August to re-victual and to land their sick, ‘poisoned by their

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27 Torrington’s defence before the House of Commons, quoted from W.L. Clowes (1897-1903) 2: 341.
29 See page 103 below.
victuals as their opponents had been the year before. Following Torrington’s defeat the command of the fleet was put into commission, with Haddock, Ashby and Killigrew being given the joint command but on 23 December 1690 this unsatisfactory state of affairs was rectified when Russell was finally persuaded to accept the post of Admiral of the Fleet.

In 1692, encouraged by over-optimistic Jacobite reports of disaffection with William’s regime, the French essayed an invasion in support of James. On this occasion it was Tourville who was ordered to fight against heavy odds and Russell’s victories at Barfleur and La Hougue between the 19 and 23 May resulted in the destruction of fifteen French ships. None were less than 60 guns and they included Tourville’s flagship, the 104-gun Soleil-Royale, although given the disparity in numbers between the two fleets (99 allied against 44 French ships) the victory was not as complete as it might have been. The destruction was wrought by fireships and boats from the fleet setting the grounded or anchored French ships ablaze rather than by the action of the battle-fleet but it ended any immediate threat of invasion and contributed to the change in French naval policy that took place after 1694. Following the battle there was uncertainty as to how to exploit the victory. Nottingham’s impracticable suggestions led to a rift with Russell, and having to choose between the two, the king chose to retain Nottingham, the command of the fleet again being put into commission.

Clark (1947: 160) is wrong to assert that France ‘did not again put a battle fleet to sea’ after La Hougue. In material terms they soon made good their losses and between 1692 and 1693 they launched eleven First-rates, six Second-rates and eleven ships of lesser rank. This allowed them to put together the force of about 90 ships under Tourville that overwhelmed the Smyrna fleet off Lagos in 1693, resulting in the loss of 92 English and Dutch merchantmen with an estimated value of about £1 million sterling. Rooke’s skilful defence with 20 ships of the line and the self-sacrifice of two Dutch captains allowed the remaining 300 ships to escape, but following this disaster, dissatisfaction with the measures to protect trade reached a peak and the merchant interests in parliament began to demand a greater degree of control over naval policy.

This was given effect in 1694 by the appointment of Sir James Houblon, a leading member of

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31 W.L. Clowes (1898): 2, 345.
32 P. Villiers (1996): 177 disputes this traditionally held view, maintaining that he had no such orders and chose to fight confident in the superiority of his ships and his own ability as a tactician.
33 There is some diversity of opinion on the relative role played by fireships and ship’s boats, some contending that the destruction was carried out entirely by the latter. Roncière, quoting contemporary sources makes it clear that the English expended at least four fireships, one of which destroyed the Soleil Royal.
34 J. Ehnnan (1953): 410. The joint commanders were Killigrew, Delavall, and Shovell.
the mercantile community who was shortly to become the governor of the Bank of England, to the Board of Admiralty.

Merchant shipping losses grew as French privateers and cruisers intensified their operations and there were complaints of extortion and neglect by the commanders of convoys and the dilatory efforts of the Dutch. The Committee for Trade, established at the start of the war, had given the merchants a limited say in naval affairs, but as losses mounted they demanded more. In January 1694, Sir Thomas Clarges proposed that the supply voted from the land tax be tacked with a clause stipulating the number of convoys and cruisers to be employed for that year. In 1696, in order to forestall more radical proposals by Parliament, William inaugurated a Board of Trade; henceforth the merchant interest would have direct access to the Council through the Secretaries of State, which ensured that they would have some say in naval policy. The result of this parliamentary activity was changes in the composition and disposition of the fleet; ships of the Fourth and Fifth-rate assumed a greater importance than hitherto and specified numbers of these ships were allocated to trade protection by Act of Parliament. This stipulated that at least four Third-rates, sixteen Fourths, thirteen Fifths and ten Sixths, over and above the battle-fleet and ships used for convoys overseas, be employed ‘for the better securing the Trade of this Kingdom’.

While this gave force of law to measures that were already taking place, it led to an increase in the purchase or construction of small cruisers. New classes of ship were developed to counter the smaller enemy privateers and speed assumed a greater importance than at any time since the Civil War. The attack on the Smyrna fleet was the swan song of the French fleet en masse but it continued to pose a threat as a “fleet in being” and prevented the dispersal of the allied battle-fleet that would have assisted the defence of trade. The war against trade had started from the first days of the war and its intensification was not primarily due to the defeat at La Hougue but was a pragmatic decision as to where to prioritise expenditure following a near collapse of the economy brought about by famine in 1693. It also freed scarce manpower to serve the armateurs and while in the early years of the war privateering was mainly a winter activity, from 1694 onwards it was pursued all the year around. The guerre du course was to have a profound effect on ship design and will be considered in more detail below.

William broke the impasse concerning the employment of the fleet. His continental strategy meant that a naval presence in the Mediterranean was highly desirable and in 1694 he

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37 A convoy was a ship assigned to protect merchantmen, collectively known as a fleet. A cruiser was any ship, regardless of size but usually of the Third-rate or less, that was ordered to patrol independently or with a small squadron.
38 J. Ehrman (1953): 571.
ordered Russell to over-winter in Cadiz in order to get an early start to campaigning in the following year. The Spanish had no facilities at Cadiz suitable for the laying-up and maintenance of a fleet and an entire dockyard organisation had to be sent out from England; this the Navy Board did with an efficiency that reflected great credit on its members. Despite misgivings, Russell carried out his task with competence and the campaign of 1694 to 1695 established him as the leading naval figure of the war.\textsuperscript{41} Throughout the conflict, small squadrons of warships operated in the Antilles in attempts to capture the wealth producing islands. The operations were mainly carried out by ships of the Fourth and Fifth-rate, but enjoyed little success, most operations failing through disease.\textsuperscript{42}

The treaty of Ryswick, signed on 21 September 1697 restored the status quo ante bellum except for the concession to France of forts on Hudson's bay and in Newfoundland. The peace would prove to be but a brief truce but the navy and the country as a whole would be much better prepared to meet the demands of the next struggle.\textsuperscript{43}

\textsuperscript{41} J. Ehrman (1953): 272-3, 605.
\textsuperscript{42} W.L. Clowes (1898): 462-495.
\textsuperscript{43} The terms of the peace were generally favourable to France and reflected their domination of the land war. They were much criticised by Tories such as Nottingham and Danby, who saw them as a betrayal of Protestant German states. \textit{Conduct}: 136-7.
3.3. Edmund Dummer (1657-1713), the early years.

The first information on Dummer comes from his own statement that ‘he was bred a shipwright under Sir John Tippetts at Portsmouth’ and that ‘he was singled out by the Navy Board for his extraordinary ingenuity to lay down the bodies of the 30 ships’. As this implies, he was apprenticed to Tippetts but employed rather for his skill as a draughtsman than as a carpenter. The statement formed part of the curriculum vitae that he submitted to the Navy Board when applying for the post of Master Shipwright at Woolwich made vacant by the death of Thomas Shish in 1685. At about the same time he was considered for a position on the Special Commission as a possible alternative to Deane. In his report, Pepys described him as, an ingenious young man but said rarely to have handled a tool in his life nor knows judiciously how to convert a piece of timber; has been much abroad indeed, but gained his present promotion upon the credit only of his designing and making of draughts; Apprentice hee was to Sir John Tippets, but mostly employed as his Clerk in writing and drawing

Dummer was probably of Huguenot ancestry and had relatives living at Swaythling, near Southampton, where he was to build his own house in later years. He cultivated influential connections and had a long association and friendship with Robert Harley who became a Secretary of State, Lord Treasurer and earl of Oxford during the reign of Queen Anne. They probably met when Dummer was giving evidence to the Commission of Public Accounts appointed in December 1690 to look into the alleged malpractice of the Special Commission and on which Harley sat. The foregoing information would suggest a date of birth in the latter part of the 1650’s.

During 1677 he was employed in the Surveyor’s office as an “extra clerk” working on the ‘designs of wett docks, lodgings at Sheerness, the design of ships sterns and taking the lines off the Old James and Tripoly Prize’. In April 1678, he accompanied Tippets to Harwich where he made record drawings of two of the thirty ships that were then nearing completion. Deane inspected the drawings on his return and suggested that Dummer be commissioned to “take off the bodies” of the remaining ships. This had unfortunate repercussions for at the time of the Popish Plot, one of the charges laid against Pepys and Deane was that, ‘they had employed a man to take the Body’s of the King’s ships, supposed to be [with] noe good intention’. Dummer was still petitioning for payment for this work in June 1680.

In signal recognition of his qualities, the Admiralty Commission of 1679 sent him on a

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44 Cat. 1: 76.
45 Pepys Library. Pepysian Mss. 1490.
46 From information kindly supplied by M. Duffey.
47 PRO Adm. 106/ 349, f.359, 27 April 1680.
48 Cat. 1; 76.
20 month voyage into the Mediterranean to study and make drawings of 'the art of shipbuilding' and 'the nature and order of the said ports, appearances of land, or ought else that might conduce to our service'. He went as a "Midshipman Extraordinary", a rank usually reserved for unemployed lieutenants or "reformados" and which entitled him to a servant and the freedom of the quarterdeck. Sailing from Deal in the Woolwich (54/46) on 3 August 1682, he arrived at Leghorn on the 17 November and between November 1682 and July 1683 visited Pisa, Venice, Bologna, Florence, Genoa, Toulon and Marseille. He sailed homeward from Leghorn in the Swallow (54/50), touching at the Balearics, Malaga, Alicante, Gibraltar and Cadiz. From Cadiz he was ordered to Tangier where Lord Dartmouth was supervising the demolition of the port facilities prior to the abandonment of the town, returning to England with the main fleet at the end of March 1684. His journal describes the places he visited along with detailed drawings of fortifications, harbours and headlands. There are also descriptions of Mediterranean ship types, with drawings and "pop-up" models showing the body sections of the ships. The most important observation from a military standpoint was his account of the trials of bomb vessels, although the exercises that he witnessed were not an unmitigated success, as he observed that many of the bombs 'broke in ye air'. He described these "battery's" as being 'about 100 tons and 'like our ketches, saving that they are square sterned'.

Dummer was officially Master Carpenter of the Windsor Castle in July 1684 but as she was laid up at the time, he did not serve at sea in that capacity. Similarly, in the following year he held a warrant as Carpenter of the Hampton Court although Joseph Allin (senior) was actually performing that duty in December and it is probable that he was appointed to both positions in order to provide him with an income while he was otherwise employed. It was about this time that he wrote his essay Improving ye art of building shipps, which he dedicated to Pepys along with his draughts of a man of war. It was receipt of the latter that led Pepys to state that he was the finest draughtsman of his acquaintance, but his efforts seem to have gained him no tangible reward. He was unsuccessful in his application for the post of Master Shipwright at Woolwich, the post going to Joseph Laurence, Master Shipwright at Sheerness. Daniel Furzer, first Assistant Shipwright at Chatham went to Sheerness and Dummer took over Furzer's old job at Chatham as assistant to Robert Lee.

This association led to the building of the first English bomb vessel, the Salamander, in 1687. An exiled Huguenot engineer called Fournier was consulted about the mounting of the mortars but the design of the ship itself was a collaborative effort between Lee and Dummer.

50 PRO Adm. 106/58, 12 July 1684.
51 BL Kings Mss. 40.
52 C. Knights (1932): 414.
53 Pepys Library. Sea Mss. 1074; 2934.
... finding upon discourse with Mr Furnier concerning the new bomb vessels, that we were not like to benefit anything by his advice in that matter, he being an engineer and not a shipwright or scaman.  

Ware shows an illustration of a draught taken from Charnock that RC Anderson tentatively identified as this ship and which looks like Dummer’s work. It had a hull like a Dutch galliot and was rated at 134 tons burden.

On the 20 April 1689, Dummer was appointed as Assistant Surveyor to the Navy, presumably on Tippetts’ recommendation. Tippetts was becoming increasingly immobilised by his recurring gout; consequently he relied on Dummer to carry out work outside London and in early May he was at Portsmouth assisting the Master Shipwright in surveying and repairing the ships and helping to get them ready for sea. At the beginning of July he was in Liverpool, working for the Committee for the affairs of Ireland, chartering 250 ships to transport Schomberg’s army to Ulster but in November he was sent to Plymouth to begin what was to be the greatest achievement of his career. The Navy Board reported to the Admiralty that,

> We did lately in pursuance of your honourable orders direct Mr, Dummer, Assistant to the Surveyor of the Navy, to repair downe to Plymouth and to inquire into the conveniences at that port, for building a dock for repairing and fitting such of their Majesty’s ships as their services shall require to be fitted at that port.

A dock in the West of England had been proposed in James’ reign, for in 1688 the Special Commission was asking the Admiralty ‘what the king wishes to do about the new dock needed at Plymouth’. James was otherwise occupied at the time and nothing was done other than to establish a base for victualling in the Cattewater. By June 1689 however, Plymouth was already being used as an advanced base and a Master Attendant, Master Caulker, Storekeeper, Boatswain and Carpenter were operating out of a hulk. In January 1690, there appears to have been general agreement that the Cattewater should be the site for the new dock ‘as proposed by Mr Dummer’. It is likely that Killigrew’s defence of the Hamoaze in the aftermath of Beachy Head led to a change of mind for by November it was decided that the dock should be located there. Dummer accepted the changed situation and observed that,

> Natural impediments have in this place their proper virtues. And this super eminent treasure of the nation, the navy and its stores, must never be easy to come at. So that wee may never lye at the mercy of an insulting enemy.

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54 PRO Adm. 1/ 3571, 1 January 1694.
56 PRO Adm. 1/ 3558, 22 May 1689.
57 PRO Adm. 1/ 3559, 27 November 1689.
58 PRO Adm. 1/ 3556, 10 March 1688.
60 S. Harris (2001): 125.
61 BL Lansdowne 847.
On the 3 December a contract was signed with Robert Waters, a local stonemason, in the sum of £8909 for a single dry-dock capable of taking ships of up to the Third-rate. However, at this stage Dummer revised his plans and suggested instead a large dry-dock supplemented by a wet dock or basin. This was probably prompted by Commissioner Greenhill’s observation that it would be difficult to secure the lock gates in westerly winds. This scheme was approved by Council and the king himself ordered that the dock should be capable of taking the largest ships in the navy. The increased estimate was £11,008 and by May 1691 the foundations were laid; it was the first dock in England to be built of stone and was stepped, both in order to reduce its volume, and to assist the shoring of ships. The design was probably based on that of Rochefort as were the gates, which were of a two-leafed pattern capable of being opened and closed in minutes by a small number of men rather than the 40 or 50 needed previously. By the end of 1692 the docks were ready and they began taking in ships early the following year.

The decision to make Plymouth a fully equipped dockyard was taken in July 1692 and estimates were obtained for the construction of the necessary buildings and wharves at a cost of £23,406, including ‘Dwelling-houses for the Officers, Storehouses, Workhouses, and inclosing the said Yard with a Wall’. The instructions from the Admiralty make it clear that the design and layout of the buildings was the Navy Board’s responsibility.

We do hereby desire and direct you forthwith to consider of what dimensions it will be requisite the said yard should be, and what houses, storehouses and other buildings will be necessary... and report your opinion therein to this Board.

The three main buildings were the officers’ terrace, the great storehouse and the ropery. Coad (1983) suggests that Hooke may have designed the buildings but it is clear from the progress report produced in December 1694 for Robert Harley that Dummer was the architect.

The structure now built differs nothing (or at least very little) from the plan first proposed but the superstructure is more beautiful than I designed it by the addition of one storey, and the alteration of the roof on that occasion, which was procured by Captain Greenhill. I had, I confess very great regard to the eminence of the situation, and was unwilling to make too proud a building... and I chose safety rather than beauty.

The dockyard had the unique advantage of being built as a single entity and was constructed with efficiency of operation in mind. Ships could lie alongside the great storehouse on one

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62 PRO Adm. 106/ 3070, 3 December 1690.
69 BL. Landsdowne: 847.
of two sides according to the direction of the wind, with everything needed for re-fitting ready to hand.

While the work at Plymouth was progressing, the Navy Board was involved in the largest ship building programme since that of the thirty ships. Following Bantry Bay and Beachy Head it was evident that a major construction programme was necessary if naval superiority was to be regained. Consequently, on the 23 December 1690, £570,000 was voted for the construction of 27 ships of the Third and Fourth-rates in addition to money already voted for three 70-gun ships to the 1677 Establishment. The proposals called for seventeen ships of the Third-rate of about 1100 tons carrying 80 guns on two decks, and ten 900-ton Fourth-rates carrying 60 guns apiece. It is not clear how these specifications were arrived at, as there is no record of them being discussed at either Admiralty or Navy Board level, although either Tippetts or Dummer may have been approached informally. The reason for the increase in the number of guns over the 70 and 50 usual for ships of these rates was probably that it was seen as a logical step in advancing naval superiority, but the setting of the tonnage is more difficult to fathom. There was no problem with the 60-gun ships as these were proportionally larger for their guns than existing 70's but there was a considerable difficulty in getting 80 guns into dimensions that could only be slightly larger than existing Third-rates. The question was referred to Tippetts and Dummer who in turn asked the opinion of the Master Shipwrights of the Dockyards. With one exception, they all produced solutions that provided for 14 guns a side on each of the gun decks, 10 a side distributed between the quarterdeck and forecastle and 2 a side on the roundhouse or poop. To achieve 14 guns on a deck meant that they had to be carried close to the extremities and to make matters worse, in order to get down to the specified tonnage, Tippetts provided for a shorter keel length than that proposed by the Master Shipwrights. Nevertheless, his dimensions of 156 feet on the gun deck, 125 feet on the keel and 41 feet breadth were approved by the Admiralty and gave a burthen of 1117 tons.

Fortunately the shipwrights ignored them; the smallest ship being Wyatt's at Bursledon at 126 feet 11 inches on the keel and 1158 tons and the largest being Frame's of Hull at 129 feet 9 inches and 1223 tons. As completed, they carried thirteen guns a side on the lower deck and fourteen on the upper, with an extra gun a side being carried on the forecastle to make up the numbers. The dimensions were similar to the 1154 ton Royal Oak that had been rebuilt in 1690 by Lee at Chatham while Dummer was there. She is variously described as carrying 74 or 76 guns and Lyon (1993) reasonably suggests that she was the inspiration for the 80-gun ships. The Royal Oak was highly successful, being both fast and weatherly and under Captain Wilde,

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70 J. Ehrman (1953): 430.
twice escaped from superior French squadrons, in each case being the sole surviving convoy. The main difference from the 80-gun ships was that the Royal Oak had between 1 foot and 1 foot 6 inches greater depth in hold, being exceptionally deep for an English Third-rate of the period. The reduction would have been made in an attempt to increase speed but instead it resulted in them being weaker and less weatherly.

The unsuitability of the gun arrangement does not seem to have impressed itself on anyone. To provide 80 guns on ships of this length meant arming them with a large number of small calibre guns on the upperworks where their weight was least desirable. The Admiralty at this time was almost wholly occupied by politicians, the only seaman being Captain Henry Priestman, a Member of Parliament and one who was better known for his extreme Whig views than for his professional ability. Whether Tippetts or Dummer designed them is uncertain but what evidence there is suggests the latter. In his naval essays, Sir Henry Shere describes them as 'great ungovernable two-decked ships' and a note in the margin bears the name Dumer (sic).

A general dissatisfaction with the performance of the navy as a whole led to the committee of enquiry into the state of the ships repaired by the Special Commission referred to in the last chapter. It was prompted by allegations made by Lee and Dummer, supported in some particulars by Tippetts and Haddock, who claimed that certificates of satisfactory completion were extorted from the shipwrights by threats, the Commissioners being, 

Procurers of certificates in favour of our works by Arguments, Terrors and influences, wholly uncustomary and designed only to drive men to certify positively against their experience and belief. Hewer and Deane counter-attacked by disparaging the competence of their accusers. They asserted that Dummer was so incompetent a shipwright that while at Chatham, Lee gave him the assistance of a "common foreman" since he was, 

of so little use in ripping-up, ransacking and repairing of ye greatest ships of England ... as necessitated ye Master Builder to provide an ordinary working shipwright at 2s 2d a day to discharge his office for him.

Deane went on to speak of the claim by the "old officers" of the Navy Board, 

under ye more soleme name of their Surveyor Sir John Tippetts seconded by ye same Dummer now become his assistant,

that up to Michelmas 1691, £120,000 had needed to be spent on carpentry alone; which account said Deane, carried with it the,

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72 Conduct: n. 35.
74 BL Harley Ms. 7476.
Deeper character of Remisness, Ignorance, and unfaithfulness than wee believe can be shewne to have ever met in any one account of the Navy since England had a Navy, or (we hope) ever will againe.

Deane was able to show that only £10,077 had been spent on timber over the period in question and the findings of the enquiry were in the Commissioners favour.⁷⁵

The efficiency of the administration of the navy was impaired at this time by factional divisions, not only between the Admiralty and the Navy Board, but within the Navy Board itself. Dummer and Tippetts managed to stay largely aloof from what was developing into a conflict between the plume and the épée with the sea-officers Haddock and Wilshaw on the one side and Sergison and Lydell, the Comptroller of the Treasurer’s accounts, on the other. On the 18 June, Tippctts who had been seriously ill wrote to Dummer at Plymouth looking forward to his return to London,

Yours of the 16th inst. I received and am glad your work is so well over. I hope now it will not be long ere wee see you here other work being designed for you; so that you are not likely to be idle this summer. I bless God I am in a better condition than of late and do find my strength to increase dayly though slowly.⁷⁶

This was to be his last recorded letter and within a month he was dead. Although outshone by his former colleague Sir Anthony Deane, he was well respected; suggesting his appointment was one of Pepys’ more inspired moments and one that would have a long-term effect on British shipbuilding.

⁷⁵ See page 57 above.
⁷⁶ PRO Adm. 91/1, f.118, 18 June 1692.
3.4. Surveyor to the Navy, 1692-1699.

Dummer fell into the role of Surveyor more or less by default and no one questioned his right to succeed Tippetts. He took over his duties from 18 July 1692, receiving his patent on 9 August, and on the 2 August Daniel Furzer, Master Shipwright at Sheerness was appointed as his assistant.77 Dummer’s appointment could be seen as a precursor of the domination of the modern professional over the artisan but it is more likely that he was simply in the right place at the right time and had sufficient “interest” in high places. He had proved himself an energetic administrator and with the war gathering momentum it was probably too much trouble to find anybody else.

The first task he set himself was to put an end to the disparity in dimensions between those specified and those produced by the shipwrights, as evidenced by the 80-gun ships. On 4 March 1693 he wrote to Winter about not building a Fourth-rate in accordance with the drawings,

I am sorry the bad weather has hindred you so as to prevent your purposes of launching and am sorry to have it told me that you affirm your 4th Rate ship is built by the draught I sent you, which I think needs no confuting, but however, I shall take care to demonstrate that there is not one individual foot of her body answerable to my draft, but that you never wrought by it at all, and twill not be much paines for you to confuse yourself by viewing only Mr. Shish’s & Mr. Snellgrove’s ships which had the same draft to work by.78

Dummer then set about unifying the system of measurement of ships so that there would be no excuse for the future and in March he wrote to all the Master Shipwrights,

Having obtained through some labour several catalogues or lists of the ships of their majesty’s navy, concerning the dimensions and burdens of them as they have been at different times, and by different hands taken and calculated, and being compared one with another it seems altogether doubtful from the vast disagreement in one and the same ship what the real and true dimension and burden of any of them is, and resolving to take some pains to obtain a more certain account thereof, have printed and inclosed a small schetz to serve for one common rule of direction and information whereby the parts necessary to be truly measure and known are all one view made intelligable to every man alike and the numbers to be set downe are to respect the letters in the manner following.79

On the 22 April 1696 Dummer’s “standard method of measurement” was adopted as official practice80 and henceforth there would be far less diversity in the dimensions of ships of a similar rate.

By 1693 there were complaints as to the durability of the ships and on the 18 December a report was produced, almost certainly by Dummer, for as Merriman (ed. 1949) points out, the author writes of the new ships as being, ‘properly such as fall under my regard’. In it he

77 PRO Adm. 2/ 9, ff. 484, 485, 18 July, 2 August 1692.
78 PRO Adm. 91/ 1, f. 278, 4 March 1693.
79 PRO Adm. 91/ 1, f. 279, 7 March 1693.
80 PRO Adm. 106/ 2507, Standing Orders.
recognised that,

At the fleet's arrival from sea at St. Helens the latter end of summer, complaints were, in a manner, universal of the weak condition of the whole navy, and that even the new ships of 80 guns were very much affected by the slender service of the summer cruise, and were found to strain, reach and become very loose in their strong works by means of the same.

Of the 80-gun ships, he goes on to say that,

They have too much in them of the frigate for the great breadth and weight of matter they have of themselves and carry in their ordnance ... These ships being almost 42 feet broad...and too much of the snugness of the frigate, are not of a due posture in the body above to that below the seat or surface of the water, but are therefore stubborn to the sails. 81

This implies that they are over-stiff, and the writer goes on to suggest a possible solution,

...It is observed that some of the Dutch men of war of like dimensions are built after the manner of three decks herein examined, without forecastle or guns in the waist, and are extremely well approved of by those I have happened to speak with who have seen them.

The matter was given added urgency by the loss of Admiral Wheeler and all hands in the Sussex off Gibraltar in February 1694. The earl of Danby, 82 himself a designer of small ships, suggested that the loss was caused because,

They have very deep waists, so that if the sea makes a breach upon them, the very weight of water which such deep waists will entertain, joined with the great weights they have on their decks, is certainly sufficient, upon a ship's scending in the sea, to make her founder, if not stave in her decks. 83

Danby's solution was also to add a third deck and like Dummer he also wished to increase the guns carried to 90. This suggestion the Navy Board as a whole fortunately rejected and they sent a recommendation to the Admiralty in April 1694 that the ships be made into three-deckers in order to make them,

More substantial and strong towards preventing their racking fore and aft, as also thwartships, the straining of a ship being much more aloof than it is in the centre of the body.

Provided that,

...no more guns, in number or in weight, be added to them, and that they have no forecastles or poops built upon them, as also that their waists be not raised above 18 inches, and that they be housed in so much as shall be necessary to prevent the making of them tender. 84

As a result, the last four ships of the programme were completed as three-decked ships, 85 the proposals being drawn up by William Stigent, the Master Shipwright at Portsmouth. Stigent

81 NMM. SER/ Misc. II, f.393. Quoted in R. Merriman (ed. 1949) 80-4. The implication is that they had too great a metacentric height, which would result in a quick roll thereby putting an undue strain on their masts and rigging.

82 Peregrine Osborne, third son and heir to Thomas Osborne, earl of Danby (1674), marquis of Carmarthen (1689) and duke of Leeds (1694). He succeeded to all the titles in due course but at this time was the earl of Danby and a Rear Admiral of the Blue. He became marquis of Carmarthen in 1694.

83 R. Merriman (ed. 1949): 84.

84 PRO Adm. 1/ 3571, f.529, 6 April 1694.

85 There is a model of the Boyne, one of the early 80-gun two decked ships in the NMM, while a drawing in Charnock purporting to be a Second-rate of 1665 is also one of them. There are no draughts of the early three-deckers in existence and that described in Lyon (1993) as the Boyne, Humber and Russell of the 1690's is almost certainly of the 1706 Establishment ships.
was to fall foul of Dummer over not building in accordance with instructions and Dummer was probably instrumental in obtaining his dismissal in June 1695.86

Danby seems to have been acting as the Admiralty's expert on ship design at this time, exacerbating the growing rift between the Boards, and in January 1694 he was giving them his somewhat spurious reasons for girdling the Royal William (100). Dummer replied with a long and reasoned argument as to why girdling was ineffective and the entire Board, including Clodgesley Shovell and Thomas Wilshaw in their capacity as Commissioners, signed the letter.87 This is the first recorded instance of a logical rebuttal of girdling on scientific grounds, although it was ignored by the Admiralty who ordered it done anyway and the practice would continue well into the second half of the eighteenth century.

In 1695 Dummer was made a Governor of the newly founded Greenwich Hospital, a position that he held until his death and perhaps granted in recognition of the part that he played in the maintenance of the fleet at Cadiz the previous winter. In the same year he was elected to Parliament as the member for Arundel, a safe government seat which he occupied despite the 1674 Place Bill.88 It was not unusual for Officers and Commissioners to hold seats at this time and Sergison, Wilshaw, Bokenham and St. Lo were all members of the 1700 parliament. A second Bill introduced in 1705 largely did away with this practice, resulting in a diminution in the status of Navy Board members although some Comptrollers continued to sit in Parliament until a new Place Bill was introduced in 1742.89

Between 4 July and 28 November 1699, Dummer, Wilshaw and two Masters of Trinity House carried out a survey of ports that might be suitable for shipbuilding between Dover and Lands End. Dummer produced drawings of 18 harbours and inlets and recommended that Dartmouth, Fowey, Falmouth and Helford were suitable for development should the need arise.90 That year also saw the completion of the work at Portsmouth. A contract had been signed with John Fitch in October 1691 for three docks, to be completed in eighteen months for the sum of £15,890. Delays due mainly to shortage of money led to a bitter dispute with Fitch who was also undertaking work on the buildings at Plymouth. Charges and counter-charges were made and in December 1698 Fitch deposed that Dummer had asked for presents upon payments of money made to him in respect of the works. A letter from the Admiralty ordering his immediate suspension suggests that this was not the only time that Dummer had contravened regulations,

87 PRO Adm. 2/ 174, 31 January 1694.
89 J. Collinge (1976): 6. Wager and Swanson both sat in the Commons while at the Navy Board.
90 BL Sloane ms. 3233. There is a further copy of Dummer's charts with soundings marked on, in BL Add. Ms. 31324.
Whereas we have received information upon Oath, of several irregular proceedings of Edmund Dumcr Esq. (sic)-Surveyor of his Majesty's navy, for which we think it necessary that he should be suspended from his employment, you are therefore hereby required and directed to cause him the said Mr. Dummer to be forthwith suspended from his employment.91

On the 29 December the Navy Board recommended that Wilshaw act as Dummer's temporary replacement during the period of his suspension.92

In February, Dummer asked the Admiralty that he be tried at law. In his petition he stated that 'he was accused upon the bare accusation of Fitch', who he had detected of 'great deceits'.93 He proceeded to bring an action for libel against Fitch at which hearing members of the Navy Board, including Sir Cloudesley Shovell, gave evidence in his favour.94 Nevertheless, the Admiralty was not prepared to wait for the outcome of the case, which Dummer eventually won, receiving £500 in damages. Wilshaw's temporary appointment lasted until July when the Admiralty 'resolved to represent to the king' that Dummer,

...was a person not fit to be employed longer in the place of Surveyor of the Navy and that they did not think it fit for the good of his Majesty's service to take off his suspension or the employing of him again.95

92 NMM Adm. A/1860, 29 December 1698.
93 CSPD. 14 February 1699.
95 Quoted in C. Knight (1932): 415.
Dummer lost his seat at Arundel in 1698 but was re-elected in 1701 and remained its member until 1705. That he was neither turned out nor strenuously opposed in what was an “Admiralty seat” was probably due to his relationship with Robert Harley who became Speaker in 1701 and a Secretary of State in 1704. In 1701 Dummer advanced his scheme for a transatlantic mail service to the West Indies, proposing a monthly service, run with four ships calling at Barbados, Antigua, Montserrat, Nevis and Jamaica. The proposal received the blessing of Nottingham and was inaugurated on the 21 October 1702 being run for the next two years on an expenses basis with Dummer receiving a salary equivalent to that of a Commissioner of the Navy. Nevertheless, in August 1702 he was soliciting Harley for the additional post of Comptroller of Victuallers’ Accounts.

If you think it proper to mention to my Lord Treasurer any remembrance of me, in case Sir Cloudisley Shovell quits, as is said, it will be seasonable.

Shovell did not quit, but undeterred, Dummer pressed for the job of Comptroller of the Storekeeper’s Accounts on the death of Thomas Wilshaw on 23 September 1702. The next day he again wrote to Harley,

Providence has opened the way wherein, if I might succeed, I should be able to do much better service than ever I have done for the navy ... If this occasion be not made use of to shew me some countenance for my abuses I shall never think anything else in the navy worth asking for. A word from you would have great weight.

Perhaps Harley recognised that such a job would present his friend with too great a temptation for peculation for in the event the job went to Henry Greenhill. Dummer was still high in official favour however, for during 1704 the navy ordered two 128 ton, 10 gun sloops from the yard fronted by his brother Richard at Blackwall. They were probably similar to the first five ships built for the transatlantic run and were described as being brigantines of between 110 and 130 tons, carrying from eight to twelve guns. The Admiralty also ordered two Sixth-rates in 1709; both were apparently built to the same draught as 12-gun ships of about 160 tons. Neither did conspicuous service, the Hind being wrecked three days after she was launched and the Swann being sold out of the navy in 1713.

By 1704 the Post Office was finding Dummer’s West Indian service too expensive and henceforth he ran it as a private enterprise. For this service he built five galley-ships of around 200 tons. These were two-decked, carried 21 guns and were capable of being rowed with 24 oars although the Mears brothers, with whom he was in partnership, suggested that they

96 From information kindly provided by M. Duffy.
97 Dummer’s proposition is contained in PRO. CO. 137/9, f.66. See appendix 8, page 224.
99 J. Kemble (1940): 34-54.
100 Details of his business arrangements are to be found in J. Kemble (1940) and H. Joyce (1893).
were of poor design, crank and overlarge for the service intended. Unfortunately, packets were being captured at the rate of one a year, mainly by privateers operating in the Western Approaches and the consequent disruption to services led to bankruptcy, his company being wound up when his last ship reached Tenby on 19 December. Ever the optimist, Dummer wrote to the Joint Postmaster Generals in July 1712 asking for their support for a service that would combine the transatlantic mail-line with an inter-island service, but to no avail.

It is difficult to assess Dummer's personal and professional qualities. The surviving correspondence shows that he was liked by Tippetts whom he describes as 'my patron and friend from my youth upward', and admired by Sergison, but that he was a rather solitary figure. He was the only Surveyor apart from William Bately, from the time of Tippetts to Symonds, who had not been the Master Shipwright of one of the Royal Dockyards. In his manuscript essay, Sutherland wrote that,

Mr. Dummer building abundance of ships and vessels in his time, but as others had done before him, when they had made their performance reach farther than their fellows, must endeavour to mend all by doing worse.

Concerning his attempts to obtain uniformity in the ships of each Rate, he says,

...He was the first that brought the proportions to exact standards, sending each builder with his warrant for building a new ship, the length on the lower deck, breadth extreme and depth in hold... but the said gentleman... was displaced before he obtained much credit on the building of ships, leaving it imperfect.

Like Deane, he was a man of great energy and wide vision. Despite their mutual hostility there were similarities in their characters and circumstances. Both ran private shipyards, the one with his son, the other with his brother, and both had a high opinion of their own abilities and were prepared to cut corners in order to achieve their objectives. Dummer was less successful in the execution of his projects than Deane, being less able either as a shipwright or a businessman and he seems to have been unwilling or unable to attend to the fine detail of his many projects, which led to their failure just short of success. His integrity is also hard to assess. He lived in a corrupt age, yet despite his influential connections he was dismissed for a relatively minor offence that was ultimately unproven and it seems likely that the Fitch affair was used as an excuse to rid the Administration of one whose radical ideas had become something of a liability.

Dummer's reputation rests on his ability as an engineer rather than as a ship designer and an admiring Sergison wrote that,

102 J. Kemble (1940): 34-54.
103 PRO CO 137/9, f. 66. 14 July 1712. See appendix 8, page 224.
104 PRO Adm. 106/349, f. 359. 27 April 1680.
105 Action and reaction equal in a fluid, or a specimen towards removing some untoward approved maxims in building and equipping ships quoted in Hattendorf (1993): 267-8.
Not one in his post ever did anything like him, the new docks at Portsmouth and Plymouth will be a lasting monument to his great skill.  

Unfortunately even his performance in that field is open to question. By 1699 the Navy Board were reporting that,

Whereas surveys have lately been taken ... of his Majesty's Docks at Portsmouth and Plymouth and it appearing to us, by the reports of the Officers employed on this service, that the said Docks and buildings are defective in several particulars.

At Portsmouth, a survey carried out by Cloudesley Shovell and Thomas Wilshaw found that 318 feet of dock walling needed to be taken down and re-built, the fault being ascribed to insufficient foundations. Neither were the dock gates satisfactory for the same survey ordered that, 'the gates to be taken down and re-built, not having sufficient ironwork'. The two-leafed design probably exceeded the technical capabilities of the age and later gates reverted to a three-leafed pattern with a removable centre section. The division of responsibility for failure between designer and contractor is always hard to determine, but at Plymouth at least, Dummer had no complaint about the standard of Waters' work for in September 1694 he had reported,

I shall not say much of the dock, tho' I am pleased with the firmness of ye work, goodness of the materials, and exact and careful composure of each part according to my design.

Dummer died in April 1713 after a short illness, and, following the personal intervention of Oxford, a pension of £150 each was granted to his wife Sarah and his daughter Jane who had been left destitute by the failure of his business affairs. In order to justify granting a pension to the dependants of one that had been dismissed for peculation, Oxford sought a testimonial from the joint Postmaster Generals, Evelyn and Frankland. This shows that at least some of Dummer's small ships were fast and successful.

We beg leave to certify to your lordship that Mr. Dummer whilst he was Surveyor of the Navy did very considerable service to this office by his forming the models of such vessels as by his advice and projection were built for Packet boats between England and Holland whereby the correspondence we carried on twice every week with great expedition and regularity during the greater part of the continuance of the former war with France and in the whole time of the late war, not more than two packet boats having been taken after Mr. Dummer's model was followed, whereas before that the vessels which were made use of had been almost continually taken to the interruption of much correspondence and a great charge and burthen to the revenue of this office.

Mr. Dummer has likewise been very serviceable by building sloops for this office carrying on the correspondence weekly with Portugal, which were allowed by the best judges to have been built with all the necessary accommodation for passengers, and at the same time with the properest forme for sailing with the greatest dispatch and the fewest hands.

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106 PRO. T.1. 96.No.53. Sergison to ? (Secretary of State or Lord Treasurer). 22 October 1705.
107 NMM Adm. A/ 1864, 27 April 1699.
108 Remarks: 123.
109 PRO Adm. 106/ 446, 16 September 1694.
110 Robert Harley was created earl of Oxford in 1712.
111 PRO. T.1.167.No.6a. 4 November 1713.
Around 1690 the Post Office had built four ships to his designs for the Harwich service that were described as being ‘of no force, but remarkable for their speed’\textsuperscript{112}. The last paragraph in the testimonial probably refers to the \textit{Spanish Expedition} and the \textit{Spanish Alliance}, which operated successfully throughout the war between Falmouth, La Coruña and Lisbon despite a reward of 10,000 \textit{livres} being offered for their capture.\textsuperscript{113} Only two of the Post Office packet boats were captured in nineteen years of war and it is unfortunate that his personal affairs were not as successful. He lost nine ships in five years and his reputation as an “unlucky carrier” led to a boycott of his ships by the West India traders and this contributed to his downfall.\textsuperscript{114}

\textsuperscript{112} H. Joyce (1893): 75.
\textsuperscript{113} G. Clark (1923): 81.
\textsuperscript{114} H. Joyce (1893): 72-7.
3.6. The French navy and the Guerre du Course, 1689-1699

The Evidence as to the performance of French line-of-battle ships during William’s War is little clearer than for the preceding period and the only drawings available are those redrawn by Admiral Edmund Paris in 1882.115 Paris claims to have copied the draught of the Soleil Royal from a manuscript of 1692, the year she was built and it still shows a typically Dutch hull form with a long floor and a very full body. His drawing of a Second-rate is very similar and the shape and proportions generally accord with the règlement of 1773. The Ordonnances of 1689 were much less prescriptive however, only establishing the principal dimensions, armament and tonnage, but it was also ordained that the Conseils de Construction should obtain,

a model in wood and a plain draught in a perpendicular streak with an longitudinal streak...They are required to study the forms of ships built and examine how to avoid the faults that are in ships already built

The dimensions as set out below are given in French feet (English dimensions in parenthesis) and are the length from stem to stern between rebates, the breadth to the outside of plank and the depth in hold, taken from the keel to the upper part of the main beam.

| 1st-rate                  | 163 x 44 x 24. | (173 x 49.9 x 25.6) | 1600-2200 tons.116 |
| 2nd-rate, 1st Order,      | 150 x 41.5 x 19. | (159.4 x 44 x 20.2) | 1300-1500 tons.    |
| 2nd-rate, 2nd Order,      | 146 x 40 x 18.25. | (155 x 42.6 x 19.4) |                  |
| 3rd-rate, 1st Order,      | 140 x 38 x 17.5. | (148.9 x 40.4 x 18.6) | 800-1200 tons.    |
| 3rd-rate, 2nd Order,      | 136 x 37 x 16.5. | (144.6 x 39.4 x 17.6) |                  |
| 4th-rate,                 | 120 x 32.5 x 14.5. | (127.6 x 34.6 x 15.5) | 500-700 tons.     |
| 5th-rate,                 | 110 x 27.5 x 14. | (116.10 x 29.2 x 14.10) | 300-400 tons.     |

Table 5. 1689 Ordinance of dimensions.

The instructions given to the Conseils de Construction shows that the view of many historians that France had already achieved predominance in ship design is at best premature. Symcox (1974) states that ‘ship for ship the French navy seems to have been superior to its rivals’ and it is a view shared by Clowes (1897-93: 2, 242), Fincham (1851: 73) and Ehrman (1953: 33). They were certainly larger for a given number of guns with the advantages that this conferred but contemporary accounts of their performance are mixed. Pepys, who was never slow to disparage his successors, stated in his minutes that; ‘the French gained the wind of us in the last fight, and kept it when they had it’117 but this merely shows the disadvantage that allied fleets were under as compared to homogeneous ones. After Beachy Head, Torrington blamed

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116 French tonnage was based on the theoretical displacement with six months’ stores on board. For purposes of calculating displacement, the French used the cubic ton of 42 cubic feet or 1.43 cubic metres.
117 Minutes: 352. Tanner (1949) states that this refers to La Hougue but it was more applicable to Beachy Head.
the heavy casualties suffered by the Dutch on their allowing themselves to be weathered and doubled, a view that was endorsed by Burchett.

The Dutch had suffered very much, and chiefly by their being (for want of a necessary precaution) weathered and surrounded by those French ships which they left ahead of them when they began to engage.\textsuperscript{118}

It should also be said that the Allies were faced by an opponent who was their superior both as a tactician and a manager of fleets. Tourville constantly exercised his fleet in its evolutions, and, given the limitations of the age, these could be carried out with speed and precision.\textsuperscript{119}

Hoste, however, bemoaned the lack of scientific knowledge among French shipbuilders at this time and in his Théorie de la Construction des Vaisseaux published in 1697, states that, 'some have begun to make plans', but that,

Their ships are no better than those which were built without the knowledge of either reading or writing. They do not sail better, often they do not carry sail so well; they rather hog, they are less durable...it is not yet known what the sea requires.\textsuperscript{120}

He went on to say that,

Chance has so much to do with construction, that the ships which are built with the greater care are commonly the worst; and those which are built carelessly, are sometimes the best. Thus the largest ships are commonly the most defective; and more good ships are seen among the merchantmen than in the royal navy.

His observations indicate that despite the Ordonnances, little progress had been made in drafting and that France was still backward in this regard.

The death of Seignelay in 1690 led to changes that were to have far-reaching consequences for the French navy. His successor was Louis de Phélippeaux, comte de Pontchartrain, who has sometimes been blamed for its decline.\textsuperscript{121} More significant was the loss of influence enjoyed by the Colbert clan that accelerated changes caused by financial crisis and hostility from the Le Tellier's army faction.\textsuperscript{122} There was also dissatisfaction with the performance of the fleet in the year after Beachy Head when Tourville's Campagne au Large was considered not to have justified its enormous cost and there was uncertainty as to just what role the navy should play after the failed invasion attempt of 1692. 1694 saw the change in official policy from guerre d'escadre to the guerre de course. By 1694 Pontchartrain had become an advocate of the guerre d'escadre but his arguments failed to impress Louis and between 1693 and 1695 expenditure on the navy fell by 40% from 32 million to 19 million livres. This was much more than was warranted by a short-term financial crisis and as a consequence France could only put 55 ships of all rates to sea during 1694.\textsuperscript{123} This made fleet

\textsuperscript{118} J. Burchett (1720): 426.
\textsuperscript{120} Quoted in J. Fincham (1851): xv.
\textsuperscript{121} E.g. E. Jenkins (1973): 78-9, 106.
\textsuperscript{122} G. Symcox (1974): 28. In 1690, Louvois had advocated the disbandment of the navy.
\textsuperscript{123} Ibid.: 146.
operations impossible and co-operation with private investors was seen as the best way of making use of the ships. This shifted the emphasis away from the ships of the line to those of the Fourth and Fifth-rate and frégates légères. In 1689 the navy list contained about 50 of the former, 18 of which were described as mediocre sailers and 10 as “très fines” while of the 26 frégates légères, only 8 were “fines” or “très fines voilières”. Only two native-built Fourth and Fifth-rates had been added to the fleet prior to 1695 but six more of each class were built between 1695 and 1699 and these were augmented by a large number of private men of war and English prizes. There was fierce competition for the latter and in contrast to British historians the French have been complimentary about them. For example Roncière, speaking of the Hope says,

C'est le Marquis de Nesmond qui se réserve ce morceau de choix, un “gros milord” de soixante-dix canons, Le Hope.125

The two most important centres of the privateering effort were Dunkirk and Saint-Malo and for the merchants, fitting out armaments for the course was often a matter of necessity when their more usual employment became unprofitable. Saint-Malo was the hardest hit as the triangular trade between Arcadia and the Mediterranean suffered a catastrophic loss; from 113 voyages in 1688, it fell to 47 in 1689 and to just 6 in 1690. The neighbouring Channel Islands suffered a similar disruption to their coasting trade with Brittany and consequently became the most numerous and successful of the British privateers. Many of the early privateers were slow, clumsily converted merchantmen, but persistence, luck and daring soon brought many of the corsairs better ships.

As the financial difficulties experienced by the navy worsened, more royal ships became available to the armateurs, but they were only given to the most successful. The same was true of captured English cruisers that were often bought into the navy and hired back to the private sector. During the Nine Years War the input of private capital helped to stave off financial collapse, provided employment for the sea-faring population and ensured that the dockyard establishment was maintained, albeit at a reduced level. Ultimately however, what started out as a policy of expediency became a major part of the French war effort, albeit one over which the government had little control. As the armateurs took a major part in financing the naval war, they expected to cruise where, when, and against whomsoever they pleased. Nevertheless, France was evidently satisfied with the outcome, for apart from a bid for naval

125 C. de la Roncière (6 vols. 1899-1926): 6, 205. The Hope was a 70-gun ship built by Castle in 1678 as part of the 30-ship programme and on which Acworth served part of his apprenticeship. Renamed L'Espérance d'Angleterre, she was destroyed at Vigo in 1702.
127 Ibid.: 339-387.
supremacy during the War of American Independence, it was to remain the chosen way of waging war at sea for the whole of the next century.

The effects of the guerre de course on ship design have largely been ignored but it had a major impact on the composition of the English fleet and the design of ships of the Fourth-rate and below. It also led to the development of ships below the Sixth-rate to deal with the smaller capres that swarmed from the minor ports of Calais, Boulogne, and Dieppe. A fundamentally different type of warfare to that practised by the regular fleets, its chief weapon was overwhelming manpower; boarding was the favoured tactic with gunnery being relatively unimportant. The corsairs prided themselves in the use of the musket, half-pike and cutlass and upper-deck armament was an encumbrance that was removed from hired royal ships as well as captured prizes in order to make room for musketeers and to compensate for the weight of large crews. To some extent this was making a virtue of necessity; powder and shot was expensive and many “armaments” were under-funded.\textsuperscript{128}

The backers of armaments came from diverse backgrounds; the course was a gamble that in an age when speculation was rife attracted money from all levels of society. Ministers and Courtiers were investors in the large armaments but the majority of them were small and funded by local shopkeepers, craftsmen and professional men. During the early years of the war about forty sloops or barques longues were constructed, mostly at Dunkirk and Brest. They were around 65 feet in length and carried from six to eight guns on a displacement of about 50 tons. Cheap to “arm”, they were popular with corsairs and were among the first royal ships to be hired out to armateurs. The great majority of ships armed for the course were of between 10 and 100 tons mounting from 2 to 10 guns; they were of shallow draught, capable of being rowed as well as sailed and could go where rated vessels could not. Their captains were usually familiar with the coasts of the countries with which they had formerly traded and many combined their depredations with pursuits such as “owling” contraband wool in exchange for duty-free brandy and wine.\textsuperscript{129} Channel Islanders carried on a similar trade in tobacco and wool aided by an unofficial non-aggression pact between the Island fishermen and those of Brittany with whom they shared a common culture and language.\textsuperscript{130}

While corsairs made do with what ships they could get during the early part of the war, the more successful began to have ships built to their own specification. Speed was the major criterion and qualities that were needed in a naval ship such as strength, endurance and the ability to ship a great amount of stores were considered largely irrelevant. Lightly and cheaply

\textsuperscript{129} Sheep farmers living within 10 miles of the coast had to account to the customs for the fleeces removed at shearing time.
\textsuperscript{130} J. Bromley (1987): 282.
built, they had short working lives, while fine ends, often combined with a steep deadrise, meant that they had a limited carrying capacity and frequently did not carry their guns well. From 1695, the armateurs contracted to build ships in the arsenal ports, the king providing the materials, building site and workers, while the armateur paid for their labour and the stores needed to “arm” the ships. They then had use of the ships for three years before they were handed over to the navy, although the king reserved the right to purchase them earlier should the need arise. Between 1694 and 1698, the majority of warships were constructed in the king’s shipyards using privately financed labour.

Although the specification of ships eventually intended for the navy was laid down by the Conseils de Construction, it was inevitable that the privateering captains would have some input into their design. In 1695 the Chevalier de Norey demanded and got a change in the design of the stern of Le Trident (60/54) built with private capital at Toulon. Nevertheless, if alterations did not accord with the views of the Conseil, the armateurs had to make them good before hand-over. Some of the changes were made to fool potential victims; DuGuay-Trouin asked for “English style” figureheads and was granted them on condition that he restored them to French ones when his ships were returned to the navy. The influence of the course on ship design was probably a mixed blessing, for, while it encouraged the experimentation in hull forms that produced some successful ships, it also encouraged building practices that led to early distortion and a short working life. An example of this was the extensive use of iron spikes rather than treenails to fix the planking to the frames.

There are conflicting opinions as to the success of the guerre de course. The estimate of English losses runs as high as 4200 ships during the war, and, while most of the ships were small, the figures caused embarrassment to the government and considerable hardship to the merchants. Estimates of the financial loss are hard to evaluate; Symcox calculates a figure of about 100 million livres in total, derived from the prize tenths and this would equate to around £5½ million. This figure includes ransoms, which became increasingly common as the war progressed, particularly in the North Sea from where it became more difficult to get prizes home. These could range from the £6 demanded from a “Scottish ferry” to around £100 for a typical coaster. The more valuable prizes were rarely ransomed although when DuGuay-Trouin took three East Indiamen valued at around £1 million, the London office sent agents to France to bid for the cargoes.

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131 G. Symcox (1974): 76-7. This meant providing the materials to “fit out” the ship and not the purchase of the guns, which were provided by the crown.
133 Ibid.: 200.
134 G. Clark (1923): 126.
Mahan (1887), normally critical of the war against commerce as an end in itself, concedes the effectiveness of the *course* during the Nine Years War. He maintained that for it to be successful however, it needed the support of divisions of ships of the line, a view that was shared by Vauban and expounded in his *Mémoire sur la Course* written in 1695.

... plans must be made for next year's armament, in the knowledge that henceforth it is both constant and certain that if there is a way to bring the English and the Dutch to reason, it is by means of the *course*, liberated once and for all from the chicanes and unjust taxes that frighten away the *armateurs*, and supported by strong squadrons of warships.\(^\text{136}\)

Vauban was not a wholly disinterested observer as he was a heavy investor, but with more support from squadrons of royal ships and subsidies to encourage groups of *corsairs* to act in concert it would have been even more effective. Nonetheless, the cries of anguish from Parliament in 1689, 1693 and 1696 and the large sums spent on counter measures were a testament to its success. Moreover, the fact that, when the next war started in 1702, the French continued where they had left off, indicates that they considered it successful. During the Nine Years War it had developed from a policy of necessity to a positive strategy intended to bring the maritime powers to their knees.

3.7 The English response to the war against trade. Cruiser design, 1689-1699.

In the years preceding the Nine Years War, both Lord Dartmouth and Pepys had pessimistically warned of the danger to trade posed by French cruisers.

In case of war with France we shall be driven wholly to give over trade; they will be able so to infest us with privateers near home, and command all in the Straits, forasmuch as by having no ports of our own there, it will be impossible for us to bear the charge of maintaining fleets there able to answer the force of France.137

Much of England's goods were carried by water and the coastal tonnage was greater than that of foreign going shipping. Two thirds of this was engaged in the East Coast trade, carried out in small fly boats, ketches, smacks, hoyas and brigantines, few of which exceeded 80 tons.138

Despite the warnings, at the beginning of the war the navy had only one ship of the Fifth-rate and six of the Sixth-rate in commission and of 22 cruisers, all but one were hired ships. Typical of these was the Jerusalem of 130 tons, 14 guns and the Endeavour of 170 tons, 14 guns, both of which were hired on the 22 May 1689.139 As a measure of desperation, Dummer was instructed to charter 16 hoyas and "smaks" to act as convoys in the Irish Sea.140

In March 1689, The Admiralty wrote to Nottingham, asking him "to move his Majesty to consider whether more small ships should not be speedily built".141 The need for a major expansion of the cruiser fleet was obvious and in June, Torrington laid down a detailed specification for a new class of Fifth-rate.

Rt. Hon. The Earl of Torrington having been pleased to declare his opinion, that these new Frigots should for rendering them more useful for their Majesty's service, be built in such a manner that they should have but one size of ordnance flush, and that to be upon the upper deck, whereby they will be able to carry them out in all weathers...The dimensions proper for them,

Lower deck between rabbits of the stem and stem post, 105 feet.

Breadth 27 feet.

Depth in Hold, 10 feet.

To have a good large quarterdeck and a forecastle. To carry 10 guns each side on the upper deck and such a number on the quarterdeck as shall be convenient...

To have a slight lower deck for the lodging of men, to be 5 feet heighth between that and the upper deck from planke to planke and to have ten oar ports or scuttles on each side.

The said lower deck to be laid even to the water's edge in the midships when all provisions, ordnance and stores shall be on board.

The lower sills of the ports of the upper deck to be seven feet at least from the upper side of the lower deck or water's edge.142

The specification was revolutionary and is of interest because it anticipates the "classic frigate" of the 1740's, the first to be launched being aptly named the Experiment built by Robert Lee at Chatham. Her dimensions accorded with Torrington's specification and she had a burthen of

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137 Minutes: 37.
139 PRO Adm. I/ 3558, f.361.
140 PRO Adm. I/ 3558, f.549, 14 June 1689.
141 HMC Finch, vol. II: 196. Commissioners of the Admiralty to Nottingham, 23 March 1689.
370 tons. It was intended that she should carry 22 six-pounders on the upper deck and 6 four-pounders on the quarterdeck but at some stage before construction began it was decided to add 4 nine-pounders to the lower deck in imitation of the Caroline galley-frigates and this would have raised its height. No drawings survive of these ships although it is likely that they were similar to the slightly larger models built to the 1706 Establishment and about thirty-five roughly similar ships were built before construction was discontinued in 1706. They suffered a high rate of attrition, six being captured in William's war and a further six in the War of the Spanish Succession, while a further eight succumbed to natural causes. It is probable that they were too weak for convoys and over-gunned for small cruisers but although not particularly popular in the English navy, several had long careers under French ownership. They voted the Ludlow 'a precious acquisition' while the Sorlings was described as 'an excellent ship' and as Les Sorlingues, served as the flagship of Cornil Saus's efficient Dunkirk squadron.

It was not until 1693 that attention was given to providing some 20-gun Sixth-rates.

Their Majesty's service requiring some small, light, good sailing frigotts of the 6th Rate to carry about 20 guns each, should be built as soon as conveniently may be; we do hereby desire and direct you forthwith to consider of what dimensions it will be fitting the said frigotts should be.

These were of a similar size to the smaller Fifth-rates, being about 94 feet on the gundeck with a beam of 24 feet 6 inches and of about 250 tons burthen. They were armed with 20 six-pounders on the upper deck and 4 four-pounders on the quarterdeck and like the Fifth-rates they could be rowed from the accommodation deck. Nineteen were built during the war, only three being taken compared to seven that succumbed to shipwreck.

In order to deal with the small caprês, a group of nine “brigantines” were built from 1691 onwards. Designed for rowing as well as sailing, they were between 58 and 64 feet long and carried six 3-pounders and a pair of swivels. They were two-masted with the mainmast stepped aft of the foremast, both of which carried square courses and topsails that were lowered for reefing. They carried triangular staysails on the main and forestay but no fore and aft mainsail. However, in heavy weather, they apparently carried a small fore and aft sail called a “wingsail” aft of the mainmast, possibly triangular in shape or set on a short gaff. In the journal of the brigantine Dispatch, it stated that,

'a great gust of wind...carried away our foremast and main topmast...We set our main staysail, wingsail, and run into Harwich.'

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143 See fig.6, page 241.
144 J. Owen (1938): 29. Saus was the lieutenant and successor to Jean Bart.
145 NMM Adm. A/1797, 7 July 1693.
146 By the middle of the eighteenth century, a wingsail was described as 'a loose-footed fore and aft sail with a short gaff'. C. Ware (1994): 85.
They could ship up to 30 oars, rowing two men to the oar and were sometimes used as tugs, the Dispatch being used in that capacity at Cadiz, while the Shark led the boat attack on the French ships stranded at La Hougue. By 1695, a new class of vessel known as “Advice boats” was superseding them but since they were of similar dimensions and proportions it is not clear how they differed, although some of them carried a fore and aft lug mainsail, which would technically make them bilanders.\(^{148}\) This is evidenced by a request from a commander to change to a square mainsail, a move that was opposed by the Navy Board who praised the sailing qualities of those with a “lugg”.\(^{149}\) It is likely that the emphasis was more on sailing than rowing qualities, as the earlier brigantines seem to have been rather slow. The Navy Board wished to use a boat built for the marquis of Carmarthen as a model that Cloudeley Shovell described as being ‘an incomparable sailer’ but it was decided that they would be too expensive and competing designs were ordered from Stigent and Waffe at the dockyards.\(^{150}\)

Experimentation was greatly encouraged by William’s Admiralty. With what seamen there were on the Board away at sea, they entertained any idea that might offer a solution to the privateering problem and in 1694 the Navy Board had to spend much time and effort explaining in detail why Venetian galleasses would be unsuitable for Northern waters.\(^{151}\) This idea may have originated with Sir Henry Shere, among whose less practical and humane ideas was the use of prison galleys in imitation of French practice.\(^{152}\) A more successful example was Carmarthen’s design for a ship to carry William back and forth across the Channel. Known as the Royal Transport, she was built by Robert Lee at Chatham and launched in 1695 as a Sixth-rate of 18 guns. She was unusual in having a two masted bezan rig\(^{153}\) and was described as the fastest ship in the navy. She excited Peter the Great’s interest and during his visit in 1695 he particularly asked to see the English ship ‘that could sail into the wind’.\(^{154}\) She was given to Peter to sweeten trade negotiations and served in the Russian navy until wrecked in 1715. A model in the Central Naval Museum in Leningrad, thought to be contemporary, shows a primitive schooner rig with steeply raking masts and the first evidence of a jib boom at the end of the bowsprit; it is likely that she would indeed be very weatherly.

\(^{148}\) For a description of this ship type, see the glossary of terms, appendix 2, page 211-14.
\(^{149}\) PRO Adm. 1/ 3579, f.419. 9 October 1696.
\(^{151}\) PRO Adm. 1/ 3571, f.225, 12 February 1694.
\(^{152}\) Naval Essays of Sir Henry Shere. Bodleian Library, Pepys Ms. D/ 147.
\(^{153}\) An almost triangular sail of Dutch origin supported by a short gaff and perhaps the inspiration of the wingsail described above. First seen in illustrations dating from the beginning of the seventeenth century. See A. Sleeswyk (1987): 377-83.
Despite Carmarthen's success at designing small ships, the Navy Board was clearly unhappy with this amateur interference in ship design and by 1697 was complaining about the king's permission for Carmarthen to complete an 80-gun ship to his own requirements.

'Wee humbly conceive that such experiments ought not to be made upon any of his Majesty's shipps of warr, and much less upon a shipp of that consequence and therefore have not yet given any orders therein, for to introduce into the navy such a practice as this building his Majesty's ships according to ye fancy and humour of particular persons will break through those wholesome rules and methods which have been found to be absolutely necessary'.

This was not the end of Carmarthen's endeavours however, for in 1700 he designed the Sixth-rate Peregrine galley (20), built by Robert Lee's brother William at Sheerness. This successful and influential ship will be examined in greater detail in the next chapter.

133 PRO Adm. 7/334, f.65, 18 May 1697.
3.8. Comparisons and conclusions.

In 1689 the navies of all the maritime powers were unsuited to for the kind of conflict that would develop as the war progressed. As a result of their experience in three Anglo-Dutch wars their fleets contained a large proportion of heavy units suitable only for summer-time operations close to their bases, and whose raison d'être was to seek out and destroy the enemy battle-fleet. Both sides came close to achieving this in the early years of the war but neither was able to exploit their success and attempts to co-operate with land forces generally failed; bad provisions, disease, and a lack of experience of those in command limiting the success of operations. Although William's concept as to how the navy could be used to support his broader strategic ideas were rarely fulfilled in practice, his intervention in the Mediterranean in 1694 was the beginning of a wider use of sea-power, albeit limited by the absence of a permanent base. The same might be said of operations in the West Indies, where disease was the main limiting factor for both navies. Initially, neither side had suitably balanced fleets for the broader strategies that were developing but it would be England that would react the more positively.

The early part of the war was characterised by the large number of ships of the First and Second-rate built by France compared with England, who built no First and just four Second-rates. The main English effort as far as the battle-fleet was concerned was the 27-ship programme and of these, the most important were the seventeen 80-gun ships referred to above. They were probably intended as powerful dual-purpose ships or "battle-cruisers" and they were recognised by contemporary opinion as a failure. With the advantage of hindsight it can be seen that it would have been better to stay with the two-decked design, making the hulls deeper and reducing the number of guns, but instead they joined the ranks of the capital ships and they were too small for that role. There was less criticism of the 60-gun ships, but since they were intended for the dual role of cruiser and line-of-battle ship, they were always going to be a compromise. Their overall length to beam ratio of 3.8:1 seems excessively narrow but was similar to French Third-rates being built at that time and while the proportions were cruiser-like, the only surviving drawing shows the full midship section typical of a line-of-battle ship.

As far as the lesser rates were concerned, it was England that out-built France and although France built thirty-two cruisers up to 1694, only fourteen more were added during the rest of the war. Apart from the ten 60-gun ships, England built thirty-six ships of 48 or 50

158 See page 90 above.
guns, twenty-nine of 32 and nineteen of 24.\textsuperscript{160} The 50-gun ships have been seen by some as 'an unhappy compromise' on the basis that they were too small for the line-of-battle.\textsuperscript{161} This misconstrues their primary purpose as they were essentially cruisers and in that role saw much more action than line-of-battle ships. They were relatively narrow, with a length to beam ratio of around 3.85:1 and had a sharper entry and run than the larger ships. Early ships were 123 foot on the gun-deck but in 1690 a larger 130-foot type was introduced and no more of the smaller ships was built after 1692.\textsuperscript{162} They were also much more lightly armed in proportion to their tonnage, carrying about 1 ton of armament to 11.5 tons of burthen compared with about 1 ton to 9 tons burthen for the 70-gun ships and 1 ton to every 8 for the over-pressed 80's.

There is a general acceptance that English ships were over-gunned for their displacement but there were a number of reasons for this. There was reluctance among French officers to share their accommodation with guns at this time as their cabin arrangement was more permanently fixed than on English ships. They carried a greater proportion of soldiers, and both they and the seamen preferred the use of small arms to small carriage guns, considering boarding an enemy to be the most glorious outcome of a fight; to this end they carried more men for a given rate of ship. The compliment of a French ship could be a third greater than equivalent English ones, which meant a greater weight of men and the stores needed to sustain them.\textsuperscript{163} The British took the opposite view; with more ships at sea and never enough men, they provided the ships with the minimum crew needed to sail and fight them. Gunnery and not boarding was inevitably the preferred tactic and ships carried a large number of anti-personnel weapons. Dummer carried out experiments with a device that he designed to clear decks of boarders and small mortars were occasionally carried on ships as small as Sixth-rates.\textsuperscript{164}

There is some evidence of a convergence in design at this time. Anderson (1921: 177) suggests that the midship sections were getting more alike and surviving drawings show that the smaller French line-of-battle ships were acquiring an easier turn to the bilge than were those of their Dutch inspired forebears. This particularly applies to those built in Toulon where Pangalot was active from 1686 and where his understudy, François Coulomb was building ships from

\textsuperscript{161} For example B. Lavery (1983): 60.
\textsuperscript{162} R. Winfield (1997): 27.
\textsuperscript{163} Estimates of the weight of stores vary, but even in Elizabethan times 1 ton of stores per month was allowed to every 4 men. M. Oppenheim (1896): 144.
\textsuperscript{164} The use of "cohorns" has not been investigated. Invented by Menno van Cohorn (1641-1703), these small mortars were widely used from the end of the seventeenth to the middle of the eighteenth centuries and the Cumberland carried eight of them in 1748. They fired either an explosive shell or an inflammable carcass. "Cowhorns" were used by John Paul Jones in the fighting tops of the Bonhomme Richard in 1779. These were small brass mortars used in the same way as swivel guns. J. Boudriot (1987): 57.
Some French ships were already larger for the number of guns carried, although French Second-rates of 64-70 guns were generally of similar size to English 70's built to the 1677 establishment. The new 60-gun ships were also of similar dimensions to their equivalents, suggesting that they may have been built to counter French ships of that rate. What little graphic evidence that exists suggests that French ships already had finer waterlines and that they were deeper to compensate for the lack of buoyancy that would result. Performance, therefore, would probably have been similar, but what is noticeable is the disparity in the length of life of the ships. In France this consistently averaged about 23 years for the larger ships, while English First-rates lasted on average 40 years and Second-rates 30. Since French ships spent a greater part of their time in port, this disparity can either be ascribed to weaker construction or lack of maintenance.

England built seven Third-rates during the war, all to the 1677 establishment and those from the Dockyards lasted slightly more than 30 years, while contract built ships lasted about half that time. The main reason for this disparity seems to have been the use of unseasoned timber and perhaps the more widespread use of inferior timber such as beech than has been recognised. It was stated that Winter paid £1-10-0 a ton for “rotten beeches”, which he then used in the Cornwall, and Admiral Russell later remarked that 'the builder deserved to be hanged for that ship'. There was a general acceptance that contract-built ships were inferior to those built in the dockyards, but with space needed for repair and maintenance and a large wartime building programme, it was necessary to use private contractors. Amongst the listed 'inconveniences of contract-built ships' were guns placed too near to the whipstaff, bitts and masts and 'want of length in the channels'.

Torrington’s specification for the 32-gun Fifth-rates was intelligent but the decision to place guns on their lower deck unfortunate. This arrangement gave them a gun to tonnage ratio of about 10.2:1, proportionally heavier than that of the 48-gun ships and while all were slightly different, they do not seem to have been particularly successful as a class. They were somewhat smaller than French 8-pounder frigates which were also two decked, but carried their main armament on the lower deck with a partial complement of guns on the upper. However, these had less than 4-foot freeboard to their lower-deck gun-ports, which meant that they could have been of little use if a sea was running. The only indication of their appearance is a pen and ink drawing by one of the Van de Veldes of the Play Prize (30), formerly Les Jeux (36), built by

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167 Probably the former as many English-built ships had long careers in French service.
169 PRO Adm. 106/3071.
170 BL Add. Ms. 9328, 21 May 1694.
Hendrik of Dunkirk in 1688 and captured in the following year.\footnote{See fig. 7, page 242.} The new English Sixth-rates were of a similar size and carried a similar armament to large frégates légères. With 20 six-pounders on the gun-deck and 4 four-pounders on the quarterdeck, they were proportionately even more heavily gunned than the 32's, with a gun to tonnage ratio of about 9.5:1.

Nevertheless, despite the heavy losses to privateers suffered by the merchants and the widespread criticism of the navy in Parliament and elsewhere, English counter-measures were not wholly ineffective for in 1694 a Saint-Malo captain reported that,

He had sailed all round the coasts of England and Ireland, and everywhere he went he found English coastguard ships, which were fast and carried many guns.\footnote{"Rapport du Sieur Du Demainne Le Breton". BN, Clairamboult, 877, f.280. Quoted in G. Symcox (1974): 170.}
CHAPTER 4  Daniel Furzer (1699-1715) and William Lee (1706-1714).

4.1 Daniel Furzer, the early years.

Furzer’s father, also named Daniel, had supervised the construction of ships for the navy on the fringes of the forest of Dean, overseeing the Princess (44) for the Commonwealth at Lydney in 1658 and the Saint David (54/46) at Con Pill in 1667. In 1671 he was made Assistant Master Shipwright at Woolwich and in the following year succeeded Anthony Deane as Master Shipwright at Portsmouth, where he stayed until his death on 3 October 1680. There he built two 70 and two 90-gun ships and the last of these, the Ossory (90/82) was no doubt the ship that Pepys refers to as being completed by his son, as she was not launched until 1682. By 1686 Daniel Furzer (2) was sufficiently well known to be considered as an alternative to Deane on the Special Commission; Pepys provides a probably biased vignette,

Mr. Furzer, Master Shipwright at Sheerness is young and never built a ship, but finished one begun by his father at Portsmouth. [He was] always bred under his father; working little, and thereby little acquainted with the methods of good husbandry.

From this it can be assumed that he was trained by his father and was only a few years out of his apprenticeship. Nevertheless, he had been the Master Shipwright at Sheerness since December 1685 having previously been First Assistant at Chatham. Sheerness was administered by Chatham dockyard where he would have become acquainted with Edmund Dummer who took over his post as assistant there. When Pepys says ‘working little’, he is probably referring to manual labour rather than the work of the office, although in 1690 Tippetts found it necessary to administer a rebuke for dilatoriness in returning his audit of materials needed and in stock.

I find no estimate, survey, or demands in my office as hath been always the practice in every yard til of late and being a work of absolute necessity and without which I cannot discharge my duty as Surveyor of their Majesty’s navy.4

It was not until 1690 that he built the first ship of his own. This was the Sheerness, a 32-gun frigate built to Torrington’s specification of 1689; she had a long life, not being broken up until 1730, although like the rest of the survivors of the class she was reduced to a 20-gun Sixth-rate in 1717. The only other ship he built while at Sheerness was the Medway, launched in 1693 as a 60-gun ship to the 1691 Establishment. Despite this lack of experience, Furzer was made assistant to Dummer on 2 August 1692 in a brief letter of appointment addressed to Daniel Furzer, Gentleman.

1 Now known as Cone Pill, near Woolaston.
2 C. Knight (1932): 412.
3 Cat. 1: 77.
4 PRO Adm. 91/1. Tippetts to Furzer, 25 November 1690.
Whereas we have thought fitting to appoint you to be assistant unto the Surveyor of their Majesty's navy in the roome of Edmund Dummer who is removed to Surveyor thereof.5

His successor at the Sheerness dockyard was William Bagwell, on whose compliant head Pepys had planted horns so many years before.

The reasons for Furzer’s appointment are unclear, but it is likely that Dummer would have been consulted before the choice was made and since Tippetts, Dummer, and Furzer all came from the Southampton area, it is likely that they were acquainted. Dummer probably intended that Furzer should take over the administrative duties of the office for it was this experience in administration that was later to influence his selection as Surveyor of the Navy.

On the 26 April 1698, Furzer left his post as Assistant Surveyor to become Master Shipwright at Chatham, the move to an inferior position probably being due to financial retrenchment following the end of the war rather than to any premonition of Dummer’s fall. He built three ships while at Chatham, all of them 70-gun ships to the dimensions established in 1677. They ranged in size from the Stirling Castle of 1087 tons, wrecked in the great gale of 1703, to the Expedition of 1116 tons that was broken up just ten years later, an unusually short life span for a dockyard-built ship. The third ship was the Eagle, lost with all hands off the Scilly Isles in 1707, along with Sir Cloudesley Shovell and the Association.

Anxious not to repeat the mistakes of the past, the Admiralty cast their net wide to find a successor to Dummer. The Navy Board was ordered to attend a meeting at the Admiralty to discuss a permanent replacement and on the 14 July they reported back with a shortlist of those ‘eminent in their profession’. Apart from Furzer, the list named Fisher Harding, Elias Waffe, Thomas Lodd, Samuel Miller and Robert Shortiss from the Dockyards, and Sir Henry Johnson, Jonas Shish (jnr.), Peter Norberry and Edward Snelgrove from the merchant yards.6 The main contestants were Harding and Furzer and the Navy Board represented Harding as being,

A man of great experience in building ships...but... had not been so long a Master Shipwright in His Majesty’s yards, nor was he so qualified to judge the management of the office of Surveyor of the Navy as Daniel Furzer, who had for several years been assistant to that office.7

Harding had considerably more shipbuilding experience than Furzer and had designed some good ships, but Pepys’ comment that he was ‘a slow man of little learning’ suggests that that his social and academic standing was perhaps not sufficiently high. Furzer was appointed Surveyor to the Navy on 2 August 1699.8

5 PRO Adm.2/9. 2 August 1692.
6 SER/83. 14 July 1699.
7 C. Knight (1932): 413. This and other references show that at this time there was a considerable amount of movement between private and royal dockyards by Master Shipwrights, according to economic circumstances.
8 PRO Adm. 7/810, f.2. 22 September 1699 (being the date of his patent).
4.2. The Spanish Succession, the Executive and the Navy.

The peace signed at the Treaty of Ryswyk had been due to the financial and physical exhaustion of the participants rather than to any resolution of the underlying causes of conflict. France had sustained the war alone for nine years but had ultimately been forced to surrender all her gains, most of which had been made at the expense of Spain. The latter still had extensive possessions in Europe as well as her colonies in South and Central America but was not considered a threat owing to her decrepitude and the decayed state of her armed forces. Nevertheless, the issue of who should succeed the childless Charles II occupied the attention of the principal powers; the maritime nations being anxious that the crown should not be united with that of France, while the Emperor was determined that the succession should remain with the Hapsburgs. Neither England nor Holland wanted another war and when Charles bequeathed his Empire to the Duke of Anjou, grandson of Louis XIV, they were prepared to accept the situation so long as a separation of the two kingdoms and existing trade rights could be guaranteed. Unwisely, Louis decided that aggression would best suit French policy; he declared an embargo on English and Dutch goods and persuaded his grandson to do likewise; he also occupied the barrier fortresses ceded to Holland at the treaty and commenced military operations in Northern Italy. With trade severely disrupted, the attitude of the maritime powers hardened and William was able to reassemble the alliances needed to curb French power. On 16 September 1701 James II died and in a quixotic gesture Louis declared his son James Edward, king of England. Parliament immediately voted a supply for 40,000 soldiers and 35,000 seamen and when William died in the following year, both a war policy and the means of waging it were at hand.⁹

The war would be the most expensive one that England had yet undertaken and it would test to the utmost the financial mechanisms put in place during William’s reign. Although the financial chaos of 1696 would not be repeated, there would still be problems in paying the wages of those manning the dockyards and the fleet, and concern at the rising level of debt was a major factor in the Tories desire for peace after 1710. For the most part it was to be a European war and is best remembered for the campaigns of Marlborough who assumed the mantle left by William, not only of directing the armies but also in holding the uneasy alliances together. He was also able to influence naval strategy in his official capacity as ‘Captain general of the Queen’s forces by land and sea’ and this policy was principally directed towards supporting continental warfare. For much of the war approximately half the battle-fleet was engaged in the Mediterranean and early campaigns were directed towards seizing a base for operations in this theatre.

When Anne ascended the throne in March 1702, she expressed the wish to avoid party strife but frequent elections and a comparatively wide franchise fuelled the "rage of party" that was the predominant feature of politics during her reign and from this the navy and its administration was not immune. A peculiarity of the early years of the eighteenth century was a reversion to government institutions that had been current at the Restoration, and in 1701 the Treasury and the Admiralty, both of which had been in commission, were placed respectively in the hands of a Lord Treasurer and a Lord High Admiral. This was probably done in an attempt to avoid inter-party rivalry and in May 1702, Anne's consort, Prince George of Denmark, succeeded the earl of Pembroke as Lord Admiral, a post that he held until his death in 1708. Not noted for his intelligence, he was nevertheless sufficiently aware of his limitations to take the advice of a council that was in effect a Board of Admiralty on which sea-officers were well represented. At various times its members included Admirals Rooke, Shovell, Byng and Leake, but its leading figure was Marlborough's autocratic brother George Churchill, a boon companion of the Prince.

It was perhaps due to the high profile composition of the Council that the Navy Board was relegated to a subservient role at this time; meetings between the two bodies became less frequent and communication was generally in the form of directives from the Admiralty Secretary, Josiah Burchett. This correspondence shows that most of the major decisions were taken at Admiralty level and that on occasion this extended to ship design. The Navy Board bore little responsibility for this changed state of affairs, for apart from the substitution of Furzer for Dummer, there was no change in its Principal Officers, although Haddock, who had been born in 1630, was ailing and losing his grip on the Board.

Following the death of Prince George, Pembroke again became Lord Admiral but finding that he was unable to work with the Whig "Junto", resigned after a year in office and a Commission headed by Lord Orford replaced him. This was also short lived and following the sweeping Tory victory in the elections of 1710, was replaced by one consisting of members who were more acceptable to the new political order. Admiral Sir John Leake was the senior member but declined the position of First Lord. This abnegation of responsibility left the Admiralty unrepresented in the cabinet, leaving naval affairs in the unreliable hands of St. John in his role as Secretary of State for Northern Affairs.

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10 J. Plumb (1967): 128-158. The number of voters as a proportion of the population was not to be equalled until the middle of the nineteenth century.
11 Sydney Godolphin held this post from 1701 to 1710.
12 O. Murray (1938): 204.
13 See page 124 below.
14 O. Murray (1938): 205.
4.3 The War at Sea, 1702-1713.

The relative unimportance attached by some historians to the war at sea compared to the titanic struggle between the armies on the Continent belies its significance. Although naval strategy was shaped by the continental war, it sometimes affected the nature of the war itself. An example of this was a greater than anticipated involvement in Spain due to pressure from Portugal, who joined the alliance as a result of Rooke’s seizure of part of the *flota* at Vigo in 1702. For the Bourbons, heavy expenditure on the army meant that France could rarely afford to commission a fleet, the ships being there, but not the means to man them. Nevertheless, this “fleet in being” constituted a threat that limited the strategic options of the maritime powers. Being allied to the Spanish Empire meant that for France the war was one of communications; of keeping supply lines with America open and disrupting those of the Allies. In this, they were largely successful and it has been said that the war in Spain was won at sea.

The obvious need for a base of operations in the Mediterranean led to an unsuccessful attempt to secure Cadiz in 1702 and the seizure of Gibraltar in 1704. This resulted in the only major fleet action of the war, when a French fleet of 51 ships and 22 galleys met 51 Allied ships off Malaga. This hard fought battle has been described as indecisive, but although no ships were lost on either side, it was a strategic victory that ensured the retention of Gibraltar. Its value was not universally appreciated in England where Godolphin commented that ‘I know not how far it is tenable, or can be of use to us’. Marlborough did appreciate its significance however, as did the French who made numerous attempts to recapture it, and in 1705, Leake fought a one-sided action with de Pointis during which all the fleeing French ships were either taken or burnt.

Despite this, securing a base for the main fleet in the Mediterranean was not pursued with much vigour. Hoffman, the Emperor’s resident minister in London had suggested the occupation of Minorca in 1705, but it was not until 1708 that Sardinia and Minorca were taken by Leake. Port Mahon gave the maritime powers a good harbour from which to cover Toulon and protect the Levant trade. Its earlier occupation would perhaps also have prevented the loss of Shovell, who was drowned when the *Association* (90), along with the *Eagle* (70), the *Romney*

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15 G. Clark (1947) for instance, barely mentions it.
16 M. Ashley (1954): 197. Increased involvement in Spain was agreed as part of the Methuen treaty signed on 27 December 1703.
17 French naval strength remained almost equal to that of Britain until the end of the war. See appendix 11, p.231.
20 BL Add. Mss. 3759, f. 57, 15 August 1704.
22 J. Owen (1938): 129.
and the Firebrand foundered amongst the rocks of the Scilly Isles when returning home in October 1707.

With Bourbon Spain allied to the French, operations in the New World assumed a greater importance than they had in the previous war. Fleets were generally larger but still comprised ships of the Fourth or Fifth-rate with the occasional Third-rate acting as a flagship. The results were again disappointing. Disaffection and incompetence amongst sea-officers hindered some, one example being Benbow's action against Ducasse in 1702, while inappropriate decisions by politicians hindered others, such as the Walker expedition to Quebec in 1711, when the Admiralty was not consulted as to the commanders to be appointed or the ships to be employed. The only light in this tale of gloom was the capture of Port Royal by commodore Martin in 1710. Disease and the lack of suitable local supply bases would, as always, be the major limiting factors.

The French were content to resume the war against trade where they had left off in 1698. It was much better organised than in the previous war and without the resources to maintain large fleets the facilities of the dockyards and of the Inscription Maritime were devoted to the course. Following the tactics advocated by Vauban, small squadrons of royal ships acted in concert with the corsairs and ex-privateers like DuGuay-Trouin or those naval officers such as Forbin or Saint-Pol Hécourt that had extensive commerce raiding experience, usually led these squadrons. These would take on the escorts while the privateers attacked the merchantmen and although these joint ventures were usually a financial loss for their backers, they caused severe disruption to allied trade. The participation of naval officers meant that the guerre de course was pursued more in accordance with an overall strategy than in the previous war.

Despite the heavy investment in cruisers made during William's war, there were never enough of them and the corsairs enjoyed some spectacular successes. The corsair captains often showed a greater commitment and fighting spirit than their British opponents and were prepared to accept heavy casualties in order to achieve results. The escorts of merchant fleets were often overwhelmed by weight of numbers and the capture of "convoys" swelled the corsairs' ranks. In 1705, Saint-Pol in Le Salisbury (54) along with four other Royal ships and six privateers attacked a Baltic convoy and captured the three escorts as well as twelve of the merchantmen. But it was the events of 1707 that aroused the greatest alarm amongst the

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23 W. L. Clowes (1898): 2, 368-73
24 G. Graham (ed. 1953); O. Murray (1938): 208.
mercantile interest in Parliament. In May the combined squadrons of Forbin and Saus with fourteen royal ships including the Salisbury, Blackwall (54) and Jersey (40), attacked a merchant fleet off Beachy Head escorted by three ships of the line. The Hampton Court (70) and the Grafton (70) were taken, while the Royal Oak (76) escaped in such a condition that she had to be run ashore in the Downs to plug her leaks. In July, Trouin and Forbin attacked a fleet of 130 sail bound for Lisbon with horses and military stores escorted by two 80-gun threedeked ships, the Devonshire and the Cumberland, the re-fitted Royal Oak and two 50-gun ships. The French had fourteen men of war including Trouin's heavy Lys (69), L'Achille (64) and Le Jason (54). The British fought stoutly but awaited attack and again found themselves boarded and defeated in detail. The Cumberland was taken along with the 50-gun ships, while the Devonshire made a running fight with five opponents before catching fire and sinking with the loss of all but three of her 520-strong crew. The Royal Oak once again escaped, a coincidence that was too much for the Admiralty and as a consequence, captain Wilde was dismissed the service following a court-martial that found he had failed to observe signals and keep his station in the line of battle. The three-deckers inflicted heavy casualties before they succumbed and the Lys alone lost nearly 300 men killed or wounded, mostly in fighting the Devonshire.

Following these losses, the merchant community expressed its dissatisfaction with the level of protection provided and this led to a Parliamentary enquiry that culminated in the Convoys and Cruiser Act of 1708. This was similar to the measures taken in 1694 and set down the numbers of ships to be employed specifically for the protection of trade in Home Waters. The 43 ships allocated comprised 6 ships of the Third-rate, 20 of the Fourth-rate, 13 of the Fifth-rate and 4 of the Sixth-rate. The numbers were little different from those already being employed but the Act meant that they could not be reallocated except in an emergency. It also stipulated that the ships should be cleaned at least three times a year and that their crews should not be "turned over" except to other cruisers. To encourage zeal amongst officers and men, the prize law was amended to give the whole value of the prize to the captors as well as allowing £5 a head for each of the crew of the prize captured or killed. Allowing for those ships

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27 Cornil Saus had been second in command to Jean Bart who died in 1701. At this time he led the efficient "Chamber of Commerce" squadron that operated out of Dunkirk. J. Bromley (1987): 191.
29 Ibid.: 234. He was re-instated on the accession of George I.
30 Ibid.: 323-7. Accounts that the Devonshire blew up (e.g. Clowes: 2, 513) are not born out by contemporary reports which suggest that the ship sank through rolling her lower deck ports under in the heavy swell that was running following the loss of the stabilising effect of her sails through fire.
in port for cleaning, repairs or provisioning, they were still spread too thinly, but after the enactment, complaints from the merchants practically ceased.\textsuperscript{32}

Although merchant losses were reduced after the implementation of the Act, they continued to be heavy among the "galleys" and "runners" operating without convoy and were greatest in the Western Approaches.\textsuperscript{33} It is significant that the Act stipulated that the majority of ships should be Fourth-rates of 50 and 60-guns as being the most effective protection against the squadronal tactics being employed by the French. A squadron of 9 ships designed to cover the Western Approaches had been operating out of the new base at Plymouth under the command of Sir George Byng from December 1704. Lord Dursley succeeded to the command in 1708, but neither commander was as successful as Admiral Vernon's panegyric of 1745 would suggest.\textsuperscript{34}

In 1708 the "Old Pretender" essayed an invasion in an attempt to exploit dissension amongst those opposed to the Act of Union. The invasion force of 8000 French troops was to be transported by Forbin in a specially selected squadron of Dunkirk privateers but details of the project had been passed to London and it was screened by a powerful force under Sir George Byng. Inclement weather gave Forbin a head start and he anchored off Stonehaven on the morning of the 12 March while Byng came to anchor east of the Isle of May that same evening, a position that put him about twelve miles to leeward of the French.\textsuperscript{35} Without time to land his troops, Forbin stood away to the north and the fact that in the chase that followed the only ship of Forbin's squadron taken was Le Salisbury has been used by historians from Charnock onwards as an illustration of the inadequacy of English cruisers. In pursuing this argument, they have ignored Byng's leeward position, the fact that his larger ships had been at sea for some time and were foul, and that the French ships were specially selected and cleaned for the mission. Lediard (1735: 830) observed,

\begin{quote}
It is certain, and Monsieur Forbin himself owns it, that the French fleet consisted of the best sailing runners and privateers that could be found in Dunkirk.
\end{quote}

Of the four ships of force in Forbin's squadron, two were British and Nangis in Le Salisbury was asked to cover the retreat, being considered the most capable of doing so. She was engaged successively by the Dover (48), Captain Thomas Mathews and the Ludlow Castle (40) commanded by Nicholas Haddock before finally striking to her replacement, the new Salisbury (54) after five years creditable service in the French navy, three of them as flagship of Saint-Pol's Dunkirk squadron. Both the English ships had been recently cleaned but given that the


\textsuperscript{33} H. Chapelle (1967) equates galleys with runners but they are not synonymous. A runner was any merchant vessel sailing without escort while a galley was a fast sailing ship capable of being rowed and was often heavily armed. See J.S. Corbett (1921): 133-5.

\textsuperscript{34} Vernon Papers, 532-3.

\textsuperscript{35} B. Tunstall (ed. 1930): 1, 4-10.
Ludlow Castle was one of the 40-gun ships so disparaged by ship historians, the chase is of interest. She was launched in 1707 and was only the second ship to be designed and built by Jacob Acworth at Sheerness.36 The Dover, rebuilt by Bagwell in 1695, was a representative of the successful 50-gun class and was to remain in service until 1730 although reduced to 40 guns in 1716.

While the above accounts represent some of the more spectacular successes of the corsairs, the majority of shipping losses was of small coasting vessels of less than 100 tons taken in the North Sea and along the South Coast. They were either cut out by small caprés insinuating themselves into convoys or snapped up from behind headlands while “running”. Their cargoes of coal, salt, grain or victuals represented little gain to the captors regardless of the increasing risk of re-capture by the increasingly efficient cruising squadrons and the Dutch privateers that operated out of Ostende after its capture in 1706. As a result ransoms became more common, reducing the impact of the war against trade and effectively destroying any vestige of hope of “bringing the trading nations to their knees” by means of the course.37

36 See page 137 below.
Although this has been described as ‘an administration of unintelligent, unimaginative and shallow men’, it was a period that saw the inauguration of a number of technical changes, which although individually small, had a considerable collective impact on the efficiency of the fleet. Ships assumed a more modern appearance; the excessive sheer that had been a feature of seventeenth century ships was gradually reduced while the amount of decoration was restricted by legislation enacted in 1700 and 1704. The first restricted the cost of decoration from between £500 for a First-rate to £25 for a Sixth-rate and abolished internal carving, while the second did away with wreaths for upper deck gun-ports and removed the port-lids from those on exposed decks. At about the same time, the stern and quarter galleries assumed the appearance that they would retain for the rest of the century. Mouldings were used instead of carved brackets between the lights of the stern galleries while at the bow the figurehead was restricted to a lion with carved trailboards. Shortly afterwards, “round-houses” made their appearance on the forecastle bulkhead for the convenience of the petty officers.

The degree to which Furzer contributed to the changes is hard to assess from the limited correspondence that survives. The Navy Board held joint discussions with the Admiralty concerning decoration and was specifically asked for their proposals for the reductions that were approved in 1704. Nevertheless, the majority of changes were promulgated by sea-officers and since the Council had the services of many eminent professionals, it is probable that most of the improvements to sails and rigging came from this source. For instance, raising the chain-wales on three-decked ships by a deck was suggested by Rooke in ‘acknowledged imitation of Dutch practice’ although this was already the rule in all countries save England. One improvement that can definitely be attributed to Furzer was the change in the shape of “tops” from round to oval in order to give a wider base for the topmast shrouds. The suggestion was embodied in a report that he produced in 1701 concerning lengthening the heads of the lower masts to give the topmasts greater support. The greatest improvement in rigging at this time was the gradual replacement of spritsail topmasts located vertically at the end of bowsprit, with jib booms mounted in the same plane. Early examples of jib booms date from before the turn of the century; the model of the Royal Transport launched in 1695 shows one and this may have

38 B. Lavery (1983): 68
40 NMM. SER/ 85, ff.375-7, Lord High Admiral to Navy Board, 16 January 1704.
41 NMM. SER/ 85, f.293. Lord High Admiral to Navy Board, 6 July 1702.
42 R. Anderson (1921):312.
43 NMM. SER/ 85, f.103. Lord High Admiral to Navy Board, 3 June 1701.
inspired an order of 1705 regarding the issue of flying jibs.\textsuperscript{44} The suggestion may have come from the marquis of Carmarthen, the designer of the Royal Transport, as the Admiralty frequently sought his opinion at this time. Henceforth, the jib boom replaced the spritsail topmast on the smaller rates but would remain complementary to it on three-decked ships for many years to come and survive much longer in a diminutive form as a jack-staff.\textsuperscript{45} They were adopted in France from about 1710 in small ships and from about 1717 in the rest of the fleet.\textsuperscript{46}

Perhaps the most important change to the fitting of ships during Furzer’s term in office was the introduction of wheel steering. A model in the National Maritime Museum dated to about 1702 shows an unidentified Second-rate that is steered by means of a windlass sited on the quarterdeck and this may have been used by the Navy Board to illustrate the principle.\textsuperscript{47} This is the earliest evidence of a rope-operated steering system, which would for the first time have put the helmsman of a three-decked ship in direct contact with the quarterdeck and allow him to see where he was going. The step from a windlass to wheel steering was a short and obvious one and was probably made some time before 1705.\textsuperscript{48}

While most of the foregoing cannot be attributed to Furzer, a major change that involved the Navy Board was a new establishment of guns introduced in 1703.\textsuperscript{49} The objective was to increase the anti-personnel component of the armament while at the same time reducing the weight of guns carried, in belated recognition of Dummer’s view that ‘all the great ships are over-pressed with metal’.\textsuperscript{50} Captain John Leake, whose father had been Master Gunner to the Fleet, was consulted regarding the general principles in conjunction with admirals Rooke, Shovell, Churchill, Mitchell and Hopsonn, details being left to the Navy Board.\textsuperscript{51} The greatest change was to ships of the Fourth-rate where increased speed was most needed; henceforth, 60-gun ships would carry 64 guns but they would carry 18 instead of 24-pounders as their main battery. Similarly 50-gun ships would become 54’s but would carry only 12 and 6 pounders instead of 18 and 9, a saving of about ten tons. Inevitably there were some ships that were too small for the increased numbers and these stayed as they were, but it also meant that some 54-gun ships that had carried 24-pounders as their main battery had their weight of broadside almost halved. The changes would only be gradually introduced, but by the later years of the war most ships were conforming to it.

\textsuperscript{44} NMM. Adm. A/1925, Lord High Admiral to Navy Board, 25 April 1705.
\textsuperscript{46} J. Boudriot (1993): 348.
\textsuperscript{47} J. Franklin (1989): 122.
\textsuperscript{48} Windlass operated steering systems may have been more widespread than is realised. The French had such a system by 1706 at the latest D. Roberts (1989): 272.
\textsuperscript{49} PRO. WO/55/1803, 13 January 1703.
\textsuperscript{50} NMM. SER/ Misc II, f.393 in R. Merriman (ed. 1949): 82.
\textsuperscript{51} J. Owen (1938): 30.
In 1708, Secretary of State Sunderland transmitted a proposal from Charles Parry and others with mining interests, to sheath the bottom of ship's hulls with British copper.\textsuperscript{52} When asked their opinion, Furzer and Lee objected on the grounds of increased cost, the difficulty of getting at the bottom for repairs and the additional time needed to sheath ships. However, they supported a suggestion made by the projectors that copper sheathing be tried on a number of merchant ships by way of experiment. The outcome of these trials is unrecorded and it was to be a further seventy years before copper sheathing would be introduced to the navy on a wide scale. While the Surveyors objections might be seen as unimaginative conservatism, they were valid ones and it is likely that given the problems that were to occur with its later introduction, the cost would have been prohibitive at this time.

Early in 1710, the Surveyors replied to an Admiralty request for suggestions for improving the sailing qualities of Sixth-rates following complaints from some of their commanders. They saw,

\begin{quote}
... no evident reason to attribute their ill performance to their shape, (they appearing, generally speaking, of a very clean, regular figure, regard being had to their drawing little water, as has always been desired of them.\textsuperscript{53}
\end{quote}

They suggested lightening the rigging by employing “pole” instead of striking topmasts and building the ships lighter by increasing the distance between frames. This was not sufficient for the Admiralty however, and in January 1711 they decided that,

Sixth-rates should be built with one deck only and a small, low forecastle; that the fifth-rates (40's) ought to be made somewhat larger, and that neither the one nor the other should carry any guns on their quarterdecks and that instead of a lion on their heads, it may be more convenient to place some very light figure thereon, or a painted board.\textsuperscript{54}

The Surveyors were ordered to prepare draughts and models of each of the revised designs ‘with all convenient speed’. The Admiralty’s intervention suggests a lack of confidence in their abilities and the changes seem to be in imitation of French practice, while disregarding the different operational requirements of the two navies. Another Admiralty instruction dating from 1710 ordered that the gunwales of 80-gun ships be raised so ‘that they may carry a flush tier of guns upon the upper deck’. This allowed a better weight distribution, relieving the strain on the ends of the ship as well as giving more room to work the guns, although it also meant higher topsides and increased windage. The first ship to be so treated was the replacement for the Devonshire, built by Acworth at Woolwich and launched in December 1710.\textsuperscript{55}

On the 14 February 1705, William Lee, the Master Shipwright at Woolwich, was appointed as Furzer’s assistant and he was made Joint Surveyor on 19 October 1706.\textsuperscript{56} He was

\begin{thebibliography}{9}
\item\textsuperscript{52} NMM. SER/86, f.561.12 October 1708.
\item\textsuperscript{53} PRO. Adm. 1/3613. Surveyors of the Navy to Navy Board, 27 January 1710.
\item\textsuperscript{54} NMM. SER/ 87. Admiralty to Navy Board, 12 January 1711.
\item\textsuperscript{55} NMM. SER/ 87. Admiralty to Navy Board, 28 July 1710.
\item\textsuperscript{56} PRO Adm. 6/8 f.23; PRO Adm. C 66/ 3454.
\end{thebibliography}
the younger brother of Robert Lee, the Master Shipwright at Chatham, although he was much
less experienced and had built fewer ships. The senior post of Deptford, from whence the
Surveyors were more usually drawn was held by Fisher Harding, who had already been passed
over when Furzer was appointed. Lee enjoyed the patronage of the marquis of Carmarthen and
it is possible that he supported his appointment, as his influence with Prince George was strong.

One of the greatest influences on British cruiser design throughout the eighteenth
century was the Peregrine Galley, built as a 20-gun galley-frigate in 1700 at Sheerness, where
Lee was Master Shipwright between 1700 and 1702. The design was probably a collaborative
effort between Carmarthen and Lee and she was converted into the Royal yacht Carolina in
1716, although she had been used for that purpose for some time. Her lines were taken off in
1720 and show a hull with full waterlines but very easy bow and stern buttock lines, allowing
for an easy flow of water under the hull rather than around it. The inspiration for what was a
uniquely British shape for fast naval vessels is unclear although the principle had long been
used in merchant ships, particularly among the Dutch and Scandinavians. The shape was used
for the ships of the “new method of building” (see pages 147-150 below); by William Bately for
his successful Richmond class frigates of 1756; and for the Thames class frigates as late as 1804.
A painting by Monamy executed prior to 1714 shows her with a gaff instead of a lateen mizzen,
a modification usually attributed to the middle of the century. Richard Stacey was to rebuild
her to the same lines in 1733.

Lee built one First-rate, the 100-gun Royal Anne, launched in 1704. Much smaller than
Fisher Harding’s successful and influential Royal Sovereign launched three years earlier, her
commander, Sir John Jennings, found her to be dangerously crank and asked that she be girdled.

Lying under our mainsail (i.e. hove-to) the Royal Anne lay on her middle tier of guns in the water,
had four feet of water on her lower gun-deck and, I am apt to believe, she would not have righted
had I not ordered her lower yards cut down. ... Which makes me presume to give as my opinion
that she ought to have a good girdling before she be fit for the sea. She is in every degree
otherwise, an extremely good ship.

Other ships included the ill-fated Devonshire (80) and the 70-gun Resolution, built in 1705 to
replace his brother’s rebuild of Deane’s ship, lost in the great storm of 1703. Unusually, Lee
was acting as the resident Commissioner at Portsmouth between April 1713 and November
1714 as well as acting as joint Surveyor. Both patents were revoked on the 16 November 1714

57 See fig.9, page 244.
Anne’s standard. Carmarthen may have been inspired to use a gaff mizzen by his designs for yachts and
brigantines. The next pictorial evidence of the use of a gaff on ship-rigged vessels is seen on a Sixth-rate
dating from about 1745.
59 NMM. Adm. A/ 1929, f.3532, 14 August 1705. Rear Admiral Sir John Jennings to the Lord High
Admiral.
and nothing else is heard of him. He did not return to the dockyards so he either retired or built merchant ships on his own account.

In his introduction to Queen Anne's Navy, Merriman points out that neither Furzer nor Lee had sea experience and that this perhaps explains a certain measure of friction that existed between sea-officers and the civil administration of the navy. The same could also be said of the previous shipwright surveyors, for although both had spent some time at sea they had not done so in an official capacity. This lack of sea-time was an omission in the training of many of the shipwrights that was to persist throughout the eighteenth century. Merriman is perhaps thinking of the rancorous correspondence between Captain Edwards and the Surveyors over the unauthorised girdling of the Plymouth, although strictly speaking this was an internecine squabble as Edwards was the resident Commissioner at Plymouth at the time. Resentful of a rebuke from the Board, he replied that,

... had both the Surveyors of her Majesty's Navy some years experience at sea, they would perhaps have allowed an old officer to have been a better judge on these affairs than they do.

This letter elicited a broadside signed by the whole Board that concluded,

They (the Surveyors) do not perceive, by what you have yet written, they are likely to owe any improvement to you, either in manners or judgement.

In the arguments between the Navy Board and sea-officers, it would be the Navy Board that would emerge predominant for the time being and after the death of the Prince and the departure of his alter ego George Churchill, the earl of Pembroke supported this predominance. This is illustrated by the reaction of Secretary Burchett to Captain Wyvell's disparaging remarks about the Navy Board, who he claimed, had not paid some of his men.

His Lordship hath commanded me to let you know that it gives him no little dissatisfaction to find that one who has the honour to bear a command in the Navy, and who hath served so long as you have done, should so much expose yourself to censure by making groundless reflections on gentlemen who compose a Board of that consequence.

Burchett consistently upheld the dignity of the civil administration during his long period in office and the Navy Board was to feel the loss when he finally retired in 1742.

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60 This was the captain who had commanded the Cumberland in her stubborn defence of the Portugal fleet against the combined squadrons of DuGuay Trouin and Forbin referred to on page 117 above.
4.5. The 1706 Establishment.

In February 1705, the Lord High Admiral wrote to the Navy Board,

I doe hereby desire and direct you to consult such officers as you judge most proper and then report to me your opinion what proportions may be most proper for the length by the keel and breadth by the beam, length on the gundeck, height to the ports from the decks; as also what other proportions may be proper to be established for the building of a second rate ship, such as the Barfleur, which is represented to me to be a complete man of war; and you are also to consider and report at the same time to me your opinion, what proportions of a like nature may be most proper for ships of eighty, seventy, sixty, fifty, forty and thirty guns. 63

In accordance with this directive, a committee comprising the Master Shipwrights of the dockyards and some of the merchant builders was set up under the chairmanship of the Surveyor. The Navy Board responded on the 16 May and an order to comply with the proposed dimensions was issued by the Admiralty on 1 June. By the 31 July, however, the Prince, at the instigation of George Churchill, was having second thoughts and the Navy Board was ordered to consult the shipwrights again with a view to amending the proposals and in particular to giving greater breadth. The new instructions also directed that,

'... you are to conform for the future to those dimensions, not only in the building new, but in the rebuilding any of her Majesty’s ships'. 64

Revised dimensions were submitted on 5 April 1706 in a letter that reported that 'the breadth in the second-rates ... exceeds [by] 3 feet, the aforementioned establishment of 19 May 1677'. These were agreed and an order to comply with them was sent on the 19 April 1706. 65

The increase in size over earlier ships was slight. The Second-rates were based on the Barfleur, which had been built by Fisher Harding in 1697, with an additional increase of 8 inches in breadth. The Third-rate 80's gained about 2 feet 6 inches in breadth over the 1691 dimensions and all were ordered to be built as three-deckers. The 70's also gained about a foot in breadth and adopted the depth in hold of the deepest ships built to date but the length was unchanged from that established in 1677. The 60-gun ships were to be identical to Furzer's Medway, launched in 1693, while the 50’s had a slight increase in breadth over the 130-foot class ordered in 1695. The 40-gun ships were given a slight increase all round while the few 30-gun ships that were built were based on the largest ships of that class and given a two foot increase in depth. The conclusion seems to be that the Admiralty were generally satisfied with the length but was looking for increased stability and gundeck height, which it hoped to achieve by increasing the immersed volume of the hull. The height of the gun-port sills above the water was standardised at 4 feet 6 inches except for the Fifth-rates, which were to be 4 feet. First and Sixth-rate ships were omitted from this Establishment, the former because they were rare

63 NMM. SER/ 86, ff.198, 199, 237, 21 February 1705.
64 Quoted in J. Hattendorf (ed.1993): 265.
65 NMM. Adm. A/1937, f.573. For a list of these dimensions see appendix 3, pages 217-18.
enough to merit individual treatment and the latter because they were small and cheap enough to permit of some experimentation.

The correspondence of the Prince’s Council endorses their lack of confidence in the professional competence of the Surveyor, although the interference probably did little harm, making the ships a little slower but rather more stable. This was the first Establishment to apply to the major part of the fleet and the first to apply to rebuilt ships as well as new construction. This would sometimes mean a considerable change in the size and shape of ships needing to be rebuilt and about this time it became the practice to take a ship entirely to pieces in a dry-dock and rebuild it elsewhere, using only such timber as was serviceable. The result was effectively a new ship, but it meant that successful individuals like the Royal Oak were sacrificed in the interests of uniformity. Apart from the length, breadth and the depth in hold, the establishment laid down the height between each of the decks, the size of the gun ports and the draught of water fore and aft.

The benefits of the Establishment were mostly bureaucratic, allowing the cost of building and rebuilding to be predicted with a greater degree of certainty. It attempted to standardise the masts, yards and sail plan for each rate, but apart from the difficulty of setting absolute standards for ships that could still vary in shape and hence stability, this met with resistance from ship’s captains, who had no hesitation in making alterations that they thought might improve the sailing qualities of their ships. The Admiralty was aware of this problem and in February 1710 requested the Navy Board to investigate what alterations had been allowed or that ‘the commanders have taken upon them to make themselves’. Despite these difficulties, some benefits did accrue from the ability to stockpile standard replacement parts but what they could not do was produce homogenous squadrons with identical fighting characteristics and it is unlikely that this was their intention. Battle fleets usually consisted of a mixture of two and three-decked ships that had widely different sailing qualities and they were limited to the speed and windward ability of the worst of them. Nevertheless, by forbidding size escalation, individual unit costs were kept down and control of procurement was placed more firmly in the hands of government. During Anne’s reign this meant the queen’s Council, guided by the Admiralty, rather than the House of Commons, but as there was no overall increase in the numbers of ships, this was not a contentious issue.

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66 For the definitive account of the rebuilding British warships between 1690 and 1740, see B. Lavery (1980): 5-14, 113-27.
4.6. French shipbuilding and British countermeasures, 1700-1715.

France began the war with almost the same tonnage as England but considerably less than that of the combined Allied fleets; furthermore, she was building at a far slower rate and this would decrease further as the war progressed, although tonnage was not seriously reduced until 1711. France only built ships-of-the-line in 1702, 1704, 1706, and 1707 but these were radically different from those that had gone before. None were three-decked, the majority being Third-rates of between 52 and 62 guns that were large for their armament and intended to support the war of communications. Some were designed specifically for the course, being commissioned by the more successful corsairs and built by the leading constructors of the arsenal ports. Two such were the 54-gun ships Auguste and Jason, built for Trouin’s squadron by Pangalo at Brest in 1704 and designed to be a match for English 60-gun ships. L’Auguste was captured by Sir George Byng’s Western squadron in August 1705 and the Jason narrowly escaped a similar fate after being overhauled and brought to action by the Worcester (50). The lines of the former, which was taken into the navy as the August (60/54), show the steep deadrise typical of Pangalo’s work. In a treatise on marine architecture written in 1733, Blaise Ollivier wrote that,

The common opinion is that the greater the deadrise in ships of war and frigates, the more fit this makes them for sailing close to the wind, for giving the vessel a great draught of water has the effect of making her less leewardly. The extreme deadrise in the ships built by M. Pangalot has been remarked upon. This builder gave up to 3 feet of deadrise to his ships ... and he was so skilled in placing in the entry and the run aft that capacity which he did away with by virtue of the steep deadrise that not only were his ships fast sailers, but for the most part they also had a good height of gundeck ... carried their sail well. No other builder has employed such a great deadrise; many have come close to it and failed.

It is more likely that they lacked buoyancy, carried their guns low and were rather tender, although this would not preclude them from being good commerce raiders. They were to have a strong influence on British cruiser design and as the August was one of only a handful of French ships to be kept on after the end of the war she must have been highly regarded. Nevertheless, the evidence suggests that they were not as fast as reputed for towards the end of 1704, Trouin in the Jason in company with L’Auguste and La Valeur (24) met the Revenge (70), commanded by Captain Kerr, and fought her for two hours. Kerr broke

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68 For tables of relative naval strength and shipbuilding between the years 1680-1720, see appendix 11, pages 231-4.
70 J. Owen (1938): 278-80.
72 See fig.10, page 245.
73 Remarks: 14.
off the action and out-ran the Frenchmen, 'notwithstanding their supposed advantages in sailing'.

The ship that impressed her captors most was the Superbe (56), built by Pierre Coulomb at Port Louis in 1708. She was taken by the Kent (70) in 1710 and bought into the navy as a 64-gun ship. Nearly thirty years later Ollivier reported that,

several English captains and shipwrights have mentioned to me the ships L'Assuré and Le Superbe taken from us in the last war as being the fastest ships which they ever had in England.

Time may have cast a golden glow over their memories and the shipwrights may have wished to flatter their guest but evidence suggests that the Superbe deserved its reputation. While the Assurance was broken up at the end of the war, the Superb remained in service until 1733 and was one of the four ships released by Byng to cut off the fleeing Spaniards at the Battle of Cape Passaro in 1718.

Five 62-gun ships, carrying 24-pounders and equal in size and gun-power to an English 70, were built during the war. One of these was the Achille, a royal ship, but built for DuGuay Trouin by Pangalo at Brest in 1704. Similarly, four 70-gun ships were built that carried 36 and 18 pounders on their gun-decks, making them more powerful than the three-decked English 80's. Glete rightly observes that the development of these large two-decked ships meant that "cruiser qualities" such as speed, seaworthiness, and weatherliness was introduced in the design of large battleships. They can, therefore, be seen as the forerunners of the "new construction" that was to have such an impact on ship design during the 1730's and 40's.

Surprisingly, only seven two-decked ship frigates and thirteen frégates légères were built for the French navy during the war, the construction of small ships being left to the private sector. In imitation of British Fifth-rates dating from William's War, many of these were demi-batterie ships, with a partial lower deck armament. One of these was the Gloire (38), another ship purpose-built for the course by Pangalo. Despite her reputation for speed, she was overhauled and brought to action by the Chester (50), commanded by Thomas Mathews. He far out-sailed his fellow captains in the chase, which taken with his performance in the Dover the previous year suggests that he knew how to get the most out of a ship. Taken into the navy as the Sweepstakes (40), she was considerably larger than English 40-gun ships and while she had

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74 J. Owen (1938): 104. The words are Captain Kerr's.
75 Remarks: 171. For drawings of the Superbe see fig. 11, page 246. L'Assuré was one of the ships taken at Vigo and was built by Pierre Coulomb's brother Francois.
76 See page 117 above.
78 See page 157 below.
79 J. Boudriot (1993): 19-20. "Ship frigates were of two orders depending on whether they carried 12 or 8 pounders as their main armament. Four of the first order were built and three of the second.
80 The Chester was built at Chatham dockyard in 1708, re-classed as a 44-gun ship in 1742, converted into a hospital ship in 1743 and remained in service until 1750.
a fearsome reputation as a commerce raider, she seems to have had an unremarkable career in the navy and was sold out of the service in 1716.\textsuperscript{81} One is forced to conclude that the performance of Pangalo’s ships was over-rated by Ollivier and that they were at best no faster than English 50-gun ships. Of the smaller frigates, only the Valeur seems to have had a good reputation. She was the only ship of the Fifth-rate or below to be retained after the end of the war, being kept in service until 1718. The navy considered very few privateers suitable for use and of approximately 300 captured during the war, only ten were purchased and all were disposed of at the end of hostilities.

In contrast to the major shipbuilding programmes of the previous war, there was no increase in the overall number of British ships during this period, there being a slight decrease in the largest and smallest elements of the fleet with a corresponding increase in the number of Fourth and Fifth-rates. The 50-gun ships (54 after the 1703 gun establishment) again bore the brunt of the war against the corsairs and thirty-six were built during the war compared to just twelve of the dual-purpose 60’s, two of which were replaced by 50’s following their capture. At the accession of George 1 there were fifty 54-gun ships in service, by far the largest class in the navy. By comparison, there were twenty-five 70-gun ships, including four older ships that had been reduced to 66-guns, and nineteen of between 60 and 64-guns.\textsuperscript{82} Nine 50-gun ships were lost to the enemy and a further ten through shipwreck.

The vulnerability of the 32-gun demi-batterie ships in the last war had been recognised and only ten more were ordered, their place being taken by larger and more powerful 40 or 42-gun ships, twenty-four of which were built during the war. They were mainly used as convoys and none were lost through enemy action. Their history is yet to be written but they may have been slow as there was a brief revival in the construction of 32’s towards the end of the war. Mathew Aylmer, commander of the main fleet towards the end of the war, had a poor opinion of some of the cruisers. He would have preferred to see more 30-gun ships rather than those of 40 guns, which he considered ‘did not do well, and nor did the smaller Sixth-rates’.\textsuperscript{83} Nevertheless, Glete is probably right when he observes that some modern historians have somewhat unfairly viewed them as the ‘unsatisfactory solutions to mid-eighteenth century warfare’.\textsuperscript{84} The Admiralty ordered twenty-two Sixth-rates of between 20 and 24 guns and twelve of the smaller class, carrying between twelve and fourteen.

The war saw the virtual demise of two types of ship, reflecting the changing nature of naval warfare. The number of fireships was reduced from eleven to two and the number of

\textsuperscript{81} See fig. 8, page 243. She was probably built by Pierre Coulomb.
\textsuperscript{82} R. Merriman (ed.1961): 365-72.
\textsuperscript{83} Quoted in J. Owen (1938): 28.
\textsuperscript{84} J. Glete (1996): 293.
brigantines from five to two. At the end of William's War, eight small 2-gun sloops had been built, probably for the suppression of smuggling but at 65 tons they were too small to take on even small caprè ses and five of them were captured during the Succession War. It is likely that they were single-masted, with a mercantile "sloop" rig and six rather larger 4-gun sloops were built between 1700 and 1705. These fared little better and towards the end of the war six much larger sloops were built, four by Joseph Allin (senior) and two by Jacob Acworth. All were of about 114 tons burthen and carried either ten 3-pounders or eight 4-pounders plus swivels and they were probably two-masted, although a drawing of the Ferret shows only one set of chain plates. Nevertheless, the Ferret was certainly two-masted by 1716 and a brig, snow, bilander or ketch rig would become standard for this class of vessel until the introduction of larger ship-rigged sloops around 1745. Because of their heavy armament in relation to their size they were quite full bodied although they had a very fine entry and run. Since none of them came into service before 1710 they saw little action but all of them were kept on after the war, probably for revenue duties. Despite their small size they saw service as far afield as America and the West Indies, the Hazard being cast away off Boston in 1714 and the Jamaica wrecked on Grand Cayman in the following year.

The period registered a decline in the Dutch navy, which, although numerically strong was out-built even by France. The sailing performance of the ageing Dutch battle-fleet was abysmal as was graphically illustrated by Leake's complaints in 1706.

The Dutch ships, not being able to ply to windward in case of contrary winds as the English could, it frequently happened in a night sail they were hull [down] to leeward; and the latter were frequently obliged to bear down three or four leagues to join them.

The Dutch built no large ships during the war, adding just ten new 50-gun ships and fourteen of the smaller charters, just enough to maintain numbers. The larger units of the fleet dropped out of service towards the end of the war, and, with no aggressive pretensions, the Dutch navy began to revert to the trade protection role it had occupied prior to the Anglo-Dutch wars.

87 R. Gardiner (ed. 1992): 54, dates ship sloops from 1753, but D. Lyon (1993): 199, gives details of two sloops, purchased from merchant yards that were launched in 1745 and 1746 respectively. For a description of these and other rigs, see the glossary of terms, appendix 2, pages 213-16.
89 G. Callender (ed. 1918): 1, 259.
4.7. Comparisons and conclusions.

The war saw the extension and refinement of strategic concepts that had originated in William's War. The fleets of the maritime powers were used to support their continental allies, while convoys and cruisers protected their trade and lines of communication. On the other hand, the French war against trade and communications became better organised and made a considerable contribution to the economic attrition that was a principal aim of the combatants. The specialisation in the ship design continued to increase and was tailored to the perceived needs of the differing strategies of the opposing navies. In England and the United Provinces this meant an increasing divergence between the small two-decked ships intended mainly for cruising and trade protection all the year round and those intended to lie in the line-of-battle. (Eleven of the ships that fought at Bantry Bay and Beachy Head had carried less than 54 guns, while only one that fought at Malaga did so). After abandoning a battle-fleet strategy the French navy relied exclusively on dual-purpose ships specifically designed for the war of communications, including a few that were as powerful as earlier three-decked second rates.

French ships were much admired by their captors and five of the ships taken at Vigo were taken into the navy. They ranged from the Prompt (76) to the Triton (42), and the Navy Board was ordered to examine them to see if any features of their design could be copied with advantage.

Whereas it has been represented unto me that some of the French men of war which were taken and brought from Vigo are very well contrived, as well for sailing as other good qualities in the sea ... I do therefore direct you to appoint the Surveyor to the Navy and the seamen of your Board, with the assistance of the Master Builders of Deptford, Woolwich and Chatham, carefully to inspect into the nature of the bodies of the said ships and to report their opinion therein to me; and also, what they shall observe as to their hulls or other conveniences appertaining thereunto that they shall judge may be imitated in the ships of the Royal Navy to the advantage of her Majesty's service. 91

Despite this enthusiasm, none of them were retained after the war and some were sold or hulked before the end, suggesting that they were weakly constructed. This was particularly true of the Prompt, rated as an 80/76-gun ship in British service and which was larger than were the old two-decked English 80's. She probably suffered from the same structural problems as she was broken up in the year following her capture. 92

Despite a chronic lack of finance, French shipbuilding continued its steady improvement throughout this period. There was an increasing tendency for French ships to get larger for the number of guns carried although it is apparent that this sometimes went beyond the capabilities of the shipwrights concerned as demonstrated by the weakness of the Prompt.

91 NMM. Adm. A/1944, f.1222. Lord High Admiral to the Navy Board, 30 December 1702. This is the first recorded instance of the lines of foreign warships being taken off by the Navy Board.
However, it is evident from contemporary accounts that the performance of some French ships was now as good as the best of their English counterparts and that some of the Coulomb brother’s work was outstanding. On the other hand, many of those built by Pangalo do not seem to have performed as well as their lines suggest that they should have. Pangalo disappears from the scene after 1708 and the Brest parish archives register his death on 17 November 1714.93 Nevertheless, he was succeeded by a number of able shipwrights, some of whom he had helped to train.

If the English expressed their admiration for some of the French ships, the French were equally appreciative of English prizes. The Salisbury had been taken by Saint-Pol in April 1703 with a squadron that included the Ludlow Castle (32) and the Milford (30) and was sufficiently well regarded by her captors for her lines to be taken off and distributed to the dockyards for emulation.94 The Ludlow Castle was described as ‘a precious acquisition’, while the Blackwall (54) and the Sorlings (32) were accounted ‘excellent ships’. So too were the 70-gun Hampton Court and Grafton, the latter remaining in French service until 1744 as a 66-gun ship.95

All the major innovations to rigging and fittings that took place around this time, originated in Britain and the introduction of jibs, which greatly improved manoeuvrability as compared to sprit topsails, was soon copied by France. They seem to have taken longer to adopt wheel steering, probably because it offered little advantage to small ships where the helmsman was sited on deck and where a tiller or whipstaff gave a faster response to the helm than a wheel and its system of ropes and blocks. The drawings of the two-decked Néréide, built by Joseph Ollivier in 1720, still show no provision for a wheel and dual provision was provided until well into the thirties.96 As in Britain, there was a reduction in the level of decoration at this time with quarter badges and galleries becoming smaller and much lighter, while the sheer tended to become flatter.

If French designers had achieved parity in hull form during the Succession War, the standard of construction is harder to assess. Documentary evidence is rare for this period but it would seem that French shipbuilding had already assumed the characteristics that would remain in place for the rest of the century. Foremost among these were the use of double frames, bolted together and the use of iron spikes as well as trenails to fasten the planking. Measures to alleviate hogging were also receiving attention and from 1705 onwards Le Sieur Gobert, who was appointed Sous-Inspecteur de Construction in 1707, began to introduce structural

93 A. Dobrenko & A. Palmer (2000) have advanced an alternative theory that Pangalo went to Russia and died there in 1719. This was more probably his son.
94 J. Owen (1938): 29. The Salisbury had been built on the foreshore at Beaulieu by Herring in 1698. She was retaken in 1708 and kept in service until 1739 as the Salisbury Prize.
improvements, including the use of diagonal ceiling planking. The top and bottom of the hold were planked horizontally but the intermediate strakes were laid at an angle of about 35° to the frames to act as bracing. Like much French detailing, it was complex and caused problems at the ends of the ship where the winding was extreme and where the planks were perforce cut from the solid. There were also attempts to lock the structure together by letting down the keelson and thick-stuff over the floors, together with the provision of a large number of binding strakes to the decks. Despite these measures, accounts suggest that French ships still had a greater propensity to hog than English ones. This will be considered in more detail in the next chapter.
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CHAPTER 5 Sir Jacob Acworth 1715-1749.

5.1 Jacob Acworth, the early years, 1666?-1715.

Jacob Acworth probably came from Chatham, where in 1689, one John Acworth was made Second Assistant Master Shipwright ‘in ye roome of Elias Waffe’, and he is a possible paternal candidate. The Chatham connection is suggested by a close relationship with the Loton family, one of whom was Storekeeper at the Dockyard and who married into the Acworth family, and where Jacob was to marry the daughter of the Master Rope-maker. It is likely that he was born between 1666 and 1668, since he began his apprenticeship in 1682 and this was almost certainly begun at Chatham where the venerable Sir Phineas Pett was Master Shipwright. Uniquely for a future Surveyor of the Navy, Jacob was to spend much of his early life at sea, something he may have had in common with other members of his family, for in 1691 it was recorded that ‘John Acworth, gentleman, formerly a voluntier in the Lenox to be a voluntier in the Kent’. This may well have been an elder brother.

Between 1685 and 1687, while still an apprentice, Jacob served in the Hope (70), where he would have been employed as a carpenter’s servant, the sea-time counting as part of his seven-year apprenticeship. After he had served his time, the Nine Years War was underway and he returned to sea, being appointed as Master Carpenter of the Salamander in July 1690, ‘in the room of the former deceased’. This was the first English “bomb” and had been designed by Edmund Dummer in collaboration with Robert Lee, who built the vessel at Chatham in 1687. Within the next two years he was promoted into the Fifth-rate Play Prize, formerly Les Jeux, taken from the French early in 1689. This was a 36-gun frigate built by Hendrik of Dunkirk in 1688 but which was reduced to 30 guns in English service. Direct experience of a Dunkirk frigate would have been valuable to an aspiring shipwright and she may have influenced some of his early designs. In July 1693 Acworth was again promoted, this time to the Bonaventure (48), once more ‘in the room of the former deceased’ but this time ‘with a servant as is proper

1 PRO Adm. 2/3, f.282, 24 September 1689.
2 By a regulation of 12 July 1662, servants to shipwrights were to be 16 years of age before commencing an apprenticeship. PRO Adm. 49/132, f.13. This would suggest the earlier date of birth but the extent to which the regulations were circumvented at this time is not known.
3 PRO Adm. 2/7, 9 February 1691.
4 C. Knight (1932): 416.
5 PRO Adm. 2/6, f.216. 30 July 1690.
6 PRO Adm. 1/3559, f.65. 15 August 1689.
7 PRO Adm. 1/3559, f.799. 16 July 1690. See fig. 7, page 242.
for a ship of the Fourth-rate’. By 1696 he was carpenter of the *Swiftsure* (70), one of the two ships built by Anthony Deane at Harwich in 1673. She is listed in Anderson (1935) as being rebuilt in 1696 but Acworth was still on her books in 1698 which suggests that he was retained to supervise the rebuilding, which was carried out in the private yard of Edward Snelgrove at Deptford.

Despite his time at sea, his “interest” was alive and well, for in December 1698 he was made Master Mast-maker at Chatham, placing him firmly on the ladder of promotion leading to Master Shipwright and once again it was a case of “dead men’s shoes”. The position was of brief duration for in the following August he was made Assistant Master Shipwright there and in this role he would have helped to prepare drawings for the ships being built in the yard as well as playing a major part in supervising their construction. From the 26 April 1698, Daniel Furzer was the Master Shipwright at Chatham, giving Acworth the opportunity of making himself known to the man who was soon to become Surveyor of the Navy. The years following his appointment would have been busy ones as the navy made good its war losses and prepared for the next conflict. During the short period of peace between 1697 and 1702, two 90-gun, four 70-gun, and a number of smaller vessels were launched at Chatham. Furthermore, in November 1703, while the Mediterranean fleet was anchored in the Downs, the greatest storm in recorded history struck the English Channel and southern North Sea. Seventeen warships were sunk with the loss of about 1500 lives and all the Thames dockyards were kept busy repairing the damage. It was probably during this period at Chatham that Acworth married Esther Sliter, daughter of the Master Rope-maker Robert Sliter.

In February 1705, Acworth was made Master Shipwright at Harwich, a small yard used for careening and minor repairs and the appointment was probably made to see how he would handle the management of a shipyard. He obviously performed well because in November of that year he was made Master Shipwright at Sheerness in succession to Joseph Allin (senior). Sheerness was an unpopular posting, being remote from London and rather unhealthy; it was mainly used for repair and because of the size of the slips few large ships were built there. Nevertheless, Acworth built three vessels while at Sheerness, all 40-gun ships to the 1706 Establishment, the first being the *Sorlings* launched in 1706 followed by the *Ludlow Castle* in 1707 and the *Adventure* in 1709. These were all of a new class built to replace the demi-batterie 32-gun ships, although in many respects they were a throwback to Commonwealth frigates. They carried 42 guns in home waters and 36 abroad, nine-pounders on

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8 NMM Adm. A/1797. 13 July 1693.
9 NMM Adm. A/1860, f.271. 27 December 1698.
11 Ibid.
the gundeck and six-pounders on the upper-deck and quarterdeck. As a class they were considered slow and over-gunned but the Ludlow Castle’s performance during Byng’s chase of Forbin in 1708 shows that this was not necessarily the case (see page 118 above).

In 1708, Acworth’s career received something of a set back when he was suspended for negligence in fitting out the Lyme and ‘other ships that have been under his care’. The order was dated the 14 September but it only took a week for Acworth to assemble his interest and have the suspension lifted; on the 22 September Prince George wrote to the Navy Board,

...it having been represented to mee that hee is a good Artist, and every way qualified by his ability to perform the duty of the said place, I do therefore hereby desire and direct you to (admonish him to be more careful for the future) lift his suspension and re-admit him to the execution of his sayd employment of Master Shipwright of her Majesty’s yard at Sheerness. The note in parenthesis was inserted as an afterthought in order to make the capitulation less total. There were complaints regarding the tardy fitting out of ships relating to many of the yards and Acworth was no doubt guilty of a lack of supervision in this instance but his speedy reinstatement shows the regard in which he was held at the Navy Board at this time. Neither did it hinder the progress of his career for in August 1709 he was promoted to the post of Master Shipwright at Woolwich in succession to Richard Stacey who moved to Portsmouth.

This was Acworth’s busiest period as a shipwright and his first design was for a 14-gun Sixth-rate called the Delight, launched in 1709. This was not an established design but one of several built in competition at each of the Dockyards. Mathew Aylmer’s comments suggest that they were rather slow and all of them were sold out of the service at the end of hostilities. Acworth’s next projects were the 80-gun Devonshire and a 50-gun ship called the Ormonde; both designed to the 1706 Establishment and launched in 1710 and 1711 respectively. The Devonshire had a relatively long life, being hulked in 1740 and not sold out of the service until 1760. She was the first three-decked 80 to have the bulwarks raised amidships in order that the guns could be distributed along the whole length of the upper deck in compliance with the Admiralty instruction of the 28 July 1710. Acworth considered her to be a successful ship and in answer to later criticism of five of the class by Admiral Vernon, explained why she was better than were some of her successors.

...She had no forecastle, a short quarter deck and two small cabins on it abaft, very light quarter pieces, and a snug taffrail, proved a very good ship, was stiff, sailed and worked well, and carried her lower battery a good height from the water, but she carried her booms on the deck, and her standing masts [lower masts] were considerably shorter than the five before mentioned ships now have.

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15 See page 130 above.
16 ADM/B/117, 3 March 1742.
The Ormonde, renamed the Dragon in 1715 following the Duke's impeachment for treason, differed in many respects from earlier 50-gun ships. There is no record as to how she performed although the lines look as if she would be fast but rather tender. They show a short floor with relatively steep deadrise and lines that were probably based on those of the Advice Prize, taken from the French in 1704. She displays Acworth's desire for lightness and simplicity, having no poop and only a single level stern gallery in the manner of later frigates, and, with her comparatively flat sheer and lack of ornamentation, looks distinctly "modern" as compared with most of her contemporaries.

Between 1711 and 1712 Acworth built three Sixth-rates, all 276-ton ship-rigged vessels that were the forerunners of the larger 1719 Establishment ships. They were a great improvement on the 24-gun ships that they replaced but were still rather small for their armament of twenty 6-pounders and were probably indifferent performers. They were two-decked ships in as much that the unarmed lower or "gun-deck" was where the crew lived and the anchor cables were handled, being pierced with oar and loading ports only. The short quarterdeck and forecastle were lightly built and also unarmed although the bulwarks had posts for swivel guns. Two sloops armed with 10 sakers and 4 swivels followed, the Happy being kept in the navy until 1735, an unusually long time for a sloop. In 1713, Acworth's Royal Oak (70) was launched, just a month after the end of hostilities. This was a rebuild of the successful 74-gun ship built by Robert Lee in 1690 and in conformation to the 1706 Establishment was smaller than the original, probably to the detriment of her unique qualities.

In November 1714, Acworth was made assistant to an ailing Daniel Furzer at a salary of £300 a year. He was promoted over the heads of Richard Stacey and Benjamin Rosewell, who had been his superior at Chatham from 1703. As well as deputising for Furzer at meetings of the Board, Acworth carried on his work at Woolwich where he had two ships under construction. One of these was the 80-gun Cambridge, but the other was a 100-gun First-rate that was launched in August 1715 as the Royal George. This was Acworth's most important ship and he had been working on the design since 1709. Originally called the Royal Charles, she was launched in 1673 to the design of Anthony Deane but at this point in her career she had to be girdled which increased her tonnage from 1443 to 1528 tons. She was rebuilt in 1693 as the Queen of 1658 tons but the final rebuild by Acworth created a completely new ship of just over 1800 tons. She was highly thought of, and although reduced to 90 guns in 1745, remained

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17 See fig. 12, page 247.
18 The lines of the Advice Prize were taken off after her capture and comparison of the draughts shows that the two ships had almost identical body sections. Chapelle (1967) states that this was the first foreign vessel to have her lines taken off in an English dockyard, but the lines of the ships taken at Vigo had been similarly recorded two years earlier.
19 PRO Adm. 6/12, f.5, 16 November 1714.
in service until 1769. Blaise Ollivier admired her during his visit in 1737 when he remarked that,

She is a very fair ship. Her lines are similar to those of the *Royal Sovereign*; I have seen her draughts. Yet she is superior to her, by the greater space which she has upon her decks, by the lines of her hull above the waterline, and by the fact that she is better executed in her upper works and has less sheer.\(^{20}\)

Furzer died in March 1715 and Acworth received his patent as Surveyor to the Navy on the sixth of April.\(^{21}\)

\(^{20}\) Remarks: 83. See fig. 13, page. 248.

The feeling of betrayal felt by George Lewis at the Tories' Restraining Orders and their unilateral peace negotiations ensured that his first ministry would be predominantly Whig despite a Tory majority in both Houses. This was overturned at the 1715 elections, but the unpopularity of the Hanoverians in the country as a whole, encouraged the rising known as the "15". Ormonde's premature flight and the defeat of the earl of Mar before James could join him meant that the danger to the succession was slight, but it was not until April 1716 that the last embers of revolt were finally stamped out. The result of the rebellion was the Septennial Act, the exclusion of the last of the Tories from the ministry, and their virtual demise as a political force. For the rest of the period covered by this study, political differences would be divided between the Court, City, and Country interests rather than along party lines.

The continuation of the Great Northern War (1700-1721), meant that Hanoverian interests tended to dominate foreign policy in the early years of the reign. Although this was unpopular, the depredations of the Swedish navy required a response, and fleets were sent to the Baltic between 1715 and 1718 for the protection of trade. Contemporaneously, there was war with Spain over her seizure of Sardinia and Sicily in July 1718 and for Britain this was a purely maritime war that culminated in the virtual annihilation of the Spanish fleet by Sir George Byng at the battle of Cape Passaro. A consequence of this policy was that both Sweden and Spain conspired with the Jacobites, and Ormonde essayed a further abortive invasion in 1719, supported by a Spanish squadron. In the North, the death of the turbulent Charles XII in December 1718 signalled a shift in power away from Sweden towards Russia and in 1720 and 1721 Sir John Norris returned to the Baltic in order to aid Queen Ulrica Eleanora against Britain's erstwhile ally. Although opposition members such as Walpole and Townshend consistently attacked the Ministry's actions as "Hanoverian", Stanhope and Carteret's policies were directed towards maintaining the balance of power and not allowing one nation to dominate the region and its valuable trade in naval stores.

Continued difficulties with Spain over their recognition of the Stuarts and commitment to the retrocession of Minorca and Gibraltar led to the dispatch of a fleet to the West Indies in 1727. It was probably the appalling death rate amongst the blockading squadrons that provided the impetus for the improvement in port facilities that took place in the area after 1729. 23

Despite the decayed state of the navies of the Bourbon powers, the navy had been well provided

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22 John, sixth earl of Mar, known as "Bobbing John" for his vacillation, being for and against the Union and the Pretender at various times. He had been Secretary of State for Scotland under Anne. B. Williams (1939): 151.

23 W.L. Clowes (1898): 3, 46. 2 flag officers, 7 or 8 captains, about 50 lieutenants, and over 4500 men died of disease, the most celebrated being Francis Hosier.
for and "extra" money for the cost of rebuilding and repair was voted in every year up to 1721.\textsuperscript{24} From Walpole's accession to power in the aftermath of the South Sea Bubble, however, the Ministry's focus shifted towards domestic policy, with the reduction of taxation and the national debt its priority.\textsuperscript{25} This parochialism, which endeared him to the Country Party and enabled him to control Parliament for two decades was dependent on peace and resulted in a failure to appreciate the renascent threat from France that dated from the \textit{Pact de Famille} with Spain in 1733. Nevertheless, his sound fiscal policies ensured that when war did come in 1739, Britain was in a strong financial position to meet it.

\textsuperscript{24} D. Baugh (1977): 453-8. See also appendix 12, pages 233-4.
\textsuperscript{25} B. Williams (1945): 177-9.
Acworth’s first task after assuming office was to revise the instructions for maintaining the ships in ordinary. These were an extension of the proposals issued in 1685 to which John Acworth was a signatory but in October 1715 he initiated a number of changes in the construction of ships, the most important of which was the introduction of cant frames at the bow,

Wrought as near a square as possible and this will likewise make them less circular and more supporting to the body than timbers set perpendicular and square athwartships.

This was not only stronger but also led to a considerable saving in timber. Other changes included an increase in the thickness of the planking between the main wales, making the wales and the planking between them flush, and the incorporation of “binding strakes” comprising,

Two strakes next the coamings fore and aft on the gundeck be wrought two inches thicker than the rest of the deck and scored with the beams and ledges and hooked and bolted into the breasthook and transom.

He confirms that this was done in order to prevent ‘cumbring’ (hogging) and may have been in imitation of French practice. His proposals were presented to the Admiralty Board in person, illustrated by means of models.

At this time Acworth was instructed to assume control of the design process and he was the first Surveyor to be officially asked to take on this responsibility. The motives for this innovation must remain a matter for speculation, but it is likely that the main reason was the Admiralty’s wish to exert greater control over the work of the shipwrights in both the royal dockyards and private yards. This would be achieved through the closer co-operation between the two Boards that became apparent from the appointment of Orford as First Commissioner in October 1714. It has been suggested that he complained about the additional work involved but his letter to the Admiralty merely asks for an ‘extra instrument’ to help in carrying out the routine work of the office so that he could devote time to this supervision.

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25 PRO Adm. 106/2507, f.197. 9 May 1715.
27 Bodleian Library, Rawlinson Mss. A/464, 12 May 1685. John Acworth was Assistant Master Shipwright at Chatham at that time.
28 PRO Adm. 106/3551. 14 October 1715.
29 PRO Adm. 49/132, f.233. They appear not to have been universally adopted as Ollivier criticised British shipwrights for not using them during his visit to the dockyards in 1737.
30 PRO Adm. 3/30, May 1716. There is a model in the possession of the NMM showing the disposition of cant frames and other alterations that was probably made for Acworth’s presentation. See fig. 14, p.249.
33 BL Add. Ms. 9328, 12 June 1716.
was duly appointed as an “extra assistant” at a salary of £150. In June 1716 Acworth wrote to all the Master Shipwrights at the Dockyards explaining the changed situation and asking them,

To prepare and send with your said draught a solid or model shaped exactly by the same, with the load waterline, the height of the decks and wales, the channels, chain plates, ports, galleries & co. marked thereon; ... in as particular a manner as possible for our consideration and directions therein, before you proceed on your building or rebuilding.

Complementary to these changes in maintenance procedure and ship construction was the imposition of a strict accounting procedure in the dockyards under the separate heads for the extra, wear and tear, and the ordinary. This was imposed because of a short-term interest by Parliament in the details of naval expenditure and a more flexible approach was soon reverted to, but it marked the assumption of a greater responsibility for naval accounts by the Navy Board at the expense of the Treasurer of the Navy.

In 1715, the Admiralty, in conjunction with the Flag Officers had proposed a new gun establishment that aimed at standardising the armament within each rate of ship regardless of size. This prompted a letter of objection from the Navy Board although they did agree that all the ships built or rebuilt to the 1706 Establishment ‘may be capable of carrying the guns proposed’. These proposals, which were promulgated on the 6 July 1716, reinstated the heavier armament reduced by the 1703 gun establishment, although the usual desultory performance of the Board of Ordnance meant that the changes could not immediately be carried out. Partly to compensate for the increased weight and partly as a result of lessons learnt from the late war, the Admiralty asked the Navy Board to propose a new establishment of dimensions. On 5 June 1719, the Board wrote to the Master Shipwrights of the Dockyards for their opinions and after joint consultation gave their reply on 7 November. Changes to the battle-fleet were small; the 80 and 90-gun ships were increased by two feet in length ‘to give them better room for their guns’ and the 80’s gained a foot in breadth, changes which hardly compensated for their reinstated armament. The 70-gun ships gained just 1 foot in length and 6 inches in breadth, while the only change to the 60-gun ships was a 1-foot increase in breadth. It was the smaller classes that gained most. The 50-gun ships were increased by 4 feet in length and 1-foot in breadth, while the 40-gun class gained 6 feet in length and 1 foot 2 inches in breadth. The 30-gun class received similar increases but none were built to the new Establishment and the

34 J. Collinge, (1978): 30. The post of Assistant Surveyor that had been created in 1689 was not filled in peacetime until 1729 when W. Mills was appointed at a salary of £300.
35 PRO Adm. 106/3551, 4 June 1716.
36 PRO Adm. 106/3551, 30 March 1717.
38 PRO Adm. 1/3627, 13 July 1715. The number of Guns on the 40, 50, and 60-gun classes was reduced to what it had been prior to 1703.
39 See page 121 above.
surviving ships were soon converted to 20-gun Sixth-rates by the removal of their lower and quarterdeck armament.

Sixth-rates were established for the first time, the design being based on the Dursley Galley, designed by Richard Stacey and launched at Deptford in February 1719. These were of similar dimensions to the 32-gun ships but reverted to Torrington's original concept with 20 six-pounders on the upper deck and an unarmed accommodation or "gun deck" pierced for sweeps, the light forecastle and quarterdeck being unarmed. There was some convergence in the proportions of the various rates, but this did not mean that 'the specialisation of function had been abolished'. Midship sections and bow profiles varied considerably and the lines of ships from 50 guns down were much finer than of those intended for the line-of-battle and they were also of lighter construction. The emphasis of the 1719 Establishment was on performance and scantlings were made smaller in order to reduce weight. It was the most prescriptive Establishment to date but the assumption that it precluded any experimentation is wrong.

Examination of the draughts of two 50-gun ships, the Falkland of 1720 and the Chatham of 1721, both designed by Stacey, shows the variation that was possible. The problem with this and later Establishments was that they failed to allow for the full exploitation of this experimentation. With the Falkland, Stacey drew a hull with marked similarities to the Superbe, taken from the French in 1710. With its great deadrise and a midship coefficient of only .74 compared with that of .82 for the more conventional Chatham, she would have needed either greater beam, length, or depth to give a similar displaced volume. Stacey apparently appreciated this for he made both the length and the breadth six inches greater than the established dimensions, which was probably as far as he dared go. The Falkland must have been a fast and weatherly ship and her midship section was to become the preferred model for the future, but she was probably rather tender and would have carried her guns low due to her small displacement. The answer to this dilemma was seen to lie in the increased breadth proposed by the 1733 Establishment.

41 Stacey succeeded Joseph Allin (senior) to the most senior Shipwright's post at Deptford following the latter's dismissal in 1715. He was superannuated in 1742.
42 D. Lyon (1993) attributes the design to the earl of Carmarthen but it seems that he is confusing Lord Dursley, who was later the earl of Berkeley and the First Lord of the Admiralty with Peregrine Osborne, marquis of Carmarthen, the gifted amateur designer of small ships.
44 See figs. 15 and 16, pages 250-1.
45 See page 128 above.
5.4 Sir Jacob Acworth and British naval administration, 1720-1739.

The corollary of Walpole’s fiscal policy was a reduction in naval expenditure and between 1722 and 1729 no “extra” money was provided. This did not mean that the navy was neglected and expenditure remained high compared with that of other nations but although money was regularly voted to pay off the accumulating naval debt, the pervading atmosphere was one of frugality and this was reflected in the activities of the Navy Board. The shortage of money meant that rebuilds were often deferred for many years while the “serviceable remains” became ever-diminishing piles of timber in the corner of a dockyard and size escalation came to be seen as highly undesirable. Satisfaction with the Navy Board was evidently high however, and on 31 August 1722, Acworth was knighted.

Following the death of George I in 1727, Lord Torrington replaced Lord Berkeley as First Commissioner of the Admiralty. It proved to be an enlightened administration and among its reforms and innovations was the foundation of a naval academy at Portsmouth to provide aspiring naval officers with an education similar to those of France. Acworth probably designed the austere looking building, for the Admiralty minutes record that,

A codified and printed book of instructions and regulations was issued for the guidance of officers, and from 1729 the qualifying period for lieutenants was raised to six years, two of which could be spent at the Academy. Legislation was also introduced for the more regular payment of seamen and it allowed them to remit pay to relatives or an agent. Neither were the dockyards neglected; a new dry-dock was built at Portsmouth and permanent naval bases were established in the West Indies at Jamaica and Antigua. Admiral Sir Charles Wager seems to have been the driving force behind the Academy while Thomas Corbett, then Assistant Secretary of the Admiralty, put together the Instructions. When Torrington died in office in June 1733 Wager succeeded him.

Historians generally regard this as a period of stagnation and Chapelle (1967) is almost alone in identifying this period as one of ‘progressive activity’ in ship design. Between 1729

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46 See appendix 11, page 233. For political expediency, in order to keep down taxation, short-term naval debt on tickets and tallies was converted to the long term as part of the national debt. See D. Baugh (ed.1977): 457.
47 Sir George Byng had been elevated to the peerage as baron Byng of Southill and viscount Torrington on the 9 September 1721. Berkeley had incurred the enmity of George II while he was Prince of Wales.
48 The Academy was of limited success. No officers of note came from it as it was considered that the loss of two years sea time and the patronage of a ship's captain outweighed the educational benefits. N.A.M. Rodger (1986): 265.
49 PRO. Adm. 3/41, 29 June 1733. See fig. 17, page 252.
and 1732, twelve 200 ton sloops were built to competing designs, the most successful being designed by Stacey and Hayward. In February 1732, trials were held between the *Experiment* (24), two sloops, the *Hawk* and the *Otter*, built in 1721 by Rosewell and Stacey and two new designs, the *Wolfe* and the *Grampus* designed by Stacey and Hayward respectively. The last two out-sailed the others in a variety of conditions and on all points of sailing.  

In June 1729, in a departure from the rebuilding policy that had been in force since 1706, the Navy Board was ordered to build six 60-gun ships in the place of eight 50’s that were due for rebuilding. These were to be built to the 1719 Establishment but the last of them, the *Centurion*, designed by Allin and made famous through Anson’s circumnavigation, was given a foot more breadth. Later, five more 50-gun ships to the 1733 Establishment were rebuilt as 60’s. The reasons are not hard to define; the 50-gun ship was now considered to be too small for the line-of-battle and the 60’s were seen as a more useful dual-purpose ship. They may also have been seen as more suitable for service in distant waters as their bodies were much more akin to the 70’s than the 50’s. However, without the length of the former or the fine lines of the latter, they would have lacked the performance of either.

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51 H. Chapelle (1967): 79
52 NMM Adm. A/2176, 4 June 1729.
Further evidence of progressive activity in ship design at this time is demonstrated by what Blaise Ollivier calls the "new manner of building". It is described in his *Remarques sur la Marine des Anglois et des Hollandois* written in 1737 following an intelligence gathering visit to English and Dutch dockyards. In it he evinced great interest in the "new manner" despite his scepticism concerning the applicability of the Newtonian theory behind it. In his report to Minister for the Marine Maurepas, he gives a clear statement as to what was meant by it.

A few years ago some of the English shipwrights put forward a new manner of building. They claim in following this method to build ships, which will sail faster than ordinary ships, will be more weatherly, will answer better the helm, and will hog less. To this end they have increased the beam of their ships of 60 and 70 guns by about a 28th part ... They have left unchanged the old length and depth in hold. They have made the floor at the midship-bend a 6th part longer than it was hitherto, and have given it one and three quarters or twice the deadrise which there is in their ordinary ships. They have fashioned the lines at bow and stern much less fine than in the previous manner of building, have fastened a double false keel, in such a manner that the keel and false keel project together beyond the planking one and three quarter times more than in our own ships; they have increased the height of the masts in proportion to the increase which they have given to the breadth, and claim to have employed in this new manner of building the principle of the solid or the curve of least possible resistance in cleaving the water as propounded by Mr Newton.

This had first been noted during an earlier "espionage" visit made by Blaise Geslain in 1729, who stated that he saw,

A frigate of 20 guns, built to the new manner of building of the cone, demonstrated and explained by the savant Isaac Newton.

The ship referred to is possibly the *Experiment*, built by Joseph Lock in 1727, as she appears to be the earliest example of the new shape.

This renewed interest in scientific design was supposedly based on Newton's "solid of least resistance", a mathematical model deriving from the 34th proposition in his work entitled *Philosophiae Naturalis Principia Mathematica*, first published in 1687. The conic sections produced by Newton's "solid" resulted in a much fuller bow than hitherto and Ollivier rightly observed that it could not be applied to its lower part. This he said,

was discovered by the English Shipwrights when they sought to employ the principle and [they] resolved the matter by drawing through the water various compromise shapes as close to the solid of least resistance as possible.

Since no record of the tests has come to light it is not clear what effect they had but the lack of correspondence on the subject suggests that either they did not excite much official interest or

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53 *Remarks*: 181.
54 Described by Maurepas as "a man of superior genius", Geslain designed and built the *Magnanime* (74), which was taken into the Royal Navy in 1748 and which was described as a "crack ship". *Remarks*: 26.
55 *Remarks*: 29.
56 An English translation of the original Latin text was not made until 1729.
57 *Remarks*: 183. The model was of course three-dimensional and took no account of surface wave making. It has been successfully used to create the bows of nuclear submarines.
that the shipwrights kept the experiments to themselves. If the prototype was indeed the
*Experiment*, it is likely that she was chosen to take part in the 1732 trials for that reason. The
results showed that she was reasonably fast down-wind in fresh conditions, but that she was not
particularly weatherly and this seems to have been a common trait of ships built in the "new
manner".58 Acworth seems to have readily embraced the new design philosophy and in 1730
sent Stacey the draught of what was to become the prototype of the 1733 Establishment 20-gun
ships.59 Compared with the fully developed design, the waterlines are extremely distorted,
which must have detracted from the performance, and, with full bow waterlines and fine bow-
buttock lines, the new ships had a shape that Chapelle (1967) aptly describes as "scow-like".

In April 1732 the Admiralty proposed to amend the 1719 Establishment and asked the
Master Shipwrights to propose enlarged dimensions.60 The suggestion that this was an attempt
to circumvent Acworth because 'he was already becoming identified as a reactionary force'61 is
not credible given his high standing at this time and that a similar procedure had been followed
in 1706 and 1719. In the event, the Master Shipwrights could not agree and it was left to
Acworth to settle the dimensions. The proposals were never gathered together and approved as
a whole but the Admiralty continued to order ships to Acworth's dimensions down to 1741.
Only the 90-gun ships received any alteration in length, but all rates gained substantially in
breadth.62 These varied, with the greatest gains being in the smaller ships in order to give a
uniform length to breadth ratio of 3.48:1 for all rates,63 although there seems to be no logical
reason for this standardisation other than bureaucratic "tidiness". Scantlings were to remain as
laid down in 1719. Ollivier equated the 1733 Establishment with the "new manner of building"
but they were not necessarily connected. Ships could be built to the new dimensions without
adopting the new bow although the increased deadrise, greater breadth and shorter keel made
fine bow-buttock lines easier to form, making the two systems complementary.

While the 1733 proposals were being formulated, intelligence reached London
concerning the large 64-gun ships that were being built in France. The first of these, the
*Fleuron*, built by Blaise Ollivier in 1730, was considerably larger than a British 70-gun ship and
to counter this threat the Admiralty, advised by the Flag Officers, suggested a new
establishment of guns. The proposal called for the 70-gun ships to be armed with 32-pounders
but reduced to 64-guns by the removal of six 9-pounders from their upper-works, giving them a

59 See fig. 18, page 253. This can be compared with the fully developed design as seen in the *Fox*. Fig.
19, page 254.
60 PRO Adm. 3/40, 18 April 1732.
comparable weight of broadside to the new French ships. The 60-gun ships were to have the 9-
pdrs on their upper decks replaced by 12-pdrs but be reduced to 58-gun ships, while the 50-gun
ships were to carry 24-pdrs in lieu of 18-pdrs as their main armament. This measure was
approved by the king in Council but was obstructed by the Ordnance Board and it would be ten
years before 70-gun ships got the larger guns. The Establishment increased the armament of
the Fifth and Sixth-rates by re-instating guns to their quarterdecks and increasing the calibre of
their main batteries from 6 to 9 and 12 to 18 pounders respectively. A pair of guns was also
added to the previously unarmed lower deck of the Sixth-rates. The request for this increased
gun-power probably came from sea-officers through the auspices of the Admiralty, but there
was no officially expressed protest from the Navy Board and the effect would be impaired
performance.

In the aftermath of the 1733 establishment proposals, the “new method” was extended
to larger ships and Ollivier identifies three ships that were built to test the new design
philosophy. These were the Eltham (40), built by Stacey at Deptford in 1736, the Elizabeth
(70), built by Ward at Chatham in 1737, and the Gloucester (50), built by Rosewell at
Sheerness, also in 1737. Sailing quality reports exist for the Elizabeth and the Eltham. The
report on the former is brief and shows that although she “steered easy”, and wore and tacked
well, she was an indifferent performer to windward, making a maximum of 7 knots in a
topgallant gale, and, that she “rolled deeply”. She was not popular with some of her
commanders and in July 1738, Acworth was writing to inform Ward that, “Captain Falkingham
greatly dislikes the Elizabeth”, the reason being that she ‘stooped to her sail’ more than
comparable ships and that ‘the Prince of Orange (a 1719 Establishment 70 built by Stacey) had
an advantage to her in sailing’.

The performance of the Eltham was also initially disappointing but she was later
enthusiastically praised and in January 1740, Acworth was writing to inform Allin that,

Since my letter to you of the 5th ins, I have seen my Lord Augustus, met him at Sr. Charles
Wager’s and discoursed him before Sir Charles concerning the behaviour of the Eltham, where his
Lordship ... declared his intire satisfaction in her behaviour and that since he lightened her, he has
had many trials even with all the ships of Admiral Haddock’s squadron and has wronged every
ship she has sailed with, therefore desires that nothing may be altered, except lengthening of the
head of the mainmast that you mentioned and the lengthening of the studding sail booms four foot,
which he prays may be done.

64 PRO Adm. 7/339, 28 April 1733.
66 PRO Adm. 91/2, 4 July 1738.
67 PRO Adm. 91/2, 21 June 1743.
68 NMM Adm. A/2255, January 1736.
69 PRO Adm. 91/2, 9 January 1740.
A sailing quality report showed that she could make between 6 and 7 knots to windward in smooth conditions but that this performance dropped off sharply as the wind and sea increased. On the other hand, she could make 11 knots with the wind abaft the beam, although she pitched “pretty deep.” This was probably due to a disproportionate volume of the immersed sections at the bow and stern but it is a further illustration that not all 40-gun ships were slow. The Gloucester accompanied Anson on his circumnavigation and his journal suggests that she was not very weatherly and rolled deeply. However, prior to the voyage she had “a good character” and in August 1738 Acworth wrote that,

Since the Gloucester is lightened, Captain Clinton says she goes exceedingly well and I hope will be a match for the Dragon.71

Damage to her masts, irreparable leaks and shortage of crew, led Anson to abandon her in the Pacific.72

Strangely for an admirer of Pangalo, Ollivier deplored the increased deadrise in the new ships but approved the increase in breadth, although he considered that this would be nullified by the increased height of the masts. He felt that the fuller bow would be stronger and more resistant to hogging but that it would result in slower ships. His conclusion was that,

The English have made, with their new manner of building, ships which cost them much more than their former ships, since they are larger, yet will be no more weatherly nor sail any faster than ordinary ships.73

The limited evidence from the sailing quality reports suggests that this was indeed the case but while historians have not always shared Ollivier’s appreciation that ships needed to be cost effective, it would seem that the “new method” was an attempt to increase performance without greatly increasing size. The ships seem to have been enthusiastically received by some of the younger commanders but viewed with deep suspicion by the older and more conservative officers.74 It was abandoned for the larger rates by 1741 although it survived longer in some of the smaller classes.

70 PRO Adm. 95/25, fl. 40 and 50.
71 PRO Adm. 91/2, 8 August 1738.
73 Remarks: 184.
74 For example: Vernon, NMM Adm. B/ 117, 3 March 1742; Mathews, PRO Adm. 1/ 381, 16 Nov. 1742
5.6 Sir Jacob Acworth and the supervision of ship design

As well as designing cruising ships, Acworth continued to supervise the work of the Master Shipwrights and to pass comment on their designs. This has been construed as being an unreasonable imposition of his own views, but apart from this being part of his job description, criticism was mainly confined to the younger shipwrights and was done with a measure of tact as a letter to Fellowes shows.

As to the draught you design for the Exeter, though the body is not strictly agreeable to my sentiments, it may do very well, but had the ship more rake afore the body would have less resistance, sheer better, and look much pleasanter to the eye, and the head may be greatly amended. The sheer of the ship is very well, but the stern too far aft, and the taffrail much too high, the gallery too much fore and aft and the top of it and upper lights much too high. Tis pity we can’t build these 60-gun ships snugger abaft. However, we should build them as snug as possible, and advance no part of their finishing that can be kept down, and nothing of the gallery seen above the planksheer of the after drift. However, now I have said all this, I only mention it for your consideration and desire that you will forthwith lay down a body and send a draught and solid to the board. 75

Acworth is asking for finer bow-buttock lines, 76 less overhang aft, and the galleries to the officers’ accommodation to be kept as simple and as low as possible. This is in keeping with his philosophy of keeping weight to a minimum and his suggestions must have produced an improvement in the final design. The letter also shows something of the constraints under which he was obliged to operate for he feels unable to do anything about the relatively long poop called for in the Establishment.

Acworth would sometimes promote his own designs and his 1733 Establishment Hampshire (50) was one such. 77 Four ships to this design were launched from private yards in 1741 and they apparently enjoyed a good reputation. A copy of the draught was sent to Fellowes, with the recommendation that, ‘as you must have heard the character of them, I submit them for your consideration only’. 78 Although Acworth was not reticent about offering the younger shipwrights ‘draughts of the approved ships that I have built’, he also recommended the designs of others and Hayward’s 1733 Establishment 60-gun Dragon was one that he often cited for emulation.

Acworth maintained an extensive correspondence with sea-officers about the performance of their ships and while his letters to most of them are cordial and respectful, regardless of their social standing, he could be scathing to those who he considered gave a ‘bad character’ to ships through carelessness or poor seamanship. When this occurred, rank did not

75 PRO Adm. 91/2, 21 Dec. 1739.
76 These were not shown on English draughts until well into the nineteenth century. It is possibly one reason why a “solid” was asked for as well as drawings.
77 See figure 20, page 255.
shield the recipient, as illustrated by his rather testy exchange with Admiral Sir John Balchen over the docking of the 80-gun *Princess Amelia* in 1735. Balchen complained that, when coming into the dock without ballast, the ship nearly capsized and requested that she be girdled to improve her stability, stating that 'he expected the Surveyor of the Navy to object to it'.

Acworth did not object, but he delivered a homily about the danger of not leaving in sufficient ballast when moving ships, the undesirable addition of weight to the forecastle and quarterdeck, and the importance of keeping the booms where the boats and spare spars were kept as low as possible. He then issued his instructions direct to the dockyard which prompted a complaint from the Admiral to the Admiralty Secretary,

> There's a long letter to the officers of the yard [from Sir Jacob], directing them to lay the booms as low as possible and to let there be no more weight upon them than is necessary, the boats stowed snug and to have 60 or 70 tons of ballast more in and to be laid low, and all without ever taking notice of me or any other officer wether it be convenient to be so or not. I think he might have the good manners to have directed them to have let me know what he would have them do. He might have given the officers [of the dockyard] directions to have girdled the ship and left the rest to the officers that are to go in her. However, what is ordered to be done I don't doubt will be of great service to the ship and am sure it is a great satisfaction both to officers and seamen.

In 1739 Acworth was again writing about the addition of top-hamper to 80-gun ships. This time it was to Allin, who had made additions to oblige Sir Chaloner Ogle.

> I hope you have or will please the Admiral; it is pretty extraordinary that tender ships should have their masts lengthened and their weight aloft increased by lengthening of their poops, when in my opinion the whole of the poop should be taken away both in the *Princess Caroline* and *Amelia*, or reduced to a very small cabin aloft and the forecastle to a small platform forward as first designed.

A complaint from the commander of the *Swift*, that his snow-rigged sloop was dangerously over-canvassed also received a contemptuous reply:

> There are very few vessels that want sail in a gale of wind, or that have too much in light winds, and if they are designed to sail fast, they must have a quantity of canvas to assist them, and in a gale of wind care must be taken to hand or shorten sail in time, and in my opinion such vessels, especially small ones, that do not sail fast, should not be employed, but laid up as quite useless.

The changes engendered by the 1733 Establishment proposals were probably in part responsible for a greater interest in the comparative evaluation of performance. Acworth's correspondence from this time shows an increasing interest in data relating to the rigging, ballasting, trim and performance of individual ships. There was a two-way flow of information with the Master Shipwrights and ship's captains aimed at bringing the performance of mediocre performers up to that of the best in their class. The information that he collated would

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79 PRO Adm. 1/ 796, 17 January 1735.
80 PRO Adm. 1/ 796, 2 February 1735.
81 PRO Adm. 9/1 2, 4 August 1739.
82 PRO Adm. 9/1 2, 14 September 1738. The commander might have had a point as four out of the ten Acworth designed *Drake* class sloops were lost at sea, including the *Swift*. See fig. 21, page 256.
eventually lead to the composition of the standard sailing quality reports that dated from 1743 and which would prove a valuable database of ships' performance, but as early as June 1738 he wrote to Rosewell concerning the Elizabeth:

Tell the Master he will oblige me much if he will send me frequent accounts of the ship's behaviour without flattery; genuine accounts are best. 83

The sailing reports would demonstrate that two ships built to similar dimensions could have widely different sailing characteristics and Acworth, who was averse to criticism of any ship that he had a hand in, often used the reports to show that similar ships behaved satisfactorily. Such criticism would usually be met with a homily about keeping the iron ballast low and not sinking the casks deeply in the shingle ballast. It is obvious that the ballasting and trim of the ship could greatly affect its performance and that some Masters achieved better results than others.

By 1739, Acworth's questions about a ship's sailing performance reflected almost exactly the queries later contained in the official forms 64 and a letter to Allin concerning the performance of the Eltham illustrates this. He asks him to find out,

The officers' opinion of her sailing by and large, working in staying and wareing and keeping of a wind, the most knots she has run by and large, how she generally keeps her helm, behaves in a head sea, and rolls in the trough of a sea, and lays to under a mainsail, and how she rides in a great sea; qualifications very proper to be known in all ships. The best account you can meet with them in this ship will oblige. 85

In the case of the Eltham, this attention to detail apparently paid off, producing the enhanced performance that so pleased Lord Augustus Fitzroy. 86

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83 PRO Adm.91/2, 21 June 1738.
84 For a draft sailing quality report, see appendix 9, page 229.
85 PRO Adm. 91/2, 14 December 1739.
86 Lord Augustus Fitzroy (1716-1741) was the third son of the second duke of Grafton, the Lord Chamberlain, and a grandson of Charles II through Barbara Villiers. He was a frequent correspondent with Sir Jacob and assumed command of the Eltham in 1736 at just 20 years of age. He survived the great gale of that year, bringing her safely into Margate but died of fever in the West Indies in 1741 while in command of the Orford (70) as part of Vernon's fleet.
5.7 The War of Jenkin’s Ear and the 1741 Establishment.

The war that Robert Walpole had tried so hard to avoid was finally declared on the 19 October 1739, ostensibly over the removal of a merchant captain’s ear. Historians have suggested that it was one for which the navy was unprepared and that this was the reason for Britain’s lack of success during the early years of the conflict. If this was the case, the parliamentary opposition, who clamoured so vociferously for war, did not think so. On the contrary, they assumed that the navy could easily hold the French in check, should they seek to intervene, while enriching the country by plundering Spanish possessions in the Caribbean. Such war policy as there was, advocated a distant water strategy aimed at disrupting Spain’s communications with the New World and seizing her overseas possessions.

Vernon’s early success in capturing Porto Bello in November seemed to support this early optimism but the lack of results elsewhere was ominous, particularly the failure of Haddock to enforce the blockade of Cadiz, and Balchen’s failure to intercept the incoming treasure flota. Mobilisation was slow, but this was due to the usual problems in manning and to a typhus epidemic that decimated the crews of ships and dockyard workers alike. Moreover, not for the first time, Britain found herself embarrassed by a shortage of cruisers and although seventeen Fifth and Sixth-rates had been ordered early in 1739, their delivery was delayed due to extremely harsh weather over the winter of 1739-40. Sir John Norris had pleaded for a postponement of the declaration of war until the spring but was overruled and it seemed not to occur to the warmongers such as Newcastle that English trade was more vulnerable than that of Spain, most of which was carried in foreign bottoms.

An expedition comprising a powerful fleet and a land force of 8000 men was planned for the West Indies even before the news of Vernon’s ephemeral victory was received in England. However, the failure of the blockade meant that the Spanish possessions had been heavily reinforced and the lack of co-operation between Vernon and General Wentworth contributed to the failure to capture either Cartagena or Santiago, with the greater part of the force dying of disease. As Sir Chaloner Ogle wryly observed,

The nature of ye climate is such that it is impossible to keep ye people alive so long as to do anything considerable.

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88 H. Richmond (1920): 37.
89 Ibid.: 101. Not as some historians think, as a result of it (e.g. D. Baugh 1965: 23).
90 Ibid.: 102-25. Wentworth succeeded Lord Cathcart who died of dysentery the day after the fleet arrived at Dominica.
The onset of operations led to a call from naval officers for increased armament; the answer to which was seen to be the implementation of the dormant 1733 gunnery proposals and Acworth was asked to produce a revised establishment of dimensions to accommodate the additional weight. Apart from the 50-gun ships, which gained six feet in length and one foot six inches in breadth, necessitated by their new armament of 24 and 12 pounders, the increases were modest, averaging about five percent. Only ships built to the new dimensions were to receive the larger guns92 and although the 1741 dimensions remained as proposals93 and ran for only four years, a considerable number of ships were built to them.

The lack of any definite strategic objectives in a war that it did not want led to a loss of parliamentary support and the collapse of Walpole’s administration, which included Wager. Walpole’s belated resignation did not mean a complete loss of influence as many of his former colleagues stayed on, but Carteret 94, reinstated as a Secretary of State, became the effective head of the Administration.95 Daniel Finch, eighth earl of Winchelsea replaced Wager at the admiralty and Murray (1938) observes that he “handled business with the uninstructed self-confidence of his father”96. Carteret pursued a “Hanover” policy that endeared him to the king but alienated much of the Commons and opposition sniping went on unabated. One of his failings was his abysmal choice of commanders, exemplified by the choice of Thomas Mathews to command the Mediterranean fleet. Mathews’ relationship with the Navy Board was not good. He had been brought out of effective retirement as Commissioner for Chatham dockyard where his overbearing manner had occasioned a series of strikes for which the Navy Board considered him responsible97. His main qualifications were that he was a sound “New Whig” and a friend of Carteret. After his dismal performance against the Franco-Spanish fleet off Toulon in February 1744 there was a parliamentary enquiry, but the motion moved by Lord Granard in April was to

... appoint a committee of enquiry into the conduct of the fleet for the past two years ... founded upon the complaints made by Admiral Mathews in his letters to the Admiralty of great defects in his ships and neglect in sending him stores, and all other supplies.98

The motion was seconded by Admiral Vernon, who accused Sir Jacob of having,

... altered the proportions of the ships for the worse, and building them much slighter and less serviceable than they used to be, so that they stood in need of perpetual repairs.

92 PRO Adm. 3/37, 4 June 1743. The order refers to the new (gun) establishment made on 25 April last.
94 Carteret became the first earl Granville on the death of his mother on 18 October 1744.
95 Lord Wilmington (formerly Spencer Compton) was First Lord of the Treasury but had less influence than did Carteret. See B. Williams (1943): 122-3.
96 Murray is referring to the second earl of Nottingham, William III’s Secretary of State and Swift’s “Bolgolam” or “Dismal”.
97 PRO Adm. 106/907, 30 August 1739; NMM Adm. B/ 110, 31 August 1739.
In the event, the move for a factional select committee was defeated and the matter was dropped for the time being.99

It is now clear that failure was due mainly to the inadequacies of the commanders and the politicians who directed them rather than material deficiencies. The accepted system of promotion by seniority meant that many of the flag officers were old and, owing to the long period of peace, untried in the command of fleets. The Admiral of the Fleet Sir John Norris was 80 in 1740 and when he retired in 1744, the 76-year old Balchen, who was lost with all hands when the Victory went down on the Casquets in November, succeeded him. Most flag officers were also politicians, deeply involved in the factional infighting that was endemic until 1745 and Mathews' stream of impractical requests to the Navy Board during his command in the Mediterranean diminishes the credibility of his fault finding. The main reason for his failure to defeat the French at Toulon on 11 February 1744 was not the state of his ships but a failure to exercise them in fleet manoeuvres or to communicate his intentions to his subordinates. Once his friends were out of office he was tried by court-martial and cashiered in October 1746.

Acworth thought that naval officers were too ready to find fault over trivial matters. In April 1740 wrote to Mathews' secretary in reply to one of his letters about the alleged poor condition of his ships,

I have been in the service 57 years and remember ships in King Charles' time always decayed as fast, I am sure much faster than they do now. But at that time, and long since, officers were glad to go to sea and would not suffer their ships to be complained of and torn to pieces in search of hidden defects100.

While there was some truth in what he said, his plain speaking would make him few friends among flag officers.

Historians have found difficulty in assessing Vernon's capability, something that they share with his contemporaries. To Lestock he was 'that provident great admiral', while to Horace Walpole he was 'that noisy, silly creature' who couldn't keep to the point of a debate. There is little doubt that he was professionally competent and that he was genuinely concerned for the welfare of seamen and the underprivileged,101 but he was stubbornly dogmatic in his opinions and his reaction to contradiction verged on hysteria. He was much given to tendering his advice to the Admiralty whether it was requested or not and he managed to be in opposition to all three administrations during the war. He too was critical of the fleet put at his disposal, describing it as 'The worst man'd squadron that ever went out of England'102 although in

100 PRO. Adm.91/2, April 1740.
101 Son of William III's Secretary of State James Vernon, he built a workhouse on his estate at Nacton that was a model of its kind.
102 PRO Adm. 1/710, Vernon to Sir Charles Wager, 22 July 1939.
contrast to fleets that followed him he was well manned, with full complements. The Admiralty found his criticism of their orders a constant irritant and in 1745 an offer to resign from command of the fleet guarding against a projected invasion was gratefully accepted. He was dismissed the service in April 1746 for publishing two pamphlets criticising the Admiralty, both of which contained correspondence between himself and the Commissioners.

Despite the debacle of Toulon and criticism of the Winchelsea Admiralty, naval affairs played relatively little part in Carteret's downfall which was mainly due to the perceived failure of his continental policy and his estrangement from the Commons, whose support he had never tried to gain. When he fell in November 1744, many of his followers went with him and these included Winchelsea from the Admiralty. His “court oriented party” gave way to a coalition of disparate interest groups or “Broad Bottom” administration, whose leading figures were the Duke of Newcastle and his more able brother Henry Pelham, both of whom had been in Carteret's government. The duke of Bedford, a vociferous critic of the Navy Board and a former member of the opposition, became First Commissioner and his twenty-seven year old protégé Lord Sandwich followed him onto the Board. Lord Vere Beauclerk and newly promoted Admiral George Anson filled the rest of the vacancies as naval representatives.

Bedford was neither energetic (he was building Woburn at the time) nor particularly knowledgeable of naval matters and his appointment was as much a piece of political “jobbery” as Winchelsea's had been. The duke of Richmond warned Newcastle,

As for his Grace of Bedford being at the head of the Admiralty, I own I am very sorry for it, for I look upon him to be vain, proud and wrong headed and I fear you will have a great deal of plague with him.

Nevertheless, he had able helpers in Sandwich and Beauclerk, who were willing to be guided in sea affairs by Anson. The Commissioners were young and aristocratic and their initial relationship with the aged members of the Navy Board was confrontational. Dissatisfaction with the speed that ships were being prepared for sea at Portsmouth resulted in them attempting to put the Dockyard Officers under the control of Admiral Steuart. Commissioner Hughes at Portsmouth urged his fellow Officers to stand firm in the face of this attempted usurpation and the Admiralty was forced to back down. It was in this charged atmosphere that the new Administration turned its attention to ship design. In particular, they showed an interest in

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104 Vernon Papers, Mss. 510, 511. Secretary of the Admiralty to Admiral Vernon, 25 March, 4 April 1746. The pamphlets were A specimen of naked truth from a British Sailor and Some Seasonable Advice from an Honest Sailor.
106 Beauclerk, Lord Vere (1699-1781) was the third son of Charles Beauclerk, first duke of St. Albans and the illegitimate son of Charles II by Eleanor Gwyn. He had two brothers in the navy.
107 BL Add. 32703, f.464.
developments that were taking place on the Continent and one of the first acts of the new Board was to order Acworth to redesign an 80-gun ship, currently being rebuilt to the 1741 Establishment, as a 74-gun ship. This was launched in 1747 as the Culloden and can reasonably be described as the first British 74 of the eighteenth century, although at 1487 tons she was much smaller than were her French counterparts.\textsuperscript{109}

Meanwhile, the situation on the Continent continued to deteriorate and in May 1745 the "pragmatic army" under the command of king's second son, William duke of Cumberland was narrowly defeated by a superior French force at Fontenoy. This resulted in the French occupation of Flanders and the capture of the British supply base at Ostende. This success revived Jacobite hopes and in June the "Young Pretender" sailed from Nantes in a privateer frigate accompanied by the Elizabeth (62) carrying arms and supplies. The Elizabeth was engaged by the Lyon (58), and after a hard fought contest, was forced to return to France without unloading its stores.\textsuperscript{110} The navy was reasonably successful at intercepting supplies and captured eight frigates or privateers that were in contact with the rebels.\textsuperscript{111} The crushing victory at Culloden in April 1746 and the retribution visited on the Highlands by Cumberland ended Jacobite aspirations for good.

The closing stages of the war saw an improvement in the fortune of British arms. In America the colonists, supported by Admiral Warren, took Louisburg. At sea, Anson assumed command of a reinforced Western squadron and on 3 May 1747 encountered Jonquière escorting a convoy intended for the recovery of Cape Breton. All the ships that resisted the superior British force were captured, including the Invincible (74) and the Serieux (64), both of the "new construction".\textsuperscript{112} A similar but much sterner contest was fought on the 14 October when Edward Hawke met L'Etenduère escorting 252 ships bound for the West Indies, also off Cape Finisterre. Three 74, two 64 and one 56-gun ship were taken in a hard fought battle that brought much credit to the out-numbered French defenders. These victories and the success of the Western squadron against French merchant shipping inclined the Bourbon powers towards peace notwithstanding the success of their armies. In May 1748 the preliminaries were signed at Aix-la-Chapelle and a definitive treaty that restored the status quo ante bellum was signed in October.

\textsuperscript{109} PRO Adm. 3/49, 31 December 1744. The only 80-gun ship built to the 1741 Establishment was the Newark, two others being completed as 66-gun ships. See fig.22, page 257.

\textsuperscript{110} The Lyon was commanded by Piercy Brett, one of Anson's young protégés. The action is described in detail in W. Perrin (ed.1927):100-116.

\textsuperscript{111} F. McLynn (1981):169 suggests that the navy would have been impotent to prevent an invasion by French troops on the basis that only eight out of thirty-two supply missions were intercepted. This is to totally ignore the difference between the risks undertaken by individual "runners" and a fleet of transports conveying an army.

\textsuperscript{112} See page 170 below.
5.8 French naval administration and ship design.

At the end of the War of the Spanish Succession both the French merchant marine and navy were in a moribund state and continued so throughout the Regency. In 1723 two events marked the beginning of a new era for the French navy; Cardinal Fleury became chief minister and de Maurepas, son of Jerome de Pontchartrain, assumed control of the Ministry of the Marine, a post that he had nominally held since he was fifteen years old. Trade prospered and by 1735 the merchant fleet, which at the end of the last war had numbered about 300 ships, had increased to around 1800. From 1730, the navy was allocated an annual budget of 9 million livres (approximately £500,000), which allowed for the maintenance of a fleet of about 54 ships, the upkeep of dockyard facilities and the construction of about three ships of the line per year.\(^{113}\)

During the early years, attention was given to restoring the battle-fleet and construction was concentrated on ships of 74, 60 and 50 guns similar to those that had been built in the last war.\(^{114}\) The 74-gun ships carried the same number of guns on their main batteries as English 70's\(^{115}\) but the greater size of French ships of a given rate has already been noted and Ollivier observed that,

> We build our 74-gun ships 5 or 6 feet longer than the English 80-gun ships; our 60-gun ships the same length or 2 or 3 feet longer than the English ships of 70 guns. We give to most of our ships of 50 guns the length which the English give to their 60-gun ships. Our frigates of 40 and 30 guns are about 2 or 3 feet longer than those of the English. We are nearly in agreement on the length of our frigates of 20 guns.\(^{116}\)

In 1730 Ollivier launched the Fleuron, a 60-gun ship that was six feet longer than usual and the first ship of what came to be called "the new construction".\(^{117}\) She still carried a 24-gun lower battery but in 1734 François Coulomb launched the Borée, her length augmented by a further six feet and carrying 26 guns on the lower deck.

This gun arrangement would henceforth be the norm and at an average burthen of 1250 tons by British measurement they were slightly larger than British 70-gun ships and fired a similar weight of broadside. The main advantage of the large size of these ships was that it allowed them to be constructed with fine lines and yet have sufficient carrying capacity for their increased armament and the stores required for their large crews. Some of this advantage was lost however, by their short floors and slack bilge which necessitated a deep draught to obtain sufficient underwater volume. Ollivier had recognised this problem by 1738 when he built the

\(^{113}\) E. Jenkins (1973): 108.

\(^{114}\) The 60's carried from 60 to 68 guns and the 50's carried anything from 50 to 60 guns, the difference being in the weight of the main battery; "50"-gun ships carrying 18-pounders while "60's" carried 24-pounders. J. Boudriot (1994): 60.

\(^{115}\) Remarks: 19.

\(^{116}\) Ibid.: 133.

\(^{117}\) It is worth noting that the Fleuron was still steered by a whipstaff.
experimental Mars with English-style midship sections but this practice was not repeated until 1745 when Jaques-Luc Coulomb built the Lys, Dragon and Fougeaux on similar lines. The principle of enlargement was extended to 74-gun ships with the construction of the Terrible in 1739. The gun-decks were lengthened to accommodate an extra gun on the tier and like the four large 70-gun ships built in the last war, carried 36 and 18-pdrs, giving them as much fire-power as a British 90-gun ship. Nevertheless, financial restraint meant that prior to the launch of the Terrible, France had only three ships of the “new construction”, all of them 64’s.

The Terrible was not particularly successful, but in 1744 two ships were launched that were to set the standard for the rest of the century. These were the Invincible built by Morineau at Rochefort and the Magnanime built on a neighbouring slip by Geslain. These were six and eight feet longer than the Terrible and much better sailers. The ships were designed to achieve ship superiority, having the potential to beat any individual English ship, or to escape from a superior force. Unfortunately the parsimony of the French treasury meant that there were never enough of them and their use in defensive convoy roles led to them being taken by their more numerous opponents. In an extension of this policy of enlargement, the French launched an 80-gun two-decked ship the Tonnant, in 1743, three more being built before the end of the war. Intended as flagships, they proved to be fast and weatherly, but their great length, (the Soleil Royale was 194 feet long by English measure) meant that they were subject to early distortion and were expensive to maintain. However, with the launch of these three types of ship, the French seized the initiative in design that they were not to lose for the remainder of the Ancien Regime.

5.9 The Norris Committee and the 1745 Establishment.

The dissatisfaction with their ships expressed by the more vocal and opinionated sea officers such as Mathews, Vernon and Knowles led the Admiralty to consider a new establishment of dimensions. The Winchelsea Board initiated an enquiry on the 22 June 1744, four days after the receipt of a letter from Vernon in which he attacked Sir Jacob with all the force of his invective.

I have given it as my opinion in private as well as public that the arbitrary power a half-experienced and half judicious Surveyor of the Navy has been entrusted with had in my opinion half ruined the navy.

He went on to say that,

With his too much pride and self-sufficiency to be capable of being better informed and too little good sense or solid judgement for being capable of directing all himself, [he] has made ours a declining navy in the art of shipbuilding, at a time when both Spain as well as France have been greatly improving in it.122

The last quotation contains a possible reason for this vituperative attack. On being asked to comment on Vernon’s proposals for improving the sailing qualities of the 80-gun ships, Acworth had given a reasoned rebuttal of his rather absurd suggestion that the lower masts be lengthened and topmasts shortened.123 Vernon was not a man to suffer contradiction with equanimity.

The faults of British ships were more cogently described by Commodore Knowles, a follower of Vernon and equally argumentative. In a letter to Winchelsea dated January 1745 he ‘begs leave to observe’ that,

The enemy’s ships of each class have always a port or two in a tier more than ours ... whereas our ships are generally crowded with a heap of small guns ... so that one of their ships of 52 guns is near as good as one of ours of 70.

He concludes that,

The ships must be so much the longer, which will in every respect make them better sea boats, and give space for more guns in a tier.124

This view was beginning to recommend itself to those responsible for procurement and a committee to consider proposals to be made by the Surveyor, Master Shipwright’s and ‘several eminent shipbuilders’ from the private yards was convened under the auspices of the recently retired Admiral of the Fleet Sir John Norris. The terms of reference laid down by the Board of Admiralty were to propose,

a solid and well directed system and establishment for building a ship of each class or rate down to a sloop inclusive.

122 PRO Adm. 1/578, 18 June 1744. Vernon to the Admiralty Secretary.
123 NMM Adm. B/117, 3 March 1742.
124 BL Add. Mss. 15956, ff.119-22. Knowles was unaware that the duke of Bedford had replaced Winchelsea on the 27 December 1744.
They added that, 

As the present ships of eighty guns, with three decks, are in general ill-approved, they were directed to propose ships carrying seventy-four guns with two decks and a half in their room.

The proposals were then to be examined by,

The Flag Officers of the Fleet, such Commissioners of the Navy as have been commanders at sea, such Captains as have served as Commodores with Captains under them, and such of the senior Captains as shall be thought proper to assist at the said consultations. 125

The Committee met between June and August 1745 and reported back to the Admiralty on the 27 November, the meetings being held at the Navy Board, possibly to accommodate the decrepitude of Acworth and Haddock. The report stated that the Committee had consulted the Surveyor and the ‘several Master Shipwrights’ and that they had ‘desired the Surveyor of the Navy frequently to be with us’. Taking into account the size of the docks, they examined the ‘several propositions’ submitted and fixed the dimensions ‘for a ship of each class’ but,

Having observed on many occasions the advantage eighty-gun ships with three decks had over those with two and a half, judged it for the benefit of the service that so useful a class of ships should be continued. 126

The new Establishment gave the largest increase in dimensions yet, 127 but was more prescriptive than previous Establishments in that the design of ships was to be standardised. To this end, a committee of shipwrights betook themselves to Deptford and prepared draughts for a ship of each rate which were then ‘carefully examined’ by the committee members, approved by the Admiralty, and ratified by the king in Council. Acworth was not present at these meetings and it is unlikely that he played much part in the design process, although his draughts seem to have been used for the 50 and 60-gun ships. 128 In January 1746 he was asking the Admiralty for the ‘draughts of ships that were prepared by Sir John Norris and other gentlemen who assisted at the setting a new Establishment’, in order that he could have copies made. 129 It appears that Joseph Allin played the major role in preparing the designs

Naval historians have generally blamed Acworth for the conservatism displayed by the Committee but this ignores its composition and over-estimates the influence he is likely to have had over its members. Apart from the aged Norris, the senior officers were Mathews and Vernon, both of whom he had offended, also prominent were Lord Vere Beauclerk and George Anson, both Admiralty Commissioners and among those seeking reform. 130 The Committee is best remembered for its rejection of the 74-gun ship in favour of the retention of 80-gun three deckers, but since the decision as to the type of ship that would be established in 1745 was

125 PRO Adm. 3/49, 31 December 1744; 16 February 1745.
126 PRO Adm. 95/2, 27 November 1745.
128 NMM. Drawing. nos. 1394, 1252.
130 A full list of members of the committee is reproduced as appendix 10, page 230.
solely the prerogative of sea-officers, one must conclude that it was not 80-gun ships per se that they objected to but the size and performance of those that they had. The senior flag officers still thought in defensive terms and in a formal battle undertaken in reasonable conditions they could be ugly opponents. At Toulon, the *Norfolk* is reported to have driven the large Spanish 70-gun *Constante* out of the line 'a shattered wreck'\(^{131}\); however, what they could not do was pursue a fleeing enemy whose fleet consisted of large two-deckers.\(^ {132}\) The navy would continue to show a predilection for small three-decked ships for the rest of the century, although the 80-gun ships would soon be abandoned in favour of 90's. The extent to which Acworth participated in the Committee's proceedings is open to question as he was originally omitted from those receiving expenses for attending the meetings, although this was later reversed.\(^ {133}\) It is possible that illness, (diplomatic or real), limited his participation, and this might explain the appointment of Allin as Joint Surveyor soon afterwards.

The reaction of the Bedford Board to the Committee's findings was simply to ignore them where they conflicted with their own views, continuing to order the reduction of three-decked 80-gun ships to two decked 66's when they came up for rebuilding. It is nevertheless ironic that the only good ships to come out of the long deliberations were three-deckers. The *Royal George* and the *Britannia*, both 100-gun First-rates, were highly regarded, the latter surviving to fight at Trafalgar and not being broken up until 1825. No 90-gun ships were built to the Committee's designs but the single 80-gun ship to the Establishment, launched in 1757 as the *Princess Amelia*, was also well thought of. Fincham described her as being 'a very superior ship in her time' and she was frequently used as a flagship, not being sold out of the service until 1818.\(^ {134}\) All the designs saw a move away from the "new method" of building, with less deadrise and fuller runs and this was to lead to problems that would become apparent after the end of hostilities.

The 1745 Establishment failed because it had the opposite effect to that intended by the reformers in the Admiralty. It locked them into the wrong kinds of ships, but because the most eminent men in the navy had blessed it, it proved hard to circumvent. Anson was unable or unwilling to impose his views on the rest of the Committee, but with its policy of close blockade, the Western squadron under his command was pursuing a different kind of war; one that showed the limitations of the small 3-decked ships and 2-decked cruisers, and it became the

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\(^{131}\) W.L. Clowes (1898): 3, 98.

\(^{132}\) The main reason for Keppel's inconclusive action off Ushant in 1778 was that his fleet contained seven 90-gun ships. It was the first major formal battle in European waters since Toulon and the similarities are striking. See A. Lambert (2000): 133.

\(^{133}\) PRO. Adm. 3/55, 13 October 1746.

\(^{134}\) J. Fincham (1851): 80. At 1585 tons, she was slightly larger than a 90-gun ship of the 1719 Establishment but was still smaller than contemporary 74's.
test bed for most of the converted ships and for those built outside the established dimensions prior to 1745.135

A few days before the 1745 Establishment was ratified, some of the more influential Admiralty Commissioners tried to engineer Acworth’s retirement. Henry Bilson Legge136 wrote a letter to the duke of Bedford at about the time that the decision was taken to appoint Joseph Allin as joint Surveyor.

I am the more encouraged to send my verdict because I find it agrees entirely with the opinion of Ld. Sandwich & Mr. Anson ... I shall therefore take the liberty to use the particle We. We are then extremely of opinion and agree in wishing that Sr. Jacob should retire with every circumstance that can make his old age easy & happy, but retain no influence in Naval architecture. For it is high time ships began to have bottoms to them as well as better economy prevailed in the dockyards. This cannot happen while he has any influence for whilst he has any he will have it all. We know Sr. Jacob to have so much of the nature of Pompey the Great in him that he cannot be an equal & if Mr Allen (sic.) should have so much of the temper of Julius Caesar about him that he cannot brook a superior, what must ensue but civil war added to the many indecorums and distresses the dockyards at present labour under? Things will go on worse than ever, the same lazziness, the same want of economy, the same aversion and discouragement to ingenuity, nothing will be suffered to continue in the Yards but cousins & flatterers, & nothing turned out but bad ships & able shipwrights.137

The Bedford Board had received their places on a ticket of reform to which they clearly saw Acworth as an impediment. In this they were undoubtedly correct for he looked to the past for his inspiration and was unable to adapt to the changed situation manifested by France’s entry into the war. In the event he did not retire but in the aftermath of the Norris Committee it was no longer an issue as the design of ships had been set for the foreseeable future.

As for the Dockyards, independently minded Commissioners and Officers who resented outside interference ran them. Moreover, Dockyard patronage had long been in the hands of the Admiralty so that any pressure that could have been exerted by the Navy Board through giving or withholding promotions had been taken away from them. In 1746, Acworth’s recommendation for filling the post of Clerk of the Survey at Deptford was refused in favour of another candidate, perhaps another indication that his influence was on the decline.138 The main complaint was that ships took too long to re-fit, but this situation was often exacerbated by crews not helping to prepare their ships for docking by removing the guns and stores or helping with the rigging. The eventual answer was employ special gangs of labourers to do the work but this was a matter for the Admiralty and Treasury, not the Navy Board.

135 A point that was made in unpublished material kindly supplied by R. Gardiner (1997). For a list of these ships, see appendix 5, page 217.
137 Woburn Mss. XI, f.34, 6 March 1746, quoted in D. A. Baugh (1965): 90.
138 Woburn Mss. XV, F.54, 28 November 1746, quoted in D. Baugh (1965): 302. The vacancy had been occasioned by the death of the Storekeeper, who happened to be Acworth’s brother-in-law.
Prior to the start of the War of Jenkin's Ear, British cruisers had compared rather favourably with the opposition. Certainly, the Spanish ships that were encountered in the early years of the war were not particularly well regarded and few captured ships were taken into service. With the entry of France into the war however, the limitations of the 24 and 44-gun frigates began to be exposed. The era of the "classic frigate" started in 1740 with the launch of Blaise Ollivier's Médée. The individual elements of its design were not new and had been combined in the Swedish Vita Örne of 1711, but like many Scandinavian innovations they had been ignored elsewhere. The new French frigate was a development of the frégate légère in its simplest form but on enlarged dimensions and was shortly to replace that class of ship altogether. The Médée carried a single battery of twenty-six 8-pounders on a structural upper deck and had a light, unarmed accommodation deck that was about 4 feet in height and placed slightly below the water-line. In all, ten "frigate form" ships were built for the navy before the end of the war.

The Médée was captured in April 1744 by the Dreadnought (50), Captain Boscawen, aided by the Acworth designed Drake class sloop Grampus. She was not bought into the Navy despite her reputation as a fast sailer but fetched a good price at auction, becoming the privateer Boscawen. Her career under the celebrated George Walker was short however, for in December he was forced to run her ashore to prevent her foundering and she instantly broke up. It was reported at the time that,

Her scantling ... was slight for her size, her planks insecurely fastened with iron nails whose heads had rusted away, her guns too heavy for her strength.

The weakness of her construction explains why she was not bought in, but inexplicably her lines were not taken off either. She was the prototype of French 30-gun frigates that were to be built down to 1774 and the only one built by Ollivier.

Several other frigates were captured during the war, including the similarly shaped Renommée, built in Brest in 1744 by Clairin-Deslauriers, one of Ollivier's pupils. At 132 feet 4 inches, she was 7 feet 6 inches longer than the Médée, but shared the same hexagonal midship section, fine entry, and extreme tumblehome. Her sailing quality report stated that she was capable of 9 Knots to windward and over 13 knots downwind. Captain Shirley believed that she could make 15 knots with the wind two points on the quarter but this is improbable. The Renown as she became was kept in the service until she was broken up in 1771 but underwent

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140 See fig. 22, page 257.
141 W.L. Clowes (1898): 3, 274.
142 J.K. Laughton (1887): 235. Walker had added four 12-pounders to her compliment of guns.
143 PRO Adm. 95/25, f.45, 31 July 1751. See fig.23, page 258.
extensive repairs over that time and well before the end of her life had lost much of her
performance due to distortion.\textsuperscript{144}

It is not surprising that the Joint Surveyors refused to see the potential of large single-decked ships as cruisers and dismissed them as being suitable only for commerce raiding. They had cramped accommodation, lacked protection for their crews, and were expensive to maintain. They gave the opinion that,

\begin{quote}
Our forty gun ships carry a much greater weight of metal and are better ships of war, and were they built snugger and lighter timbered might sail better ... their guns being on two decks gives good room for both men and guns to be much better disposed of, than were they placed on one deck and a quarterdeck as proposed. The French ships are certainly much weaker ships than ours.\textsuperscript{145}
\end{quote}

This response bears all the hallmarks of Acworth and was based on economics and the defensive qualities needed for convoys and failed to appreciate the strategic need for such delicate and expensive ships. Neither were they popular with their crews; there were numerous petitions relating to the poor conditions aboard captured French frigates and the rate of desertion was far higher than in other ships.\textsuperscript{146}

Anson was more farsighted; his best cruiser was the \textit{Ambuscade} (ex. \textit{Embuscade}), the largest of the captured frigates and rated as a 40-gun ship in British service.\textsuperscript{147} It was at his suggestion that the Admiralty ordered the lines to be taken off the St-Malo privateer \textit{Tygre} (26), captured by the \textit{Falkland} (50) in February 1746. Why this ship was chosen is not clear, but it was probably because, like the \textit{Ambuscade}, she had a midship section that was closer to the British and hence of relatively greater capacity than the more extreme forms seen in the \textit{Médée} and \textit{Renommée}. Two ships were ordered to be built, 'without the least deviation' from the draught\textsuperscript{148} and although not completed until after the end of the war, the \textit{Lyme} and the \textit{Unicorn} became the forerunners of English 28-gun frigates that were built down to the War of American Independence.\textsuperscript{149}

In 1747, the Surveyors were asked to design a replacement for the now outclassed 24-gun ships. They responded in February 1748.

Having acquainted us that great complaint is made of the qualities of his Majesty's ships of 24-guns, especially in regard to their sailing, and directed us to send one or two plans or models according to which we would then have them built for the future without confining ourselves to the present Establishment, we send you herewith two models and a draught of each.\textsuperscript{150}

Neither approached the dimensions of new French designs but the fault lay in the specification,

\begin{itemize}
\item \textsuperscript{144} R. Gardiner (1992): 102.
\item \textsuperscript{145} PRO Adm. 106/ 2183, 15 May 1747.
\item \textsuperscript{146} N.A.M. Rodger (1986): 233.
\item \textsuperscript{147} See fig. 24, page 259.
\item \textsuperscript{148} NMM Adm. B/ 135, 13 May 1747.
\item \textsuperscript{150} PRO Adm. 106/ 2183, f.485, 3 February 1748.
\end{itemize}
which called for a direct replacement for the 24-gun ships rather than for one comparable to the French 26 or 30-gun frigates. Acworth's ship, the *Seahorse*, was a development of his 1746 *Centaur* design with the accommodation deck lowered by about 1 foot 6 inches. Allin's ship, the *Mermaid* was the more radical and was long for her guns, being only 3 feet shorter than the *Lyme* but with two less gun-ports a side. Both abandoned lower deck guns but they still carried their upper-deck battery nearly seven feet from the water. Allin used the extra length to create a shape that was closer to her French counterparts but she seems to have been no faster than Acworth's ship. Nevertheless, she caused considerable interest at the time and during the Admiralty's visitation of the dockyards in 1749 they asked that the ship be docked so that the lines could be examined. It was reported that,

The Mermaid having been taken into a dock, the Lords and all the Officers present, viewed her bottom, she being built by a new draught of Mr. Allin's, and having examined the same, are of opinion it is a great improvement upon the established draught for building of the 24 gunships. Ordered Capt. Montagu to be very particular in his observations upon her sailing and working.

The design may have influenced Slade, as many of its features such as the narrow stern and lack of hollow in the waterlines were to be seen in his *Niger* class frigates of 1757. Both were popular ships and although the *Mermaid* was wrecked in 1760, Acworth's *Seahorse* was not sold out of the service until 1784. The *Seahorse* formed part of a "crack squadron" that was sent to the Mediterranean after the war in order to suppress piracy and was also present at the taking of Quebec.

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151 See fig. 26, page 261.
152 See fig. 27, page 262.
153 From the limited information contained in the sailing quality reports; Pro Adm. 95/28, f.47 for *Seahorse* and Pro Adm. 95/26, f.13 for *Mermaid*.
154 Pro Adm. 3/58, 4 August 1749.
155 D. Bonner-Smith (ed. 1937): 47. Keppel commanded this squadron which included the *Lyme* and the *Unicorn*. The *Seahorse* was captained in turn by Samuel Barrington and Hugh Palliser, both of whom were successful and influential officers.
5.11 The origins of the 74-gun ship.

The threat posed by French 74-gun ships of the “new construction” was recognised as early as 1742 when the Winchelsea Board ordered that the Namure, a 1719 Establishment 90-gun ship, be cut down to a 74. Similarly, the Bedford Board ordered the Culloden to be built as a 74-gun ship, although these were stopgap measures and the ships that were produced were relatively poor performers. A ship that is sometimes thought to have played a part in the evolution of the British 74 was the Spanish Princesa (70), captured by the Kent, Lenox and Orford in 1740. At 1710 tons, she was of 500 tons greater burthen than a British 70 and the fact that it took three of them nearly six hours to take her has been cited as an example of the superiority of Spanish shipbuilding.\(^1\)\(^5\) Her qualities have probably been over-rated; she was essentially defensive in concept, being massively built and considering her size, both slow and unweatherly. Consequently, she was given a deeper false keel in 1746\(^1\)\(^6\) and although her size made her a popular ship, it is unlikely that she influenced procurement policy.

The need to build 74-gun ships was not fully brought home until the captures made at the battles of Finisterre in May and October 1747. Four out of the five 74’s taken in the two actions were bought into the navy, the Neptune being considered too weak. The Invincible was particularly admired, being both faster and more weatherly than almost any of the British battle-fleet. Captain Bentley reported that she had ‘gone 13 knots large and 8 by the wind and would have gone more could I have made a proper sail’.\(^1\)\(^5\) It was evident that a response would have to be made and that the escalation in building and running costs implicit in the construction of large two-decked ships would have to be faced. Nevertheless, it was to be deferred for as long as possible.

It has become accepted dogma that Thomas Slade developed the British 74-gun ship within three weeks of his taking office in 1755.\(^1\)\(^5\)\(^9\) Given the amount of work involved in picking up the reins from a superannuated Allin this seems highly improbable, and it is more likely that Slade’s draughts for the Dublin class were modifications to drawings already in existence.\(^1\)\(^6\) The findings of the Norris Committee, while suggesting that ‘so useful a class’ as the 80-gun ships should be continued, did not rule out the possibility of building 74’s. In August 1746 the Admiralty instructed the Navy Board to prepare specifications, drawings and a

\(^{157}\) PRO Adm. 95/12, 25 October 1746.
\(^{158}\) PRO Adm.95/25 no.67, 15 November 1752.
\(^{160}\) By way of contrast it took Slade 6 months to prepare the draught of the Victory. A. Jones (1975): 225. The Victory was essentially a stretched 1745 Establishment First-rate design.
model for a 74-gun ship and by January 1747 these had been sent, together with a list of scantlings and a proposed gun layout.

In having your letter of the 8th August last acquainted us that in the late Establishment for building a ship of each class in the Royal Navy, there was no mention of a ship of two decks and a half to carry 74 guns, and your having signified to us the directions of the Rt. Honourable the Lords Commissioners of the Admiralty to consider of proper dimensions for such a ship, to carry the number and nature of guns on each deck as on the other side (overleaf), and to prepare a Draught and Solid by which we would propose to build her, ... we have caused a Draught and solid to be prepared accordingly, which we send herewith and desire you will lay the same before their Lordships for their consideration. 161

The proposed ships were to carry twenty-eight 32-pounders on their lower deck and thirty 18-pounders on their upper deck, two more on each deck than the 1745 Establishment 70's. Twelve 9-pounders on the quarterdeck and four more on the forecastle made up the numbers. The surviving documents give no overall dimensions, but since the 1745 Establishment 70's had a gun-deck length of 160 feet, it would be reasonable to assume of a length of about 165 feet for the proposed 74-gun ship.

That these were in the order of those proposed, is substantiated by a letter from the Navy Board to the Admiralty dated the 13 July 1747. This stated that the dimensions of the established 80-gun ships would be suitable for rebuilding the Somerset as a 74-gun ship. These gave a gun-deck length of 165 feet, a breadth of 47 feet, and a depth in hold of 20 feet. This compares with 165 feet 6 inches, 46 feet 6 inches and 19 feet 9 inches for Slade's Dublin class. Another indication that the Dublin class were derived from the 1745 Establishment ships is that they shared their faults, in particular that of steering badly. 162 Slade was to refine the design over the next two years until he produced the successful Bellona class and its derivatives. While Slade was perhaps the most successful British designer of the century, he is known to have frequently adapted the draughts of others; his work should therefore be seen as a part of a gradual process of evolution rather than as a sudden breakthrough. 163

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161 NMM Adm. B/137, 9 January 1747.
162 PRO Adm. 95/12, 13 April 1756.
163 For example his Barfleur class 90-gun ships were derived from the Royal William (100) of 1719. D. Lyon (1993): 64.
5.12 Comparisons and conclusions.

The early part of the war was disastrous for Britain as a whole and the government in particular and in the opinion of Lord Chesterfield it was, 

... the worst conducted part of the worst conducted war that was ever carried on by this nation or any other.\[^{164}\] 

It was to get worse as the dispute over the Austrian succession brought France into the war and the struggle intensified. The war against trade disappointed those who had advocated it, and Spain inflicted heavy losses against merchant shipping in the early years of the war. Conversely, French entry into the war was not as disastrous as it might have been; small numbers of ships, and the absence of Dunkirk as a fortified base, meant that the course was not as successful as it had been in previous conflicts.\[^{165}\] The war developed into a global struggle and eventually the navy compensated for the gains made by the French army, but ultimately peace was due to the exhaustion of the combatants rather than by any victories gained by land or sea. 'Bête comme la Paix' was the catchword in France, where it was recognised that the war had settled none of the outstanding questions of colonial conflict.

The period saw little change in the balance of naval power and Britain started and ended it without a serious rival, her superiority being based on overwhelming numbers. The French and Spanish navies essayed a brief revival but by the end of the war were in much the same position as they had been at the end of that of the Spanish Succession. The once proud Dutch navy continued its decline and by the 1720's the Amsterdam Admiralty was employing British shipwrights to design its ships.\[^{166}\] It had 56 ships of the line in 1720 but only 35 by 1740, most of them small, of outmoded design and in poor condition.\[^{167}\]

As far as the design of individual ships was concerned however, major changes were taking place. The most rapid and sustained period of improvement in French naval architecture began at the end of the Regency and was to reach its peak between 1740 and 1760. Boudriot calls this 'la periode savante', when pseudo-science gave way to real scientific advance and failures became less common.\[^{168}\] The changes can be attributed to Maurepas, Ollivier and Bouguer who together brought intelligence to the Ministry, innovation to ship design, and made stability theory practicable. This renaissance arose from the construction of the large 64 and 74-

\[^{164}\] Parl. Hist, X, November 1740, quoted in H. Richmond (1920): 1, 71
\[^{165}\] Dunkirk's fortifications had been dismantled under the terms of the treaty of Utrecht and were not to be reinstated until 1762.
\[^{166}\] Remarks: 203. Charles Bentham arrived in Amsterdam in 1727 and became Master Shipwright in 1735, taking over from another Englishman, Thomas Davis. The domination of Amsterdam shipbuilding by British shipwrights lasted about 50 years although they were divorced from developments that were taking place in their home country during that time.
gun ships of the “new construction” and the development of the 8-pounder frigate. The former espoused a policy of individual ship superiority rather than the naval supremacy that France realised was unattainable at this time, while the latter embraced the lessons learnt in the guerre de course. Britain resisted this escalation of the arms race for as long as possible and her reactions were the minimum needed to maintain her predominance. A response was prepared, but not used until it was forced on the government at the beginning of the Seven Years’ War.

It is uncertain how much the resistance to size escalation was due to Acworth’s conservatism and how much to government policy expressed through the Admiralty, although both probably played their part. Finance was always a matter of concern to the Navy Board and they were alarmed at the increasing level of naval debt, for which they feared they would be held to account. There was also the belief amongst British shipwrights that speed could be achieved without resorting to extreme length with its attendant cost implications. British ships were often fast for their size, as the performance of the Kent, Dragon and Eltham showed but ultimately they could not compete with much longer French designs. Mahan (1889: 259) points out that,

French authors will be found asserting that English ships are faster, while at the same period Englishmen complain that they are slower. It may be accepted as generally true that the French ships built between 1740 and 1800 were better designed and larger, class for class, than the English.

This is a fair assessment of the situation as regards the shape of the hull but durability and cost effectiveness are as important as speed. Ollivier’s Remarques provide a unique insight into the different building practices prevalent in English, French and Dutch shipyards at this time. They demonstrate the greater complexity of French building techniques, which was partly necessitated by their inability to bend plank very far and the degree to which French shipwrights interlocked components in an effort to counteract hogging. Another major difference was the French preference for iron fastenings for their ships. Not only were the components of their frames bolted together, the butts of planks were bolted and every other external and all internal plank fastenings were iron spikes or nails, while the planking of British ships was entirely fastened with treenails, both inside and out. This reliance on iron was a major reason for the short life of French ships.

Historians have ignored the major contribution that Acworth made to the development

169 D.A. Baugh (1977: 455. At this time the Treasury looked to the navy to monitor its own spending.
170 Despite Geslain and Ollivier’s detailed descriptions of British steam trunks, similar measures were not adopted in France until after the Revolution.
171 In Tippetts and Dummer’s time the butts of planks were bolted (PRO. Adm. 91/1, f.112, 26 February 1692) but this seems to have been abandoned during Furzer’s period in office.
172 Le Conquerant (74), launched in 1746 had to be rebuilt in 1750 and ‘she was not an isolated case’. J. Pritchard (1987): 126.
of English ship design. During his early years he was the leading advocate of low profile, reduced sheer and light upperworks, or what he termed "snug ships" and many of them were fast and weatherly. While his instructions for preserving ships in ordinary were largely a reiteration of those of 1684, those for improving the structure such as cant frames and binding strakes, were important innovations. He encouraged experimentation and comparative testing, and his introduction of sailing quality reports was of great value. His pre-eminence at the Navy Board was unquestioned, a disgruntled observer commenting that the rest of the Board were determined to be led by the nose by a brute of a shipwright. This has led some historians to regard him as a truculent, uneducated boor, but his correspondence shows that this is far from being the case. To modern eyes he appears domineering, but he lived in an age of robust individuals and he commanded a respect that was not accorded most of his predecessors. During the "mutiny" of workmen at Chatham in 1739, the strikers appealed to Acworth directly as being 'well known for your wisdom and prudence, confirmed by long experience'.

For much of his life he had provided firm leadership, within the bounds of what were possible at that time and during the '45 Rebellion he was appointed as colonel of two regiments of militia drawn from the dockyard workers of Deptford and Woolwich. Like Dummer he was involved in architecture and he prepared designs for both the naval college and Haslar hospital at Portsmouth. His voluminous correspondence shows him to be hard working and far from incompetent, or even, in Vernon's words, 'half competent'. During the parliamentary enquiry of 1744, Thomas Winnington, had defended Sir Jacob, citing Lord Torrington as saying that,

His death would be a great loss to the navy, since he never remembered so able, so diligent, and honest an officer in that place.

Acworth died on 16 March 1749 while still in office. That he was indeed unusually honest by the standards of his age is demonstrated by the fact that he did not use his position to enrich himself or his family, as the citation granting a pension of £300 a year to his widow shows,

To Dame Esther Acworth ... in consideration of the long and faithful service of her husband Sir Jacob Acworth, late surveyor of His Majesty's navy, in several employment's he went thro' from the year 1682 to the time of his death and of the slender provision he hath made for his family.

173 Jack Russell to his father in a letter dated March 1747 quoted in D. Baugh (1965): 48. Russell was a snobbish parvenu, distantly related to the duke of Bedford and he made similar comments about the captains with whom he was forced to associate.
174 NMM Adm. B/ 110, 31 August 1739. The "mutiny" or strike was occasioned by Mathews.
175 PRO Adm. 3/52, 16 December 1745.
176 See page 147 above. Acworth's design for Haslar hospital was rejected in favour of one by Theodore Jacobsen, the designer of captain Coram's Foundling Hospital. PRO Adm. 98/2, f.166, 27 June 1745.
177 Thomas Winnington (1696-1746) was a leading spokesman in Walpole's government. He was a Lord Commissioner of the Admiralty from 1730 to 1736 and of the Treasury from 1736 to 1741.
178 Parl. Hist. IX, 703.
179 PRO Adm. 7/812, March 1749. Esther Acworth died on the 26 December 1752.
CHAPTER 6 Postscript, Sir Joseph Allin (1746-1755).

Although the peace in Europe lasted for nearly eight years, hostilities scarcely ceased in North America and on the Indian sub-continent. For the first six of those years, government was in the hands of Newcastle and his brother Henry Pelham who had been Chancellor since 1743. After the war he adopted the usual policy of financial retrenchment, reducing expenditure from the wartime high of about £10 million to just £2.6 million in 1751 and as a consequence, the naval budget was cut from £2,288,827 in 1748 to £800,206 in 1753. Nevertheless, naval expenditure remained relatively high owing to the renascent threat from the French and Spanish navies. In 1748 the French fleet contained just six 74-gun ships and a 70 but in the next three years six more 74’s were launched and six more laid down. In addition, nine new 64’s were launched by 1750 and six more laid down. At the end of the War of the Austrian succession, Spain had only twelve ships of the line remaining, but between the wars built a further thirty-three, many of them large.

Bedford had been made a Secretary of State in February 1748 and had proved as indolent in that role as he had been at the Admiralty, where Sandwich succeeded him. In 1751 Pelham got rid of Bedford by the simple expedient of dismissing his protégé and Anson became First Lord. Nevertheless, most of the reforms in naval administration took place during Bedford and Sandwich’s period in office, although it is generally assumed that Anson played a leading role in their formulation. In 1747 the half pay of a Rear Admiral was awarded to those senior captains who were too aged or otherwise incapable of serving in that rank at sea, allowing younger officers to be promoted in their stead. Uniforms for officers were introduced in 1748 and in 1749 a new naval discipline act was promulgated. This imposed stricter penalties on those officers thought not to be sufficiently exerting themselves and it was under the twelfth article of these regulations that Admiral John Byng was shot in 1756, “pour encourager les autres”.

Joseph Allin was the son of the shipwright of the same name who had served under Russell at Cadiz and had been made Assistant Master Shipwright at Deptford on his return to England in 1695. He was Master Shipwright at Woolwich in 1705 and attained the senior post

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1 B. Williams (1745): 316. For the yearly expenditure on the navy see appendix 11, page 233-4.
4 B. Williams (1943): 182.
of Deptford in the following November. He was dismissed from his employment in 1715 ostensibly on foot of anonymous information concerning irregularities in timber contracts, being replaced by Richard Stacey. He may have been related to Sir Thomas Allin, the royalist admiral and if so might have been a victim of the purge of suspected Jacobites that occurred about that time. Stacey was the subject of similar accusations from a group of disgruntled shipwrights but in his case the Admiralty chose to ignore them.

Joseph junior’s early career is obscure; he probably trained under his father and on 4 December 1722 was appointed First Assistant at Deptford having previously held that position at Portsmouth. On 2 November 1726 he became the Master Shipwright at Plymouth, a post that he held for just six weeks before returning to Portsmouth in that capacity. He stayed there until 1 August 1742 when he moved to the senior position at Deptford on the retirement of Stacey.

He was made joint Surveyor on 11 July 1746 and his appointment has been seen as an attempt to oust Acworth with whom he often disagreed. However, Acworth’s increasing disability and the additional workload engendered by the outcome of the Norris Committee were more likely reasons. This is suggested by the fact that the termination of Allin’s appointment was considered at the end of hostilities, although the Council decided otherwise and it was recorded in January 1749 that,

... there should be two Surveyors of the Navy by reason of the extraordinary increase of that branch of business, and the great age of Sir Jacob Acworth, which rendered him unable to visit the several yards so frequently as the service required, and so carry on that branch of the service alone.

Allin was the natural choice as he held the senior shipwright’s position and enjoyed the patronage of both Anson and Newcastle, to whom he was distantly related by marriage. In the event there was no conflict; each went his own way, producing competing designs, anticipating the process that would be formally adopted after 1755.

As a designer he was inconsistent, producing some good ships and others which were over-decorated and overburdened with top-hamper. His most important commission was the First-rate Victory (100), launched in 1738. She had a poop-royal and three levels of stern galleries and when Sir John Norris complained about the height of his new flagship, Acworth protested to her designer that ‘our ships are too heavy, too loose, and too high without those

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6 C. Knight (1932): 416.
7 NMM. Adm. A/2054, February 1716. A petition from Joseph Allin regarding his dismissal.
8 PRO. Adm. 3/30, 3 October 1716.
9 Remarks: 132.
11 PRO Adm. 3/60, 6 January 1749. On Allin’s appointment, Mills, who had been Assistant Surveyor since 1729, was pensioned off. (PRO Adm. 7/812, f.11).
12 D.A. Baugh (1965): 304. His wife was first cousin to the Pelham’s of Wickham.
additional encumbrances. This was being less than ingenuous for the 1719 Establishment permitted a poop-royal and his own Royal George had one. Nevertheless, Ollivier who saw her when she was nearly complete agreed and wrote that ‘her upper works are scarce suitable for her lower body’. It is possible that unweatherly qualities contributed to her loss with Admiral Balchen and all hands in October 1744. On the other hand, the Centurion (60) launched in 1733 and made famous by Anson’s circumnavigation was an excellent ship, as was the Nottingham (60) launched two years later. He built ten 70-gun ships during his career, perhaps the most important being the Yarmouth, which was ordered in 1740 and launched in 1745. She was six feet longer than the dimensions established in 1741 and had the same gun arrangement as later 74’s. She was probably the prototype of the 1745 Establishment ships, although these reverted to carrying 26 guns on the gun-deck instead of 28 in order to reduce overcrowding. She had a long life, being classed as a 74-gun ship for local service in 1781 and surviving as a hulk until 1801.

It is significant that despite the instructions of 1715-16 the design of the Victory appears to have been carried out without reference to the Surveyor’s office. This was not the only source of contention for in July 1738 Acworth had to reprimand Allin for producing misleading progress reports for several of the ships under repair.

I was sorry to find by your letter of the 23rd past the defects you mention in the Yarmouth, Dorsetshire, Monmouth and Medway, ships of consequence, and all are continued in your weekly progress to be in good condition and may be fitt for the sea in 24 days time, by which our Board might have been led into great mistakes and made wrong representations to the Lords of the Admiralty, which you well know should be always carefully avoided.

Furthermore he had discovered that Allin was spending time and money on repairing a ship that the Navy Board had instructed him to sell.

The Board are at a loss to know why the Success, under orders to be sold, was docked, and what you propose to do with her, surely there never was such doings.

The independence that he showed was due to his confidence of support at the highest levels of the Administration, an indication of which being the frequency with which he corresponded directly with the Admiralty rather than going through the usual channels.

It has been said that Allin ‘played a considerable part in holding back progress in the 1750’s’ but this verdict presupposes a responsibility for procurement that he did not have and

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13 PRO Adm. 91/2, 14 April 1740.
14 Remarks: 127.
15 The Admiralty suggested that ‘eight or nine feet’ be added to the length prior to the keel being laid. NMM Adm. B/ 119, 16 September 1742.
16 See page 142 above.
17 PRO Adm. 91/2, 4 July 1738.
fails to recognise the financial restraints imposed by the Pelham Administration. Both Sandwich and Anson ensured that men who shared their enthusiasm for reform were placed on the Navy Board as vacancies occurred. Savage Mostyn replaced Haddock as Comptroller in 1749 and Legge became Treasurer at much the same time, while on 26 May 1749 William Bately was appointed as Allin’s assistant.

The folly of the Norris Committee in committing the navy to standard, untried designs was soon made evident. In June 1750 the Admiralty reported to the Council that,

Several ships having been built to the said Establishment and tried at sea, the captains of some of them have represented that they do not steer easy nor sail so well as was expected and the Commissioners of the Navy together with the Master Shipwrights of the several yards having given us their opinion that it may be advisable to vary from the aforesaid Establishment in such ships as shall be built for the future to remedy the above complaints. We are about giving orders for setting up three ninety gun ships, one eighty, one seventy and two sixty to be rebuilt in his majesty’s yards and do pray your excellencies leave and authority to make such variations as shall be thought necessary to make them better ships of war. 20

It was left to Allin and Bately to make the changes but the Admiralty initially felt unable to authorise any increase in dimensions and the first ships merely had slight adjustments to the lines to improve the flow of water to the rudder. 21 It was not until the end of the following year that Allin felt able to make small increases to the overall length, although at the same time he greatly increased the length on the keel. For example, his design for the 90-gun-ships showed an increase of just one foot overall while the length of the keel was increased by five feet. He also made considerable changes to the designs of Acworth’s 50 and 60-gun ships, in each case using the additional length to produce finer ends and eliminating the characteristic hollow in their waterlines. This marked a departure from the “new method of building”, which was now abandoned for ships above the Sixth-rate.

Initially there was little change to the 70-gun ships apart from a slight reduction in width and an increase in depth but in 1754 Allin designed the Burford class which shared the modifications applied to the other rates. They were two feet longer on the gundeck and three feet six inches longer on the keel than the established ships and shared the same gun-port arrangement as all the later 74-gun ships. They had a burthen of 1427 tons and while the eight ships built to the 1745 Establishment were later rated as 64’s, the three ships built to the new dimensions continued to rate as 70’s. In 1750 the Dunkirk (60) was ordered to be built ‘agreeable to the draught and scheme of dimensions and scantlings proposed by the Surveyor of the Navy’, which gave an additional three feet six inches over the established dimensions. 22 The Admiralty itself proposed a 60-gun ship that was 7 feet 6 inches longer than the establishment

20 PRO Adm. 7/340, f.410, 14 June 1750.
21 PRO Adm. 3/62, 25 April 1751.
22 D. Lyon (1993): 76.
but although laid down in 1751 she was not launched until 1757. Bately’s draught for a 90-gun ship ordered in 1750 was 5 feet longer than the Establishment and was finally launched in 1756 as the Namure. These were isolated cases, but by the closing months of 1752, the Establishments were effectively dead. The Admiralty continued to ask the Council for permission for increases in size, but with the Burford class in 1754, they omitted to do even that, without being called to account.\textsuperscript{23}

The more aggressive strategy adopted by the western squadron during the closing stages of the war changed the Admiralty’s perception of the types of ship that were needed. Two-decked 44 or 24-gun ships were unsuited to the new strategic requirements and no more were ordered after 1746.\textsuperscript{24} 50-gun ships also went out of favour, construction initially concentrating on 60’s. Anson was aware that the era of the two-decked cruiser had passed, and, for the future, construction would concentrate on increasingly powerful “frigate-form” ships carrying their main armament on a single deck. Had 24-gun ships been built, it is likely that Allin’s Mermaid would have been the design used but in the event the Unicorn class 24’s, later to be rated as 28’s by the addition of four 3-pounders to the quarterdeck, were to replace them. Nevertheless, despite the order to build the Lyme and the Unicorn to the lines of the Tygre, ‘without the least deviation’\textsuperscript{25}, neither they nor their successors were slavish copies of their progenitor. Later ships were ordered ‘to the draught of the Lyme with such alterations as may tend to the better accommodation and the carrying of guns’, and this resulted in a slight increase in the height of the lower deck.\textsuperscript{26}

As in Walpole’s peace there was considerable experimentation among the smaller classes and two 20-gun ships were built prior to the Seven Years War, one to the reduced lines of the Tygre and the other to those of the Royal Caroline.\textsuperscript{27} In 1749 the Admiralty held a competition for a small sloop for revenue duties, for which Allin and Lock were declared joint winners, and in 1752 Allin designed a similar class of vessel based on the Royal Caroline, two being completed as ketches and two as snows. A less successful experiment by Lock in 1752 was the construction of two sloops to the reduced lines of the Monarch (74), designed by Blaise Ollivier, showing that it was not usually possible to successfully transpose the lines of large ships to small ones.

Allin was knighted on the 10 November 1750 and superannuated in August 1755 after becoming “disordered in his senses”. He was granted a pension of £250 a year with effect from

\textsuperscript{23} PRO Adm. 7/ 340, 20 February 1754.
\textsuperscript{24} Slade designed much-enlarged prototype 44-gun ships in 1758 and 1769 and there was extensive construction of the latter to meet the particular requirements of the American War of Independence.
\textsuperscript{25} NMM. Adm. B/135, 27 March 1747.
\textsuperscript{26} R. Gardiner (1992): 16.
\textsuperscript{27} Ex Peregrine Galley, also known as the Carolina.
the 6 August 'the day he was superseded'. While not as gifted or as energetic as Acworth, he had probably achieved as much as was possible within the political and economic conditions that existed during his period in office. The foundations had been laid for the developments that were to materialise during the Seven Years War when unprecedented funds would be made available to the navy, and when, under the enlightened leadership of Pitt, the Admiralty would be left to dispose of them as it saw fit.

28 PRO Adm. 7/813, Salaries and Pension Book, 26 August 1755.
CHAPTER 7 Conclusions

7.1 Naval Administration, Procurement, and Supply.

The strength of the British navy lay in its prominent position in the British consciousness, and, for the most part, in the government’s willingness to provide generous funds for its upkeep. This had not always been the case and the patchy performance of the navy in the later Dutch wars can largely be attributed to a lack of funds. The shortage was particularly apparent during the periods when the king chose to prorogue Parliament and subsist off his own resources and subsidies from Louis. The parliaments of Charles II were generally reluctant to vote money that might either be diverted elsewhere or used to build a fleet that could be used to support absolutism, Catholicism, and French foreign policy. ‘Will you put your money into the same men’s hands that have supported the French king’, asked Sacheverell in 1676. Upon this distrust foundered Andrew Yarranton’s proposals for a Dutch-style ‘Publick Bank’ in 1677 and it was not until 1692 that consideration was first given to providing long-term borrowing by means of ‘a fund of perpetual interest’. Early attempts by Sir George Downing at the Treasury to ensure that the money voted was used for the intended purpose by introducing appropriation of supply, largely foundered on the opposition of Clarendon and Southampton, who saw it as an unreasonable restriction on the king’s prerogative.

After 1672, the Admiralty and Executive were closely linked, leadership of both being vested in either the king or his brother. Procurement was therefore direct and simple; the Executive, guided by the technical expertise drafted into the Navy Board for that purpose, decided the specification, the Executive’s representatives in Parliament put the case for the number and type of ships required, and, if the money was voted, the programme went ahead. The period of the Commission of 1679-1684 was an exception and until recently historians have generally accepted Pepys’ view that its members were both corrupt and inefficient. It was born out of an attempt by Charles to reconcile the warring factions within his government and it represented a broad spectrum of political opinion, its changing membership ‘reflecting the shifting sands of domestic politics’. Mainly civilian in composition and dominated by the earl

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3 Ibid.: 50.
4 K. Feiling, (1924):112. S. Baxter’s assertion (1957: 10) that there was ‘a well developed system of appropriations of parts of the revenue’ is over-optimistic at this time. It was not much used until 1679 and ignored by James II. The principle was not firmly fixed until after the Revolution. See G. Clark, (1947): 64.
5 W. Aiken (1960): 222.
of Nottingham, its internal divisions engendered by the exclusion crisis and shortage of money rendered it ineffective; nevertheless, its constitution was to endure.  

William’s Commission of 1689 was modelled on it, and three of the members of the earlier Commission sat on it. It was no more successful than its predecessor, because although it enjoyed a more comfortable relationship with both the Executive and Parliament, it lacked influence due to the dearth of naval experience in its mainly political composition. As a consequence, it became largely irrelevant and struggled to find a role, often being bypassed in favour of the Navy Board. Procurement followed much the same pattern as under Charles, and, after Herbert’s brief sojourn as First Commissioner, the Executive, aided by the Navy Board took the decisions. While Charles’ Admiralty contained some prominent naval officers, William’s Council did not and although Russell joined it in 1690, he had little input into its proceedings, spending much of his time at sea. This meant that Nottingham in his capacity as Secretary of State had the greatest input and while he was unquestionably honest and hard working, his influence on the navy was not always beneficial. The outcome of this was the unfortunate choice of specification for the new 80-gun ships and the adulteration of that for Herbert’s frigates.

Nevertheless, aided by the financial systems put in place by the Treasury, the Administration had taken measures that would ensure future naval supremacy. A major shipbuilding programme was inaugurated; a totally new dockyard was built at Plymouth and a supply and cleaning base established at Kinsale; the victualling of the fleet was reorganised and a retirement home for sailors and marines founded at Greenwich. In addition, large numbers of new types of warship were built to counter the war against trade and attempts were made to put the recruitment of seamen on a more equitable basis. One cannot help but be struck by the good intentions of the Administration at this time. There was an enormous effort to improve all aspects of the service, including the welfare of the men, the like of which had not been seen since the early days of the Commonwealth.

If the British navy had become a national institution after the Revolution, this was not the case in France and although Colbert had created a navy and the infrastructure to go with it, as has been aptly observed ‘it lacked roots in public opinion’. Colbert has received the same veneration in France as that accorded to Pepys in England, but many of the systems that he inaugurated were deeply flawed. His administration was intensely personal and entirely civilian in complexion; moreover, it lacked permanence, the secretaries and clerks being the personal

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6 For the membership of this Commission, see appendix 6, page 219.
9 For a recent study into the 1696 Registration Act, see G. Hughes (1996): 25-33.
retainers of the Secretary of State and it was not until Pontchartrain took over in 1691 that a permanent naval administration was established. Except at a local level, naval officers formed no part of the naval administration, which was itself distanced from the decision making Council of State. Furthermore, the navy that he created was entirely unsuited to the changed strategic circumstances brought about by war with the maritime powers, being chiefly intended for the protection of trade. It was Seignelay, aided by Duquesne and Tourville, the leading admirals of the day, and by Biaggio Pangalo the leading constructor, who created a navy that could compete with them on equal terms. The performance of the French navy following 1694 is the more creditable when one considers the chaotic state of the Administration. Much of their success was due to the elan shown by naval officers but part of the credit must go to the Conseils de Construction who specified ships suitable for the changed tactical situation regardless of Colbert’s “establishments”.

Anne’s reversion to administrative systems that had been in force in her father’s and grandfather’s time may have been motivated by her wish to avoid political dissension in the Treasury and Admiralty, but it was also symptomatic of the conservatism of her reign. The Lord High Admiral and his advisors wasted no time in asserting their predominance over naval affairs. In 1706 they initiated the Establishment that would set a pattern for procurement that would last until the end of the War of the Austrian Succession. They consulted the Navy Board as to suitable dimensions for the ships, but when they didn’t like them, had no hesitation in sending them back for reconsideration. This lack of confidence endorsed the inferior status of the Navy Board whose role degenerated into that of executing decisions taken elsewhere, and heralds the start of the military domination of naval administration.

Prince George’s Council set two precedents that effected the composition of the fleet. One was that ships requiring rebuilding should be rebuilt to the new Establishment rather than to their original dimensions and the other, the principle that a ship was voted for “in perpetuity”, that when a ship decayed it was “rebuilt” and that when it was lost it was replaced. This was a mixed blessing; on the one hand it enabled the strength of the fleet to be maintained throughout the long period without major war that followed the Treaty of Utrecht but on the other it fossilised the number and type of each rate for the future. Any change to the

12 Ibid.: 20.
13 Ibid.: 16.
14 O. Murray (1938): 204
15 This was not always appreciated by subsequent Admiralty Boards; in November 1742 the Winchelsea Board was expressing its astonishment that the Hampton Court, built to the 1706 Establishment should be rebuilt to other than her original dimensions. Acworth successfully argued that she should be rebuilt to the enlarged dimensions of the 1741 proposals. (NMM Adm. B/120, 15 November 1742).
Establishment would have to be approved by Parliament and would have to overcome the inertia of a conservative Executive.

Relations between the two Boards improved after the accession of George I. Naval administration continued to be led by sea-officers, but the advent of peace, the Septennial Act, and a relaxation of political tensions meant that Admiralty Commissioners stayed in place longer, allowing them to become more expert as administrators. Furthermore, the personnel at the Navy Board had a higher profile, which engendered more respect for that body, and decisions were increasingly taken at joint meetings of the Boards. However, from the accession of Wager, the Admiralty reverted to a more civilian composition and was used by Walpole as a repository for men on whose political support he could rely. They lacked the expertise of their predecessors and were not able to inaugurate the changes in procurement needed to counter the developments taking place in France. The advent of war in 1739 radically changed procurement policy; the idea of direct replacement and rebuilding was dropped and while the settlement of the 1741 Establishment proposals was made under the old system, this was the last to do so.

When Walpole resigned in December 1742, Wager went with him and the close relationship between the Admiralty and Navy Board was broken. In 1742, Josiah Burchett retired; he had served as Admiralty Secretary or Joint Secretary since 1694 and his absence further loosened the ties. The Carteret and Wilmington administration exacerbated the factional bitterness that was the inevitable outcome of military failure. The civilian First Commissioner, Winchelsea, inspired no confidence amongst sea-officers and the complaints of politically motivated admirals such as Vernon and Mathews helped to undermine the naval administration. Most flag officers were in parliament and Namier (1961) observes that ‘the close connection between the Navy and Parliament raised naval debates in the House to a remarkable level’, and that when party feeling ran high, this introduced political dissension into the service.

It was the Bedford Board’s determination to make the Navy Board both subordinate and subservient and it was in this spirit that the 1745 Establishment was formulated. The findings of the Norris Committee must have come as an unpleasant surprise but the received view that Acworth influenced the proceedings is not credible given that its members comprised those Admirals he had most offended as well as the sea-going element of the new Admiralty. The part that Anson played in the proceedings is somewhat ambivalent; as the junior Commissioner, newly appointed Rear-Admiral and aspiring politician, he probably deferred to his seniors, but on his return to the Admiralty he steadfastly worked to undermine the committee’s resolutions. The Admiralty simply ignored those recommendations that they did not like and continued to order 80-gun ships to be cut down to two-decked ships when they came up for rebuilding.

16 O. Murray (1938): 212.
Nevertheless, their main objective was achieved. Ship design was taken out of the hands of the Master Shipwrights and put into the hands of Surveyors who would henceforth act under their auspices. The Admiralty Boards that succeeded Wager's were also mainly civilian in composition but from the time of the Bedford Board, "militarization" was gradually re-introduced, almost certainly due to Anson's influence.

After the revolution of 1688, Britain enjoyed the unique advantage that no government, of whatever persuasion, could be seen to neglect the navy. Not even the most reactionary squire, oppressed by the land tax and heavy excise duties, denied the need for naval supremacy. 'They (the members of parliament) durst not go back into their country (counties) if they do not give liberally', commented one observer in 1690.\(^{17}\) To the majority this meant maintaining the numerical ascendancy enjoyed at the end of the War of the Spanish Succession and for the most part this was achieved. This was guaranteed by the Establishments, which controlled the numbers as well as the size and type of ships. Britain spent twice as much as her rivals over this period, but this only allowed sufficient funds for repair and replacement and not the development of larger types of ship. Although the Surveyors and Shipwrights exercised considerable ingenuity in trying to bring about improvement despite limited resources, historians continue to castigate them for failing to take measures that were outside their control.

\(^{17}\) D. Baugh in J. Hill (ed. 1995): 94.
The nature of warfare in the late seventeenth and early eighteenth centuries differed from what had gone before and what was to succeed it. It was highly formalised and the aim was not the seizure of the enemy’s home territory but the erosion of their financial ability to wage war in order to gain terms that achieved specific objectives. In this milieu, money was the chief weapon and Britain’s success was largely founded on its financial institutions and the creation of a long-term national debt. For this reason, trade protection and attempts to seize the wealth producing colonies of an opponent, played a major part in the strategy of the combatants. As Godolphin observed in 1693 ‘the war cannot be supported unless trade is protected’. A systematic assault on the trade of the maritime powers by France was not just the result of naval defeat or financial penury but was a deliberate policy that began from the onset of war. Seignelay set out the terms under which royal ships would be hired out to armateurs in an Ordnance dated the 20 November 1688 although it was assumed that the guerre d’escadre and the guerre de course would be carried on simultaneously. Only the financial crisis of les années des misères led to complete reliance on the latter after 1694 so that scarce resources could be predominantly directed towards the army.

The new mantra of naval historians is that ships grew larger and more seaworthy as a result of the emergence of global strategies, but growth was not necessarily connected to the spread of world-wide conflict. Global strategies were carried out to a limited extent by Elizabeth’s navy, the Commonwealth, William and Anne’s navies, and those of the Hanovarians, but the size of the ships had little effect on the success or failure of their enterprises. Lambert’s view that ‘bigger ships were required to make seapower effective at a distance’ is clearly wrong. Blake pioneered the business of keeping a fleet at sea for long periods of time in ships that were no bigger than mid-eighteenth century Fifth-rates. What is more important was the growth of bases in the colonies and the economic development that enabled them to provide the resources to support extended overseas operations.

Size escalation was initially a product of the French bid for naval supremacy that took part in home waters at the end of the seventeenth century. It became more important when the policy of the “mission” replaced it and individual ship superiority offered the potential of engagement or flight at will. Not being totally dependent on the navy for her trade and defence, France was free to choose the strategy she wished to pursue. Britain, on the other hand, needed

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a balanced fleet that could contest naval superiority in home waters as well as protect trade and the lines of communication with her wealth producing colonies. This policy required large numbers of ships, and size, and therefore cost escalation was not in the national interest and was resisted for as long as possible. When the threat from the French “new construction” became too great, it activated a response, but it would always be the minimum required. For the most part, British ships would continue to be smaller than those of their Bourbon rivals and this has led many historians to assume that they were therefore inferior. For most of the period covered by this study, defensive considerations played a large part in procurement policy, for although France might not have territorial ambitions in Britain, she sponsored the exiled Stuarts that had. There was a constant threat from this source and invasion attempts were made in 1692, 1708, 1715, 1719 and 1745.

The French strategy of waging a war of communications with individually superior ships could only be successful for as long as British naval policy remained essentially defensive. Once a policy of “offensive defence” became established, the smaller but more numerous British ships often defeated them. Their use as convoy escorts tied to slow fleets of merchant vessels ignored the purpose for which they were built and consequently they suffered heavy losses. This was largely caused by a Western squadron that had developed from a small force for the protection of trade into a battle-fleet intended to screen Brest as well as protect communications. This was the catalyst for changes in ship design that would become apparent after 1755, but for which the foundations had been laid in the previous decade.

Glete appositely observes that criticism of early eighteenth century ships centres on the fact that they were not more akin to their late eighteenth century counterparts. This generally focuses on the view that they were disproportionately high out of the water for their length, making them less weatherly and less seaworthy than were their successors. However, it must be born in mind that most of the rated ships of the navies studied here were either two or three-decked ships. Only the smaller Sixth-rate of 20-guns or Frégates légères had unarmed accommodation decks until the principle was extended to the French equivalent of the Fifth-rate in 1740. In Britain the usefulness of “single-decked” ships was debated and captured ships were evaluated at sea, providing the experience that would lead to a major construction programme during the Seven-Year’s War. The advantage of two-decked Fifth-rates over single-decked ships was cogently explained by the Navy Board in 1746 but this was a product of old defensive strategies that were being gradually replaced under the influence of Anson.

24 These were still known as guedecks in the British navy.
25 See Page 166 above.
The largest part of Britain’s fleet consisted of 50 and 60-gun Fourth-rates and in the first two wars against France, these saw more action than any other class. They were both dual-purpose ships but while the 50-gun ship was essentially a cruiser, it was intended that the 60 should regularly lie in the line-of-battle. The lines were somewhat fuller and they were more heavily built than the 50’s and as a result were generally slower and less weatherly. 70-gun ships were the fast, all-weather element of the battle-fleet, designed for the line-of-battle or to pursue and bring to action a reluctant enemy. Direct descendants of the ships built under the “thirty ships” programme, they suffered from the success of their forbears and should undoubtedly ‘have grown larger sooner’. 26 They were fast for their size but inevitably rather crank, for designers would have been unaware of the principle that ‘an increase in size is accompanied by an increase in stability above that indicated by the increase in lineal dimensions’. 27 The 80-gun ships were originally intended to fit into this category, but a poorly considered specification made them unsuitable for that role. The decision to turn them into three-deckers was a retrograde step that looked back to the Dutch wars although they were to remain a major part of the battle-fleet for nearly fifty years.

Were they as bad as modern opinion suggests? Unlike the other three-decked ships that formed the defensive backbone of the fleet they were frequently commissioned and there was no suggestion that they should be replaced until the 1740’s. They were cheaper to man than the other “ships of force” and provided better accommodation for men than did two-deckers, making them useful for combined operations. It has been suggested that they were intended for operations close to home 28 but it is unlikely that this was ever the intention. Glete observes that they were intended to provide both security from invasion and the ability to make interventions in distant waters 29 and they were frequently used in the West Indies, the Baltic, and the Mediterranean. Sailing quality reports suggest that they were not particularly slow but were rather unweatherly and tended to be crank. Over time they accumulated large poops, long forecastles and fixed awnings, turning them into the equivalent of miniature First or Second-rates rather than the spar-decked ships originally intended. Their most vociferous critics were Mathews and Vernon, but they were both on the committee that pressed for their retention in 1745. Nevertheless, their total unsuitability for the more aggressive strategies that were shortly afterwards practised by Anson and Hawke led to their rapid and almost complete demise.

7.3 Dockyards, Personnel, and Naval Supremacy.

If money was the main ingredient of naval supremacy, the dockyard infrastructure, the quality of officers and men and the way that they were looked after were important components. Upon the efficiency of the Dockyards depended the speed with which ships could be cleaned and repaired and despite the complaints of impatient Admirals, it would seem that on the whole they performed their tasks well. In 1744, Sir John Norris 'expressed his satisfaction at the state he found his ships in', an unusual statement for an eighteenth-century admiral. Britain enjoyed considerable advantages over her rivals in terms of infrastructure and there were many more dry docks where ships could be maintained. Steam chests and sawpits were just two items that were not available in France and although Ollivier regarded British workmen as lazy, he envied the quality of their tools.

Brest did not have a dry dock until the 1740's and Toulon until the 1770's. Britain had the added advantage that her dockyards were reasonably close to the decision making bodies. Even Plymouth was no more than thirty-six hours away from London whereas Brest was six days from Paris, a factor that may have contributed to the defeat of Tourville in 1692. France also suffered strategically, from not having an arsenal port in the English Channel. Vauban had begun to construct a facility at Cherbourg in 1687 but Louvois bought about its destruction on the grounds that the enemy could use it. Vauban's harbour was intended as a base for commerce raiders similar to that at Dunkirk and not as an arsenal dockyard; nevertheless, its presence might have prevented the destruction wreaked on the French fleet in the aftermath of Barfleur.

The Bedford Board shared Ollivier's views on dockyard labour but the Admiralty visitation of 1749 showed that the Admiralty's conviction that the dockyards were inefficient and corrupt was largely unfounded. The comparison between that visit and the one made by the Audit Commissioners in 1710 is marked and shows the improvement that had taken place over the intervening years. It is possible that Anson's harrying of the dockyards while commander-in-chief of the western squadron (as well as being an Admiralty Commissioner) was partly responsible.

31 Remarks: 55.
33 M. Battesti (1996): 278.
34 PRO. Adm. 49/133, ff. 514-5, March 1749.
35 PRO Adm. 49/132, ff. 203-5, February to May 1711. The Accountant General's department found that Plymouth dockyard had been engaged in the manufacture of 'coaches, chariots, chairs, scutores, chests of drawers, desks, tables' etc for sale to private clients and that labour had been hired out to local shipbuilders. All the senior officers of the yard were dismissed.
Despite the foregoing, the similarities between British and French dockyard practises are more apparent than the differences. French shipwrights underwent the same period of apprenticeship, were paid in the same manner (à la journée du roi), and received the same perk of "chips". They were paid somewhat less however, and the perennial shortage of funds meant that like those of Charles II they were often not paid at all; consequently, walkouts and desertion were common during the eighteenth century. French arsenal ports were run by Intendants, who assumed some of the functions exercised by English Master Shipwrights such as the ordering of stores. They were theoretically subject to the supervision of the court bureaucracy, but their distance from the administration meant that they had a large measure of autonomy and they enjoyed powers of patronage denied to their English counterparts.

The superiority of British officers and seamen is often cited as the reason for the navy prevailing in the face of better ships, yet for most of the period under review there is little evidence to support this view. Lord Peterborough admired the skill of the seamen but had a poor opinion of the senior officers, and in 1705 wrote to Godolphin:

I shall ever be of opinion, though I know the good qualities of some few of the sea officers, that in general there is not a more ignorant, worse judging set of men in the world and yet none more positive.

Burnet also had a low opinion of the English gentry from which the officer class was drawn describing them as, 'the worst instructed and the least knowing of any of their rank, I ever went amongst'. However, there is some indication that by the middle of the eighteenth century, the training from childhood of British officers was making them technically superior to their counterparts. French officers did not commence their careers until they were fifteen years old and did not serve as ordinary seamen like their British counterparts. As Curtis Barnet wrote to Anson in 1745, 'I am stupid enough to think that we are worse officers though better seamen than our neighbours'. By 1745 however, things were beginning to change and gentlemanly attributes were becoming more common.

The navy was a more attractive career option for senior members of the aristocracy than it was in France. This was largely due to the interest shown in the navy by Charles, whose illegitimate son Henry, the first duke of Grafton, took up the career in his early teens. It was

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37 Ibid.: 96.
41 Quoted in Sir H. Richmond, (1920): I, xii. Barnet was regretting the fact that British officers did not have the gentlemanly accomplishments of their French counterparts.
42 The son of Charles and Barbara Villiers and the grandfather of Lord Augustus Fitzroy (see page 153 above), he was the Senior Captain (commodore) when killed at the siege of Cork in 1690. The Beauclerks, Charles' descendants by Eleanor Gwyn were also prominent in the navy.
also the case that at this time, that with the exception of some of the French corsair captains, British officers were closer to their men than their Bourbon counterparts. They shared their hardships and learnt their skills from an early age and class differences obtruded less than they did than later in the century. In the British navy of the mid-eighteenth century it was still possible for a foredeck hand that had been flogged around the fleet to become an Admiral or a mulatto ex-slave to become a Post Captain.\footnote{43}{The Admiral was “Billy” Mitchell; the latter example is quoted from N.A.M. Rodger, (1986): 272.}

French ships carried many more officers and up to a third more crew than equivalent English ships and this had an effect on the ship-design of the two nations. Part of Mathews’ litany of complaints was that,

\begin{quote}
Monsieur de Court has 15 officers in his ship, I have 7, he has 900-1000 men, I have 780 when full mann’d; all the rest of the ships are in proportion.\footnote{44}{Quoted in J. Black & P. Woodfine, (eds. 1988): 20.}
\end{quote}

Despite the ships being bigger, the larger crews and more commodious officer’s accommodation meant that over-crowding was relatively greater than on British ships. This, and a lack of basic hygiene, meant that disease was even more rampant, and this frequently curtailed operations. Moreover, when the men did fall ill, British seamen were generally better looked after, given the limited medical expertise of the day. In France, the sick and wounded were usually committed to the care of private contractors, or if they were lucky, religious institutions.\footnote{45}{J. Pritchard (1987): 100.}

Soldiers made up a third of the compliment of French ships and although they piqued themselves on their skill in the use of small arms and dashing boarding tactics, this was not much in evidence between the War of the Spanish Succession and the wars of the French Revolution. Nevertheless, it had a continuing influence on ship design. Ollivier criticised the lack of flare in the bows of English ships on the grounds that this made boarding more difficult,\footnote{46}{Remarks: 137. The additional weight in the bow was undesirable and this feature was not seen in the more successful French frigates.} although he failed to criticise the absurd amount of tumblehome seen in some French ships that would have the same effect.
7.4 The role of the Surveyor and the Master Shipwrights.

From Pepys' introduction of a shipwright to the position of Surveyor of the Navy in 1672, the post gradually evolved until by 1755 it had assumed the form that it would retain until 1832. The original intention was to have an expert available to advise the Executive in its efforts to bring a semblance of order to ship procurement. This was only gradually achieved, but in an age of robust individuals it proved difficult for the Surveyor to impose his views on the sometimes-difficult characters who ran the dockyards. Until their influence began to be eroded under the Whig oligarchy they enjoyed considerable local power and patronage and resentment over Dummer's attempt to assert greater control over their activities has been advanced as a possible reason for his dismissal. His shortcomings were probably reason enough but he achieved a degree of standardisation nevertheless and was supported in the removal of those who obstructed him. Furzer on the other hand, seemed content to resume the traditional role of the Surveyor, for the most part leaving ship design to those that built them. The important changes in the detailed aspects of design that took place during his period in office were largely the work of sea-officers and although he assisted in these, the dismissive way in which he was treated suggests that his role was a minor one.

Acworth was a dominant character and his twelve years of sea-time gave him an authority amongst sea-officers that his predecessors had lacked. Nevertheless, even in his official capacity as the arbiter of all ship design, his influence was largely limited to the younger shipwrights and those that owed their position to his patronage. Evidence suggests that he never tried to influence the more senior of his colleagues and in his early days he was careful to solicit their opinions. Ironically, the Norris committee, one intention of which was to limit the influence of the Surveyor, resulted in placing design almost entirely in his hands, for instead of seven or eight people being involved in design, this was reduced to just two, albeit under the auspices of the Admiralty. The commissioning of competing designs from the Joint Surveyors for a replacement for the 24-gun ships in 1748 inaugurated a system of design that would become the norm after 1755. This worked well enough while men with the ability of Slade or Bately were designing ships but it was shown to be less satisfactory under some of those that succeeded them.

For most of the period under review, French shipbuilders had much in common with their English counterparts. They came from similar shipbuilding dynasties, entered on their

48 For example Thomas Fellowes. See pages 142-3 above.
49 For example, PRO. Adm. 106/3297, 1 July 1717, Quoted in B. Lavery, (1984): 164. Stacey, Naish and Hayward were asked their advice on the design of 60-gun ships.
apprenticeship at the same age and spent the same amount of time learning their trade. One difference there was however, and this was the attitude to formal training in mathematics and scientific theory. This aspect troubled the English shipwright not at all, and they, like sea-officers, considered on the job training of greater value. As early as the 1680's promising French apprentices had spent some of their time studying at the Écoles de Construction established for the education of the Gardes de la Marine. A result of this was the increasing application of scientific theory and displacement calculations, and these had become commonplace by about 1730. There was an acceleration of this effort when Duhamel de Monceau assumed the post of Surveyor of the Navy in 1739, and in 1741 he founded the Petite École in Paris to teach selected shipwrights mathematics, physics and the principles of drafting. Whether as a result of this academic training, or the tutelage of Blaise Ollivier, the years between 1740 and 1760 produced the best designers of the Ancien Régime and the work of designers such as Geslain, Morineau, Clairin-Deslauriers, and the Coulombe brothers would not be bettered during the eighteenth century.

Baugh's contention that shipwright's were 'at once social inferiors and experts' requires qualification. Their social standing was not as low as he imagines and Surveyors were invariably addressed as "esquire", putting them on a par with the minor gentry, while for the successful, knighthood conferred additional status. On the other hand it must be admitted that great magnates such as the duke of Bedford would consider most people their social inferiors. Neither did sea-officers consider themselves inexpert. Ignorance of the principles of construction or stability did not prevent them from giving their often-impracticable advice. Even Knowles, one of the more "scientific" officers could avow that additional weight in the structure of a ship would not detract from its performance. Furthermore, their opinions were solicited and listened to, and Admiral Lestock's (not unreasonable) proposals for modifying the 80-gun Devonshire were accepted in toto.

50 J. Boudriot, (1986): 12. This was closed in 1748.
52 Such titles closely defined social status at this time, an "esquire" being one with a considerable landed interest or an equivalent income from his employment. A "gentleman" would be a son of the foregoing who had not yet attained his inheritance or "place". French shipwrights enjoyed a similar distinction, Chief Surveyors of the dockyards being entitled "le Sieur", the French equivalent of esquire. Their sons were eligible for cadetships in the armed forces, for which patents of nobility were required.
54 PRO. Adm. 106/2182, f.333, December 1746. The Devonshire was girdled and reduced to a two-decked 66-gun ship, while Acworth's counter-proposal to retain her as an 80-gun ship was rejected.
The Establishments were not just about standardisation and controlling costs, they were also about improving performance and the introduction and dissemination of technical advances. In this context, that of 1719 was the most influential; yet it has been the one most criticised as being consequential of stagnation and conservatism. Until comparatively recently naval history has tended to be written either by naval officers or those who have viewed the navy from a similar military standpoint and failure has usually been ascribed to politicians or administrators. British sea-officers were particularly prone to criticise contemporary technology, which has led to a number of myths about British ships and we are indebted to David Roberts' translation of Ollivier's *Remarques* for dispelling some of these.

Ollivier was not infallible and during his visits to the dockyards saw only a small proportion of the ships and a few of the less experienced shipwrights but his report provides a unique insight in the shipbuilding methods of England, Holland and France. Out of 160 shipbuilding practices that he commented on, 135 related to England and he found about 90 of these superior to those employed in France. He used about 20 of them on his own ships, but despite his recommendations, conservatism and parochialism meant that scarcely any of them were employed after his early death in 1746. Those that he most admired were the use of:

- Treenails rather than nails or bolts.
- Hook and butt planking.
- Cant frames.
- Fewer and shorter riders.
- Fewer deck beams.
- Measures taken to reduce hogging.
- Lighter rigging and shorter masts.
- Cheaper methods of assembling made masts.

He criticised in particular:

- Ships that were too short for the guns carried.
- The position of the rabbet of the stem.\(^{56}\)
- The failure to do displacement calculations.\(^{57}\)
- Excessive sheer.
- The use of horizontal rather than diagonal strakes in the ceiling.\(^{58}\)

The report dispels the idea that French ships of the line were more lightly built than English ships and suggests that the cause of their weakness lay elsewhere.

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\(^{55}\) E.g. R. Albion (1926): 80. See page 1 above.  
\(^{56}\) English shipwrights placed the rabbet at the back of the stem-post, while the French enclosed much it within the planking.  
\(^{57}\) Thomas Simpson introduced his new system for calculating displacement in 1743 and "Simpson’s Rule" remained in use until the age of computer aided design.  
\(^{58}\) Much of the benefit of this was lost by having a change in direction at the mid-point, necessitating a triangular area of horizontal planking. The practice was abandoned in the 1750’s.
The details of the construction of the framing of English warships is hard to unravel at this stage in their development and has, perhaps wisely, been circumscribed by ship historians. Despite the "room and space" being laid down in the establishments it is probable that shipwrights considered these as maximal and it seems that they followed their own inclinations in the different yards.\textsuperscript{59} In general, it would appear that English ships were more or less solidly framed up to the runghead ribband and that from there, every seventh frame was double, being fastened together with trenails, while the filling frames were single, the component parts not being joined together at all.\textsuperscript{60} In France, all the frames of all ships were double, the component parts being bolted together. Ollivier considered that the English method of construction made the ships,

Lighter by all the timber which is avoided in the frames, and by the weight of more than 2000 iron bolts; it provides a better landing for the planking of the hull and the ceiling on the frames, and a greater security in the caulking, since the spaces are more evenly spread.\textsuperscript{61}

It would also have resulted in a saving in labour and materials, and, like the attitude to size escalation, was probably a deliberate policy of providing just enough strength for the use for which the ships were intended. As a result, they were easier to build, maintain, and dismantle than were their rivals, leading to a saving in "lifetime costs".

Ollivier's report also refutes the idea that English ships were over-sparred as compared to French ships, praising their shorter masts and lighter rigging, and he estimated that the mast caps on English ships were three to four hundred pounds lighter than those on French ships.\textsuperscript{62}

All the major developments in rigging over the period took place on British ships, reflecting the greater time they spent at sea and perhaps because of this, the greater professionalism of their officers. Nevertheless, he may not have seen many of the 1733 Establishment ships rigged. Mathews and Vernon certainly thought that ships of the "new manner of building" were over-masted, and Mathews complained that,

Sixty-gun ships carry eighty-gun ships' topmasts ... and seventy-gun ships topmasts are within two inches as taunt as mine.\textsuperscript{63}

The height of the mainmast had been set at 2.36 x the breadth of the ship in the 1719 Establishment, with the other masts in proportion; the 1733 Establishment merely increased the dimensions in accordance with this formula.\textsuperscript{64}

\textsuperscript{59} Remarks: 48, 65-7. For the definition of room and space, see appendix 2, page 215.
\textsuperscript{60} Ibid.: 65-7.
\textsuperscript{61} Ibid. 66-7. He is referring to a 70 or 74-gun ship.
\textsuperscript{62} Remarks: 102-3. This weight must be multiplied by six. He adopted English-style caps on his own ships.
\textsuperscript{63} PRO Adm. 1/381, 16 November 1742, quoted in D. Baugh (1977): 220. Mathew's ship was the 90-gun Namure.
\textsuperscript{64} The Norris Committee reduced the proportion to 2.22 in 1745. R. Winfield (1997): 87.
The performance of French ships prior to the introduction of sailing quality reports is hard to evaluate but it is evident that from as early as the first decade of the eighteenth century some French ships were excellent performers. However, it is also clear that some, particularly those of middling size, were often very mediocre. This was probably because larger ships were the preserves of experienced builders, while ships of 40 and 50-guns were often left to the less experienced. Pangalo was the most influential designer in the early the early years but he was responsible for many of the faults as well as the good qualities of French ships. Fine waterlines and a short, sharply rising floor meant that they were potentially fast, but their lack of buoyancy meant that they were necessarily deep and heavily ballasted, destroying much of that potential. They carried their main batteries low and were often overhauled by smaller British cruisers. The new frigates were an exception; they were the products of young designers, but these were early graduates of the Petite École and Ollivier’s protégés. Ollivier, who as the originator of both the large 64-gun ship and the classic single-decked frigate was probably the most important influence on French ship design during the eighteenth century, commented on the relative performance of warships of the 1730’s.

The English ships of 50 to 100 guns draw two feet to two feet and a half less water than do our ships, and this is the advantage which they obtain from their full lines and the small quantity of ballast which the middling height of their masts and the lightness of their rigging permits them to take on board. From this lesser draught derives the result that their ships find less obstacle to their cleaving the water, and while it is true that they make more leeway when sailing close-hauled, they gain when running more than they lose in leeway. 65

Another statement that will surprise many was that,

What may be said with certainty of the English ships is that they all carry their lower battery high out of the water since they are full below the waterline and carry less weight than do our ships 66

Analysis of the lines of 1733 Establishment ships confirms the buoyant sections but Ollivier, who was never convinced by the Newtonian theory behind the bluff-bowed approach, gave the opinion that,

In general I find that the entry of our ships is better contrived to cleave the water than that of the English ships, and if this superiority is not always evident when we compare the speed of our ships to the speed of the English ships, it is because it is destroyed by the excessive weight of our sparring and of our rigging (171).

Successful French ships were designed on the simple principles of sharp bow waterlines, fine run, and large size, an effective but expensive formula. With a need for the maximum number of units, British ships were necessarily small and British designers sought more sophisticated means of achieving fast hulls. In order to provide sufficient buoyancy, full body sections had to be carried closer to the ends of the hull, resulting in hollow waterlines, a measure that Ollivier

65 Remarks: 161. Evidence would suggest that British ships in general were not more leewardly, probably due to their deeper keels and prominent gripe, features that Ollivier deplored.
66 Ibid.: 171.
commended:

... The prejudice which we have in favour of sharp floors, which seem to us more apt to cleave the water than a full floor, has prevented us from perceiving all the advantages which the English obtain from their great convexity of the runghead ribband. We have preferred to swamp the gundeck sill, or else to avoid swamping it we have increased excessively the depth in hold, rather than have recourse to such a simple expedient as that practised by the English shipwrights. In consequence, we are obliged to use much ballast in our ships, so that through our desire to make them fast sailers we in fact place an obstacle in the way of their sailing by making them heavier by the whole weight of this ballast which our sharp floors demand. 57

These comments are a graphic critique of the Pangalo design philosophy described above.

Prior to the advent of the big new French 8-pounder frigates in 1740, British cruisers of the Sixth-rate and below were generally superior to their rivals as there was no disparity of size at this level and continuous experimentation had encouraged developments in rig and hull form. Analysis shows that English sloops were particularly fast for their size, if somewhat dangerous in the hands of young and inexperienced commanders, 68 although the Tryall's passage around the Horn with Anson shows that they were not inherently unseaworthy. 69 For this reason, there was virtually no imitation of small French ships until the Admiralty ordered the construction of the two ships to the lines of the privateer frigate Tygre at the beginning of 1747. 70 In choosing the Tygre, the Admiralty showed considerable discrimination in that they rejected the less buoyant but possibly faster "hexagonal" hull form exemplified by the Médée and Renommée in favour of one better suited to their operational requirements.

The moribund state of the French navy at the end of the Regency caused a fundamental reappraisal of the type of ship that was needed to meet the pragmatically limited objectives of a new navy. While Britain was pursuing the chimera of the "new method of building", the "new construction" in France concentrated on 64, 74 and 80-gun ships of hitherto unparalleled size. It was within the power of the Norris committee to make similar sweeping changes but it chose not to do so and it is apparent that at least as much conservatism was displayed by the senior flag-officers as by the Surveyor and the Master Shipwrights. The decision to alter the existing established ship types was not within the remit of the Navy Board who perforce agreed that the Admiralty "were invested with the power of directing the building of ships of his majesty's navy". 71 This was a re-iteration of what had always been the case and it was not until Anson applied his clear-sighted vision as to what type of ships were required, that Britain made a belated response just prior to the start of the Seven Years War. In this he had the support of his
colleagues on the Board of Admiralty and of William Pitt, whose disinterested leadership recognised Anson's ability even though he found him politically distasteful. In a departure from the usual policy of limiting cost, an unprecedented programme of construction was ordered, concentrated on 74-gun ships and frigates. Expenditure on the navy during the Seven Years War was more than half as much again as in that of the Austrian Succession, partly because the country could afford it, but also because it had become a matter of necessity.\textsuperscript{72}

The view that the Establishments were wholly responsible for stagnation and a lack of experimentation is clearly wrong and many of the defects in British ships arose out other aspects of the system of procurement, prominent among these being political interference and the well-meaning contributions of technically illiterate sea-officers. However, Baugh is undoubtedly correct when he states that the main drawback of the Establishments was not that they prevented experimentation but that they gave an advantage to conservatism;\textsuperscript{73} however, in this they merely reflected the spirit of the age. It is also unrealistic to draw parallels with France, where the use of private resources to fund much of their shipbuilding created a different milieu. It was incumbent on the weaker power to experiment and Britain was content to follow suit when and if those experiments proved successful. The degree of standardisation that they introduced had benefits not only for cost control, repairs, and maintenance, but also for manning, allowing an easier transfer of crews between ships. In 1739 the British navy numbered some 170 rated ships divided into eight classes while the French had 49 ships of fifteen different types.\textsuperscript{74}

The inferiority of British ship design can be said to date from the introduction of the “new method of building” and the 1733 Establishment. Ironically, it arose not out of the conservatism suggested by historians, but out of experimentation. Acworth must bear a major part of the blame, but he was responding to the financial and political pressure that was being applied to him. The faults had begun to be addressed by the 1741 Establishment but cracks were beginning to appear in the system and increasing numbers of ships were ordered to be built that were outside the established types and dimensions. One intention of the 1745 Establishment was to restore standardisation but the inane decision to build all the ships to standard untried designs accelerated its collapse. Establishments had been of some benefit while a relatively large group of independently minded shipwrights were designing the ships, both in order to impose a degree of uniformity and to control cost. However, once ship design was restricted to the Surveyors, working under close Admiralty control, their raison d'être ended and they were abandoned.

\textsuperscript{72} See appendix 11, page 231.

\textsuperscript{73} D. Baugh (1977): 200.

\textsuperscript{74} D. Panzac (1997): 43. Panzac suggests 140 ships, ignoring the Sixth-rate (see appendix 4, page 219 below). There are nine classes if a distinction is made between the 20 and 24-gun ships.
7.6 Areas for further research.

The aim of this study has been to provide a continuous overall picture of the development of those aspects of naval administration appertaining to the design and procurement of naval ships during an important and neglected period in their evolution. The period covered by each of the Surveyors has therefore been treated in a necessarily cursory manner and there are many areas that would benefit from further research including a more detailed study of each of the Surveyors themselves. The development of small cruising ships and those of the “new manner of building” would also benefit from further study. It is evident from the frequent references to the provision of mortars for use on small ships that further research is needed on this neglected aspect of naval armament. Given time and better access to the drawing and model collections held at the National Maritime Museum, more could be said about the work of individual shipwright’s and their place in the evolution of the sailing warship. The digitisation of the drawings and the scanning of block models would help attribution and would allow the application of hydrodynamic analysis by means of computer aided design packages.
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APPENDIX 1. MANUSCRIPT REFERENCES.

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Pepys’ personal papers are of interest but often difficult to read. The limited access to the collection detracts from its value.

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106/398, 23 November 1690. Plymouth dockyard, correspondence on wet basin.
106/446, 16 September 1694. Dummer to Wilshaw re Plymouth dock.
106/2182, 18 November 1746. Navy Board comments on lack of space to build 70-gun ships.
106/349, f.359, 27 April 1680. Lestock’s proposals for altering the Devonshire.
9 January 1748. Navy Board sends draughts and solids of a 74-gun ship to the Admiralty.
3 February 1748. Order for non-established 24-gun ships.
22 April 1696. Establishment of Dummer’s standard method of measurement.
4 November 1700. Order restricting carved work.
9 May 1715. Order establishing Acworth’s measures for preserving ships in ordinary.
26 October 1716. Order that ship’s carpenters should attend dockyard repairs.
28 February 1744. Order that two decked ships should be fitted with gang-boards.
106/3070, 3 December 1690. Contract and specification for the Newark and Penzanze.
106/3071, 22 April 1696. Russell’s comments about contract built ships.
106/3297, 1 July 1717. Acworth’s consultation with other shipwrights.
106/3551, 14 October 1715. Acworth’s report on changes in construction.
106/3571, 1 January 1694. Fournier and the first bomb vessels.
CO/ Series. Records of the Colonial Office.

137/9, f.66, October 1705.
f.66, 14 July 1712. Dummer’s 1705 proposals for a West Indies packet service.
Dummer’s final proposals to save the company.

TI/ Series. Treasury Papers.

96, 22 October 1705.
167, 4 December 1714. Sergison on Dummer. Admiralty to Harley regarding a petition from Dummer’s widow for a pension and enclosing a testimonial from the joint Postmaster Generals.

WO/ Series. War Office and Board of Ordnance papers.

55/1803, 13 January 1703. Proposals for reducing the armament of ships.
APPENDIX 2 GLOSSARY OF TERMS.¹

Apron
Timber placed behind the stem to strengthen it at the scarphs and facilitate the fastening of the hood ends.

Bilander
See Brigantine.

Billboard
An inclined board between the fore channel and the side of the ship to prevent damage from the fluke or "bill" of the anchor.

Binding strakes
Thick strips of deck planking notched over the deck beams to help counteract hogging.

Bolster
Timber chocks to prevent chafe to the mast from the standing rigging. Also a chock used to reinforce the billboard.

Breast hooks
Large horizontal knees fixed to the stem and sides to hold them together. Also simply known as hooks.

Brigantine
A two masted vessel with the mainmast stepped aft and built for sailing and rowing. Originally entirely square-rigged, they later adopted a fore and aft gaff or lug mainsail in the latter case it would then technically be a Bilander. Sometimes known by the diminutive term "Brig", there being no difference at this time.

Bumpkin
A spar protruding from the bow to extend the tack of the fore-course. Also spelt as boomkin.

Burden
The notional cargo capacity of a vessel. Also called Burthen.

Cant frame
A frame member mounted obliquely to the centreline at the extremities of the ship.

Catharpins
Lines used to adjust the tension of the lower shrouds.

Cat-head
Beam extended outboard at approximately a right angle (nearer 45° in French ships) to the ships side used for securing (catting) the anchor. Usually terminates in a lion’s face, hence the name.

Carlings
Fore and aft timbers between the deck beams.

Ceiling
The internal planking of a ship. See also “quick-work”. Known as footwaling, thickstuff and middle bands until after the middle of the eighteenth century.

Channels
Broad horizontal planks carrying the deadeyes for the shrouds.

Channel Wales
Thick planking below the channels to which the chain plates were bolted.

Chainwales
The collective term for the two preceding items used in the seventeenth century.

Chesstree
A timber bolted to the topsides containing one or more sheaves through which the tack of a course was rove and extended to windward.

Clamp
Thick ceiling planking acting as a beam shelf.

¹ Compiled from disparate sources, the principal ones being R. Steffy (1994) and D. Roberts (ed. 1992).
Cutter
A development of the sloop rig with a horizontal running bowsprit dating from the second quarter of the eighteenth century.

Dagger knee
Raking knee.

Dead-flat
The point near the midship section where the frames are identical, creating a parallel body. Also used for the straight and vertical area of the hull above the waterline before the timbers start to curve inwards to form the tumble-home.

Deadrise
The amount of rising of the floor above the horizontal plane.

Deadwood
Timber placed on top of the keel, particularly at the extremities to fill out the narrow parts of a ship’s body. See also rising wood.

Deadworks
“That part of a ship which is above water when she is laden”. (Falconer).

Drift
The point where the sheer of the upper works is raised and the rail or the side of the superstructure is cut off and terminated with a scroll or carved figure. See also Hances.

Eking
Carved work under the lower part of the quarter-piece at the aft end of the quarter-gallery.

False keel
Sacrificial timber laid under the main keel to protect the caulking of the joints and to increase its depth.

Fashion piece
The after-most frame that defines the shape of the stem.

Fish davit
Machine used to hoist and draw up the flukes of the anchor in order to stow it.

Floor
The lowest part of the frame, laid across the keel.

Foot-waling
Thick planking next to the limber-strake.

Futtock
Curved timbers placed above the floors, forming part of the frame. Probably derived from “foot-hook”.

Gammoning
Lashing securing the bowsprit to the knee of the head.

Gripe
A curved piece of timber joining the forward end of the keel to the lower part of the stem.

Hances
Steps in the rails to the upperworks. Also known as drifts.

Hanging knee
L-shaped structural timber under a deck beam.

Harpins
The name given to ribbands where they curve at bow and stern. Usually carved out of the solid.

Helm port transom
Hole for the tiller in ships with an external rudder head.

Hook and butt
A method of planking whereby one edge of the plank was straight while its opposite side had sloping edges locked by a hook.

Jeer
Halyard.

Jeer-bitts
Belaying points for the fore and main yards (up to circa 1750).

Keelson
Structural member laid over the centre of the floors and through bolted to floors and keel.
Ketch
A two masted vessel with the mainsail set amidships with a small mizzen mast carrying a gaff-headed mizzen sail with or without a topsail.

Ledge
Timber placed between the carlings and lying parallel to the deck beams.

Lodging knee
A knee placed horizontally between a pair of deck beams.

Navel timber
A short timber acting as the scarph between a floor and futtock timber or two futtocks, where these abut one another.

Orlop
The deck immediately over the hold. Often not continuous and usually partially removable. From the Dutch *Overlopper*.

Plank sheer
Horizontal fore and aft timber, which forms the outer limit of the upper deck at the sides.

Pitch
A mixture of tar and resin used in anti-fouling (black stuff) and for caulking deck and hull planking.

Quickwork
The common ceiling of the interior of the ship. Of simple construction it could be installed quickly.

Resin (or Rosin)
A solid residue left after the distillation of crude turpentine.

Rider
Additional internal frame sited on top of the ceiling to provide additional stiffening to the hull.

Rigol
Curved gutter over a gun-port.

Rising wood
Timbers fastened to the top of the keel and notched into the bottom of the floor timbers to better secure those members and give them the proper rising.

Room and Space
The distance from the moulded edge of one frame to the corresponding point on an adjoining frame, measured at or near the keelson. The part occupied by the frame being called the *room* while unoccupied gap between the frames is called the *space*.

Runghead
The extremity of a floor timber. Also called the wronghead. Derived from wrang, the medieval term for a floor timber.

Sampson(‘s) post
Thick pillar under a deck beam in French ships.

Sloop
The sloop rig belonged to a single masted vessel with a fore and aft gaff mainsail, with or without square topsails, with a steeply stowed bowsprit carrying a jib or jibs.

Snow
Two masted vessel with the mainmast stepped aft, characterised by a loose footed fore and aft mizzen set on a separate tri-mast or tri-stay immediately abaft the mainmast.

Spirketing
Thick internal planking equivalent to the wales on the outside. Known as spirket risings until the middle of the eighteenth century.

Standard
A knee placed on top of a deck beam.

Tar
The distilled residue of the gum from pine trees.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td>Carved brackets in the form of grotesque figures often with bearded heads and female breasts. Probably derived from <em>Terminus</em>, the Roman god of boundaries.</td>
</tr>
<tr>
<td>Tree-nails</td>
<td>Cylindrical pins of oak, from one to three feet six inches long, used to fasten the planking to the frames.</td>
</tr>
<tr>
<td>Trestle-trees</td>
<td>Bars of oak fixed horizontally to the lower mast-head to support the frame of the top and the weight of the top-mast.</td>
</tr>
<tr>
<td>Trundle head</td>
<td>The circular part of the capstan head designed to take the capstan bars.</td>
</tr>
<tr>
<td>Tuck</td>
<td>That part of the stern where the ends of the planks are gathered together under the counter.</td>
</tr>
<tr>
<td>Tumblehome</td>
<td>The inward curvature of a ship's side above the point of maximum beam.</td>
</tr>
<tr>
<td>Wainscot</td>
<td>Originally the form in which timber was shipped from the Baltic, i.e. with two sides hewn flat for ease of carriage.</td>
</tr>
</tbody>
</table>
APPENDIX 3. Table of established or proposed dimensions.

Dimensions are in feet and inches. Keel length was not specified until the 1706 Establishment.

<table>
<thead>
<tr>
<th>Establishment or Establishment proposals.</th>
<th>1677</th>
<th>1691</th>
<th>1706</th>
<th>1719</th>
<th>1733</th>
<th>1741</th>
<th>1745</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>100-gun ships</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length on gundeck</td>
<td>165:0</td>
<td>174:0</td>
<td>174:0</td>
<td>175:01</td>
<td>178:0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On keel for tonnage</td>
<td>137:8</td>
<td>140:7</td>
<td>140:7</td>
<td>142:4</td>
<td>144:6½</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breadth extreme</td>
<td>46:0</td>
<td>50:0</td>
<td>50:0</td>
<td>50:0</td>
<td>51:0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth in hold</td>
<td>19:2</td>
<td>20:0</td>
<td>20:6</td>
<td>21:0</td>
<td>21:6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burthen in tons</td>
<td>1550¹</td>
<td>1869</td>
<td>1869</td>
<td>1892</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>90-gun ships</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length on gundeck</td>
<td>158:0</td>
<td>162:0</td>
<td>164:0</td>
<td>166:0</td>
<td>170:0</td>
<td>170:0</td>
<td></td>
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<tr>
<td>On keel for tonnage</td>
<td>132:0</td>
<td>132:5</td>
<td>134:1</td>
<td>137:0</td>
<td>138:4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breadth extreme</td>
<td>44:0</td>
<td>47:0</td>
<td>47:2</td>
<td>47:9</td>
<td>48:0</td>
<td>48:6</td>
<td></td>
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<tr>
<td>Burthen in tons</td>
<td>1307</td>
<td>1551</td>
<td>1566</td>
<td>1623</td>
<td>1679</td>
<td>1730</td>
<td></td>
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<td><strong>80-gun ships</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length on gundeck</td>
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<td>156:0</td>
<td>158:0</td>
<td>158:0</td>
<td>161:0</td>
<td>165:0</td>
<td></td>
</tr>
<tr>
<td>On keel for tonnage</td>
<td>127:6</td>
<td>128:2</td>
<td>127:8</td>
<td>130:1</td>
<td>134:10¼</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breadth extreme</td>
<td>41:0</td>
<td>43:6</td>
<td>44:6</td>
<td>45:5</td>
<td>46:0</td>
<td>47:0</td>
<td></td>
</tr>
<tr>
<td>Depth in hold</td>
<td>17:4</td>
<td>17:8</td>
<td>18:2</td>
<td>18:7</td>
<td>19:4</td>
<td>20:0</td>
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</tr>
<tr>
<td>Burthen in tons</td>
<td>1100</td>
<td>1283</td>
<td>1350</td>
<td>1400</td>
<td>1472</td>
<td>1585</td>
<td></td>
</tr>
<tr>
<td><strong>70-gun ships²</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length on gundeck</td>
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<td>150:0</td>
<td>151:0</td>
<td>151:0</td>
<td>154:0</td>
<td>160:0</td>
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<tr>
<td>On keel for tonnage</td>
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<td>123:2</td>
<td>122:0</td>
<td>125:5</td>
<td>131:4</td>
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<tr>
<td>Breadth extreme</td>
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<td>41:0</td>
<td>41:6</td>
<td>43:5</td>
<td>44:0</td>
<td>45:0</td>
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<td>17:4</td>
<td>17:4</td>
<td>17:9</td>
<td>18:11</td>
<td>19:4</td>
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</tr>
<tr>
<td>Burthen in tons</td>
<td>1013</td>
<td>1069</td>
<td>1128</td>
<td>1224</td>
<td>1291</td>
<td>1414</td>
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</tr>
</tbody>
</table>

¹ The only ship built in this programme had a burthen of 1739 tons
² 70-gun ships carried 64 guns for the duration of the 1741 establishment proposals and 68 shortly after the 1745 Establishment, again reduced to 64 with the introduction of the larger 74-gun ships.
<table>
<thead>
<tr>
<th>60-gun ships&lt;sup&gt;3&lt;/sup&gt;</th>
<th>1691</th>
<th>1706</th>
<th>1719</th>
<th>1733</th>
<th>1741</th>
<th>1745</th>
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<tbody>
<tr>
<td>Length on gundeck</td>
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<td>144:0</td>
<td>144:0</td>
<td>144:0</td>
<td>147:0</td>
<td>150:0</td>
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<tr>
<td>Breadth extreme</td>
<td>37:6</td>
<td>38:0</td>
<td>39:0</td>
<td>41:5</td>
<td>42:0</td>
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<td>15:8</td>
<td>16:5</td>
<td>16:11</td>
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<td>18:6</td>
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<tr>
<td>Burthen in tons</td>
<td>900</td>
<td>914</td>
<td>951</td>
<td>1068</td>
<td>1123</td>
<td>1191</td>
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<table>
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<tbody>
<tr>
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<td>134:0</td>
<td>134:0</td>
<td>140:0</td>
<td>144:0</td>
<td></td>
</tr>
<tr>
<td>Breadth extreme</td>
<td>35:0</td>
<td>36:0</td>
<td>38:6</td>
<td>40:0</td>
<td>41:0</td>
<td></td>
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<tr>
<td>Depth in hold</td>
<td>14:0</td>
<td>15:2</td>
<td>15:9</td>
<td>17:2½</td>
<td>17:8</td>
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<tr>
<td>Burthen in tons</td>
<td>704</td>
<td>755</td>
<td>853</td>
<td>968</td>
<td>1052</td>
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<table>
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<td>124:0</td>
<td>124:0</td>
<td>126:0</td>
<td>132:0</td>
<td></td>
</tr>
<tr>
<td>On keel for tonnage</td>
<td>97:6</td>
<td>101:8</td>
<td>100:3</td>
<td>102:6</td>
<td>108:10</td>
<td></td>
</tr>
<tr>
<td>Breadth extreme</td>
<td>32:0</td>
<td>33:2</td>
<td>35:8</td>
<td>36:0</td>
<td>37:6</td>
<td></td>
</tr>
<tr>
<td>Depth in hold</td>
<td>13:6</td>
<td>14:0</td>
<td>14:6</td>
<td>15:5½</td>
<td>16:0</td>
<td></td>
</tr>
<tr>
<td>Burthen in tons</td>
<td>531</td>
<td>594</td>
<td>678</td>
<td>706</td>
<td>814</td>
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</tr>
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</table>

<table>
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<tr>
<th>20-gun ships</th>
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<tbody>
<tr>
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<tr>
<td>Breadth extreme</td>
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</tr>
<tr>
<td>Depth in hold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burthen in tons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 Reduced to 58 guns for the duration of the 1741 establishment proposals and restored to 60 guns in 1745.
APPENDIX 4.

Table showing the composition of the British fleet.

<table>
<thead>
<tr>
<th>Rate</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>Sloops</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1688</td>
<td>9 (2)</td>
<td>11 (1)</td>
<td>39 (23)</td>
<td>41 (39)</td>
<td>2 (2)</td>
<td>6 (4)</td>
<td>0</td>
<td>W.L. Clowes (1898)</td>
</tr>
<tr>
<td>1702</td>
<td>7 (5)</td>
<td>14 (8)</td>
<td>47 (42)</td>
<td>62 (60)</td>
<td>30 (29)</td>
<td>16 (16)</td>
<td>8 (8)</td>
<td>R. Merriman (1949)</td>
</tr>
<tr>
<td>1714</td>
<td>7 (3)</td>
<td>13 (10)</td>
<td>42 (33)</td>
<td>69 (53)</td>
<td>42 (39)</td>
<td>24 (23)</td>
<td>8 (8)</td>
<td>R. Merriman (1961)</td>
</tr>
<tr>
<td>1727</td>
<td>7</td>
<td>13</td>
<td>40</td>
<td>64</td>
<td>27</td>
<td>27</td>
<td>13</td>
<td>W.L. Clowes (1898)</td>
</tr>
<tr>
<td>1739</td>
<td>7 (4)</td>
<td>12 (7)</td>
<td>40 (27)</td>
<td>62 (48)</td>
<td>19 (12)</td>
<td>30 (19)</td>
<td>N/A</td>
<td>D. Baugh (1965)</td>
</tr>
<tr>
<td>1742</td>
<td>7 (6)</td>
<td>13 (11)</td>
<td>41 (32)</td>
<td>64 (59)</td>
<td>24 (22)</td>
<td>32 (29)</td>
<td>20</td>
<td>D. Baugh (1965)</td>
</tr>
<tr>
<td>1745</td>
<td>6 (5)</td>
<td>13 (11)</td>
<td>42 (34)</td>
<td>64 (51)</td>
<td>30 (25)</td>
<td>40 (33)</td>
<td>27</td>
<td>D. Baugh (1965)</td>
</tr>
<tr>
<td>1751</td>
<td>5 (3)</td>
<td>13 (10)</td>
<td>49 (46)</td>
<td>64 (57)</td>
<td>39 (39)</td>
<td>39 (39)</td>
<td>N/A</td>
<td>D. Baugh (1965)</td>
</tr>
</tbody>
</table>

Figures in parenthesis are those in commission or suitable for fitting for sea.

These are listed ships, including those being rebuilt or awaiting rebuilding.

APPENDIX 5

A list of the ships in Anson’s western squadron at the first battle of Finisterre, showing those that were built outside the established dimensions or taken from the French (marked thus*).

*Prince George (90) 1719 Establishment 90-gun ship built by Stacey. Anson’s flagship.
*Devonshire (66) 1741 Establishment three-decked 80, girdled and cut down in 1747.
*Namure (74)* 1719 Establishment 90-gun ship cut down in 1746.
*Monmouth (64) 1733 Establishment 70-gun ship reduced to 64 guns.
*Yarmouth (64)* 1741 Establishment 70-gun ship lengthened by 6 feet (Allin).
*Nottingham (60) 1733 60-gun design probably by Acworth.
*Defiance (60) 1741 60-gun design by Acworth.
*Pembroke (60) 1719 Establishment 60-gun design by Hayward.
*Centurion (50)* 1719 Establishment 60-gun ship broadened by 1 foot (Allin).
*Falkland (50) 1741 Establishment 50-gun design by Acworth.
*Bristol (50)* 1741 Establishment 50-gun design lengthened by 6 feet.
*Ambuscade (40)* Captured French 38-gun frigate *Embuscade*. See fig. 26 below.
*Falcon (10) Standard *Swallow* class sloop (Acworth).

Only the *Devonshire, Namure, Yarmouth, Defiance, Pembroke, Windsor, Centurion,* and *Bristol* were engaged.1

---

1 W.L. Clowes (1898): 3, 125.
APPENDIX 6. Lords Commissioners of the Admiralty.

Date of Patent.

26 September 1677
King's Admiralty Council
Secretary: - Samuel Pepys

14 May 1679
Hon. Sir Henry Capel
Hon Daniel Finch
Sir Thomas Lee
Sir Henry Winch
Sir Thomas Meres
Edward Hales

20 May 1702
H.R.H. Prince George of Denmark, Lord High Admiral

25 May 1702
Lord High Admiral's Council:
Admiral of the Fleet Sir George Rooke
Vice-Admiral Sir David Mitchell
Admiral George Churchill
Richard Hill
Secretaries: - Josiah Burchett, George Clarke

26 January 1702
Thomas Herbert, Earl of Pembroke and Montgomery, Lord High Admiral
Secretaries: - Josiah Burchett, George Clarke

8 November 1709
Admiral Edward Russell, Earl of Orford
Admiral of the Fleet Sir John Leake
Admiral Sir George Byng
George Dodington
Paul Methuen
Secretary: - Josiah Burchett

14 October 1714
Admiral Edward Russell, Earl of Orford
George Dodington
Sir John Jennings
Sir Charles Turner
Abraham Stanyan
George Baillie
Secretary: - Josiah Burchett

16 April 1717
James, Earl of Berkeley
Mathew Aylmer
Admiral Sir George Byng
John Cockburn
William Chetwynd
Secretary: - Josiah Burchett
2 August 1727 Admiral George Byng, Viscount Torrington
    John Cockburn
    Admiral Sir John Norris
    Admiral Sir Charles Wager
    Sir Thomas Lyttelton, Bart
    George Malpas, Viscount Cholmondeley
    Samuel Molyneux
    Secretary: - Josiah Burchett

21 June 1733
    Admiral Sir Charles Wager
    Sir Thomas Lyttelton, Bart
    Lord Archibald Hamilton
    Sir Thomas Frankland, Bart
    Thomas Winnington
    Thomas Clutterbuck
    Lord Harry Powlett
    Secretary: - Josiah Burchett

19 March 1742 Daniel Finch, Eighth Earl of Winchelsea
    John Cockburn
    Lord Archibald Hamilton
    Charles Calvert, Lord Baltimore
    Philip Cavendish
    George Lee
    John Trevor
    Secretaries: - Josiah Burchett, Thomas Corbett

27 December 1744 John Russell, Fourth Duke of Bedford
    John Montague, Fourth Earl of Sandwich
    Lord Archibald Hamilton
    Lord Vere Beauclerk
    Charles Calvert, Lord Baltimore
    Admiral George Anson
    George Grenville
    Secretary: - Thomas Corbett

26 February 1748 John Montague, Fourth Earl of Sandwich
    Lord Vere Beauclerk
    Admiral Lord Anson
    William Barrington, Second Viscount Barrington
    William Ponsonby, Viscount Duncannon
    Welbore Ellis
    Hon. John Stanhope
    Secretary: - Thomas Corbett

22 June 1751 Admiral Lord Anson
    William Barrington, Second Viscount Barrington
    William Ponsonby, Viscount Duncannon
    Welbore Ellis
    Hon. Thomas Villiers
    Admiral William Rowley
    Admiral the Hon. Edward Boscawen
    Secretary: - Thomas Corbett
APPENDIX 7. Officers and Commissioners of the navy Board.

Date of patent

**Comptroller of the Navy**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 July 1660</td>
<td>Colonel Robert Slingsby</td>
</tr>
<tr>
<td>28 November 1661</td>
<td>Sir John Mennes</td>
</tr>
<tr>
<td>15 April 1671</td>
<td>Sir Thomas Allin</td>
</tr>
<tr>
<td>28 January 1680</td>
<td>Thomas Hayter</td>
</tr>
<tr>
<td>2 February 1682</td>
<td>Sir Richard Haddock (1)</td>
</tr>
<tr>
<td>16 March 1715</td>
<td>Rear-Admiral Sir Charles Wager</td>
</tr>
<tr>
<td>23 April 1718</td>
<td>Thomas Swanton</td>
</tr>
<tr>
<td>9 February 1723</td>
<td>Vice-Admiral James Mighells</td>
</tr>
<tr>
<td>27 April 1734</td>
<td>Richard Haddock (2)</td>
</tr>
<tr>
<td>27 March 1749</td>
<td>Savage Mostyn</td>
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**Surveyor of the Navy**

<table>
<thead>
<tr>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>20 June 1660</td>
<td>Sir William Batten</td>
</tr>
<tr>
<td>25 November 1667</td>
<td>Thomas Middleton</td>
</tr>
<tr>
<td>5 September 1672</td>
<td>Sir John Tippets</td>
</tr>
<tr>
<td>9 August 1692</td>
<td>Edmund Dummer</td>
</tr>
<tr>
<td>22 September 1699</td>
<td>Daniel Furzer</td>
</tr>
<tr>
<td>19 October 1706</td>
<td>Daniel Furzer, William Lee</td>
</tr>
<tr>
<td>November 1714</td>
<td>Daniel Furzer</td>
</tr>
<tr>
<td>16 April 1715</td>
<td>Jacob Acworth</td>
</tr>
<tr>
<td>11 July 1746</td>
<td>Sir Jacob Acworth, Joseph Allin</td>
</tr>
<tr>
<td>16 March 1749</td>
<td>Joseph Allin</td>
</tr>
<tr>
<td>4 September 1755</td>
<td>William Bately, Thomas Slade.</td>
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</table>

**Assistant or First assistant Surveyor**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 April 1689</td>
<td>Edmund Dummer</td>
</tr>
<tr>
<td>2 August 1692</td>
<td>Daniel Furzer</td>
</tr>
<tr>
<td>22 November 1699</td>
<td>J. Batt</td>
</tr>
<tr>
<td>21 February 1705</td>
<td>William Lee</td>
</tr>
<tr>
<td>16 November 1714</td>
<td>Jacob Acworth</td>
</tr>
<tr>
<td>7 May 1729</td>
<td>W. Mills</td>
</tr>
<tr>
<td>26 May 1749</td>
<td>William Bately</td>
</tr>
</tbody>
</table>

**Clerk of the Acts**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
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</thead>
<tbody>
<tr>
<td>13 July 1660</td>
<td>Samuel Pepys</td>
</tr>
<tr>
<td>19 June 1673</td>
<td>Thomas Hayter, John Pepys</td>
</tr>
<tr>
<td>14 April 1677</td>
<td>Thomas Hayter, James Sotherne</td>
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<tr>
<td>May 1679</td>
<td>James Sotherne</td>
</tr>
<tr>
<td>6 February 1690</td>
<td>Charles Sergison</td>
</tr>
<tr>
<td>21 May 1719</td>
<td>Tempest Holmes</td>
</tr>
<tr>
<td>11 October 1726</td>
<td>Thomas Pearse</td>
</tr>
<tr>
<td>15 April 1743</td>
<td>John Cleveland</td>
</tr>
<tr>
<td>16 August 1746</td>
<td>Robert Osborn</td>
</tr>
<tr>
<td>27 July 1747</td>
<td>Daniel Devert</td>
</tr>
</tbody>
</table>
Dummer’s 1705 proposal for a Transatlantic mail service and a record of his losses.


APPENDIX 8.

The Proposition

Which was first laid down & proposed, to advance a Probability of maintaining a Monthly Correspondence with all the English-Island Plantations in America, and the Advantage to England, if made Practicable.

It was proposed in the following Manner; Namely.

That if Four Vessels did Sail from England to the West-Indies in a Course of Succession Monthly, and that each Vessel should perform her Voyage in 100 days or thereabout, that after the first should have performed, then the Proceedings, Return and Expenditure of Time of each and every of the said Vessels successively would be equal, continually, if no Accident prevented the same, which was demonstrated by the Underwritten Scheme.

Let ABCD be put for four Vessels, and be it supposed, that the first of them Went from England &

January
February
March
April
May
June
July
August
September
October
November
December
January
February
March
April

On the first three months expense of
Time at Sea before A returns,

Returns back from the
West Indies.

It is therefore hereby plain, that if A did go away in the beginning of January and did not return in April, and B, C & D did in a Monthly Succession constantly follow, then ABCD, successively, would go out & come home from all the Islands in the same Proportion of Time continually.

For if A Sails in January, and Returns back in April, and B, C & D in February, and Returns back in May, in which Month A proceeds again to the West-Indies, then after 3 first three months are expired (as in the Scheme) One Vessel will go out, and another will Return home every Month continually, if by no Accident prevented.

It was then Added,

That if this Correspondence be established, all the incident Occasions of State and Trade would be effectually answered, and the Practice thereof would indubitably introduce, new and very great Advantage to the Public, true Interest depending between this Kingdom & those Islands in Peace & War. For one thing and the earliest Knowledge of things gained, afford the best Means of Success in all Designs whatever.

The Author’s Observation.

That Her MAJ THE having been pleased to put the above Proposition into Practice, it now appears by a View of the Voyages, and these found in order performed, on the other side, that his Supposition thereof is in Fact answered, tho’ at first thought impracticable by many of the Seamen in England.

The Rate of Letters Outward & Inward.

Single of One Sheet 1-3  1-6  &c.
Double or Two Sheets  2-6  3-0 &c.

and so on in proportion.

For every Ounce or a greater weight.

Six Shillings, Outward & Inward.

Published at Oct. 1705 by E. D.
A record of the voyages made and the losses incurred.

The Course of the West-India Packet-Boats from the beginning of the Service under the Post Master General, by Edm. Dumont.

### Names of the Ships

<table>
<thead>
<tr>
<th>Vessels</th>
<th>Voyages under his Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgman</td>
<td>Neerla</td>
</tr>
<tr>
<td>Manbrid</td>
<td>Plymouth</td>
</tr>
<tr>
<td>K. William</td>
<td>Plymouth</td>
</tr>
<tr>
<td>Bridgman</td>
<td>2</td>
</tr>
<tr>
<td>Manbrid</td>
<td>2</td>
</tr>
<tr>
<td>K. William</td>
<td>2</td>
</tr>
<tr>
<td>Prince</td>
<td>3</td>
</tr>
<tr>
<td>Manbrid</td>
<td>3</td>
</tr>
<tr>
<td>K. William</td>
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<tr>
<td>Prince</td>
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<tr>
<td>Diligence</td>
<td>3</td>
</tr>
<tr>
<td>Prince</td>
<td>3</td>
</tr>
<tr>
<td>K. William</td>
<td>4</td>
</tr>
<tr>
<td>Prince</td>
<td>4</td>
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### Voyages under Contract

<table>
<thead>
<tr>
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<tr>
<td>Cotton</td>
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</tr>
<tr>
<td>Six Islands</td>
<td>1</td>
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<tr>
<td>Frankland</td>
<td>1</td>
</tr>
<tr>
<td>Queen Anne</td>
<td>1</td>
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<tr>
<td>Jamaica</td>
<td>1</td>
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<tr>
<td>Barbadoes</td>
<td>1</td>
</tr>
<tr>
<td>Queen Anne</td>
<td>2</td>
</tr>
<tr>
<td>K. William</td>
<td>2</td>
</tr>
<tr>
<td>Prince George</td>
<td>2</td>
</tr>
<tr>
<td>Antego</td>
<td>2</td>
</tr>
<tr>
<td>Jamaica</td>
<td>2</td>
</tr>
<tr>
<td>Frankland</td>
<td>2</td>
</tr>
<tr>
<td>Prince George</td>
<td>2</td>
</tr>
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<td>Antego</td>
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<tr>
<td>Jamaica</td>
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</tr>
<tr>
<td>Frankland</td>
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<td>K. William</td>
<td>3</td>
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<td>Prince George</td>
<td>3</td>
</tr>
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<td>Antego</td>
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<td>Kingston</td>
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<td>Frankland</td>
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<td>Antego</td>
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<td>Resolution</td>
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<td>7</td>
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<td>Frankland</td>
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<td>K. William</td>
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<td>Cotton</td>
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<td>Sophia</td>
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<td>Sophial</td>
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<td>Frankland</td>
<td>9</td>
</tr>
<tr>
<td>K. William</td>
<td>8</td>
</tr>
</tbody>
</table>
A record of the voyages made and the losses incurred (continued).

<table>
<thead>
<tr>
<th>SHIPS</th>
<th>Voyages</th>
<th>Whence Sailt</th>
<th>Days out</th>
<th>Where Returned</th>
<th>Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perseverance</td>
<td>1</td>
<td>Plymouth</td>
<td>03 Aug. 1709</td>
<td>110</td>
<td>Clowesly</td>
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<td>2</td>
<td>10 Oct.</td>
<td>164</td>
<td>Southwark</td>
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<td>3</td>
<td>13 Jan.</td>
<td>169</td>
<td>3 July</td>
<td>Taken to Monega 7 Sept following</td>
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<tr>
<td>Perseverance</td>
<td>4</td>
<td>17 Mar.</td>
<td>100</td>
<td>Bideford</td>
<td>Taken to Monega 7 Sept following</td>
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<tr>
<td>Perseverance</td>
<td>5</td>
<td>3 May</td>
<td>113</td>
<td>23 November</td>
<td>Taken to Monega 7 Sept following</td>
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<td>Perseverance</td>
<td>6</td>
<td>21 July</td>
<td>133</td>
<td>Falmouth</td>
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<td>21 Sept</td>
<td>133</td>
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<td>21 Nov.</td>
<td>123</td>
<td>5 Mar.</td>
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<td>13 Mar.</td>
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<td>19 May</td>
<td>102</td>
<td>Bideford</td>
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</tr>
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</table>

Discontinued 7th August 1711.
Dummer's appeal for further funding and his final proposal of the 14 July 1712.

May it Please your Lord:

To give ye: Lord an Account of those Accidents which were the Cause of leaving the Pidcket Boates to the West-Indies will not be so acceptable to your Lord, as not being so distant to the intended Voyage, (as was my designe) if I am accepted not only to undertake that Service again, but to do it much greater Dispatch.

I have seen the Inconveniences of Obeying Navy Vessells to pass by all the Islands: I have learnt by Experience that it is Boates which shall go to Barbadoes, are not for any further toeward, than to Barbadoes, and thence to return for England: And that the Boates which shall go to Jamaica, do go to no other Island: But return thence directly. That then the Time they stay at each Island by my first Project (much too short) will be longer; And yet all Dispatch to land from each Island will be quicker, and the Service in General more Acceptable: For not with standing this Alteration; these Islands shall be served with a Monthly Boat from England as they were before.

In this Intention of mine shall appear worthy of ye: Lord's regard, I shall only request ye: Lord's sentiments by Way of Certificate in such Words as ye: Lord shall think proper for shewing ye: Lord's Particular Approbation thereof, to be by me communicated to such Person from Whom I am more certain I should have Assistance: To be Writted also in some manner appropriate for the Perusal of ye: Lord's respective Governors of Barbadoes, the Leeward Islands, and Jamaica. Because such Signification from ye: Lord's that such Services shall be acceptable to ye: Publicke, and such Advenstures will very much contribute to my Success in them.

This favour can't dispart of from ye: Lord; if it were only to encourage or enable me to make my Voyage, and demands by my own Concerns without asking any assistance or Assistance of the Prince for those Lodges I have hitherto thereby, during the War; (Contained in the Inclosed Print) and for unforeseen Occor-

Bold, and unexpected Enterprise, as this at first was known to be; By seizing our fruit against a String undo ye: Lord's Countersigns, that will, depend upon the like Actings to the Governor, to Trade, and to the plantations, in Time of Peace.

London 14 July 1712

I am

May it Please ye: Lord

Ye: Lord's

Most Obedient and Most Humble Serv.
APPENDIX 9 DRAFT SAILING QUALITY REPORT FORM

Observations of Qualities of His Majesty's ship

Her best sailing Draft of Water, when victualled and stored for Channel service
afore .......... Abaft .......... or as much lighter as she is able to bear sail. Her lowest gundeck
ports will then be .......... Above water.

Query the first. How she behaves close hauled and how many knots she has run

In a topgallant gale .......... 

In a topsail gale .......... 

How she steers and how she wears and stays
Under her Reefed topsails .......... 
Reefed courses .......... 

And query, whether she will stay under her courses .......... 

Query the 2nd. In each circumstance above mentioned (in sailing with other ships) in what
proportion she gathers to windward, and in what proportion she forereaches, and in general her
proportion of leeway.

Query the 3rd. How she behaves in sailing through all variations of the wind from it being a
point or two abaft the beam to its veering forward upon the bowline in every strength of gale,
especially in a stiff gale and a head sea; and how many knots she runs in each circumstance and
how she carries her helm.

Query the 4th. The most knots she runs before the wind and how she rolls in the trough of the
sea.

Query the 5th. How she behaves lying-to or a-try, under a mainsail and also under a mizon
ballanc'd

Query the 6th. What for a Roader she is, and how she careens.

Query the 7th. If upon trial the best sailing draft of water given as above should not prove to be
so, what is her best sailing draft of water. Afore .......... Abaft .......... 

Query the 8th. What is her draft of water when victualled to six months, and stored for foreign
service. Afore .......... Abaft .......... 

Query the 9th. What height is her lowest gundeck port then above the surface of the water.

Query the 10th. The trim of the ship.
APPENDIX 10 Members of the Norris Committee. NMM Adm. B/131.

A list of the names of the Flag Officers, Commissioners of the Navy, Commodores and Captains who assisted at any of the meetings of Sir John Norris for considering of a new Establishment for building ships of the Royal Navy.

Right Honourable Sir John Norris
Admiral Mathews
Admiral Vernon
Sir Chaloner Ogle
Right Honourable Lord Vere Beauclerk
Rear Admiral Anson
Richard Haddock Esquire, Comptroller of the Navy
Commissioners Cleveland
                      Geddes
Commodore Long
Honourable Commodore Byng
Commodore Osborn

Names of the Clerks or Instruments Employed on the above occasion, and what their present salaries are

Thomas Tomlinson. A Clerk in the Navy Office at £60 per annum.

Maurice Harrison } Extra clerks, without salary employed on this occasion.
Thomas Tomlinson }
APPENDIX 11 Tables of Naval Strength and Expenditure.

Taken from J. Glete, (1993): vol.1, 218.

<table>
<thead>
<tr>
<th>Year</th>
<th>£ Sterling</th>
<th>France</th>
<th>Livres</th>
</tr>
</thead>
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<tr>
<td>1663-1682</td>
<td>10,000,000 (aprox. av.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1683</td>
<td>11,740,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1684</td>
<td>11,580,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1685</td>
<td>10,790,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1686</td>
<td>10,270,000</td>
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<td></td>
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<td>1722</td>
<td>1,582,799³</td>
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</table>

¹ The exchange rate fluctuated but prior to 1700 it averaged 14 Livres to the £ sterling. Between 1702 and 1707, it averaged 17.2 and between 1708 and 1714, 18.3 Livres to the £. The average thereafter was about 18. Rates taken from J. Bromley (1987).
² Includes repayment of accumulated debt.
³ Includes repayment of £1,000,000 of debt.
<table>
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<th>Year</th>
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<th>France</th>
<th>Livres</th>
<th>£ Sterling</th>
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4 Taken from D. Panzac, (1998).
5 Includes £500,000 debt repayment.
6 Includes £1,200,000 debt repayment.
7 Includes £1,000,000 debt repayment.
8 Includes £4,000,000 debt repayment.
9 Taken from J. Rivetand (1987). The lack of a centralized national budget makes French figures very approximate.
Explanatory notes on the drawings and comparative data.

The Admiralty draughts from the collection held at the national Maritime Museum have been redrawn to show waterlines where these were omitted, and buttock lines which were not shown on Admiralty draughts during the eighteenth century. (Without them it would have been difficult to judge the fineness of the lines in this direction and it is possible that the “solids” that accompanied the drawings may have been intended to supply this deficiency). Tangential angles are taken at the load waterline and half depth for the bow waterlines and at quarter breadth in the case of bow and stern buttock lines. These show the fineness of the entry and run in both planes.

The midsection and prismatic coefficients have been defined in the introduction (see volume 1, pages 8-9 above). It will be seen that English ships generally have a much larger midsection coefficient than French ships and this is particularly noticeable in shallow hulls where it is needed to give sufficient buoyancy. Ideally this should be combined with fine ends as seen in both the Charles Galley (fig.3) and the Peregrine Galley (fig.9) and both these ships have low prismatic coefficients. In the broader and deeper hulls of larger ships, it is necessary to retain full body sections closer to the ends and this makes forming fine ends more difficult. The English solution was to provide a great deal of hollow in the lower waterlines, a feature much used by Acworth and seen in an extreme form in the Dolphin (fig.18). It was a feature that was much admired by Ollivier, who stated that, 'prejudice ... has prevented us from perceiving the advantages which the English obtain from their great convexity of the runghead ribband'. In an extreme form however, it would cause the breakdown of laminar flow and impair performance. The practice was largely abandoned after the Establishments, when bigger ships made it unnecessary. For this reason, it was rarely seen in French ships where their greater size allowed them to draw out the ends without recourse to that expedient and they often had both small midsection and prismatic coefficients (e.g. Rénommée, fig.25). This was also evident in Acworth’s Drake class sloops (fig.22) which were as fast for their size as any of those examined.

Where sailing quality reports are available a figure has been give for velocity related to the waterline length. Where there are a number of reports the mean velocity has been used and obvious anomalies ignored. For cruising ships, a figure of 1.1 to 1.2√LWL indicates a very fast hull while for line of battle ships 1√LWL would be good. Actual speed is dependent on waterline length so that although a Drake class sloop has the same figure as the Rénommée, she would not be as fast. Conversely although the Princesa has a figure of only 0.84, her great size meant that she was a reasonable performer.

The selection of draughts has concentrated on the cruising and commerce raiding ships of the period because this was where the major improvements in performance were taking place and where the relative sophistication of designs can best be judged. The results show that, for their size, the performance of cruising ships of both Britain and France reached its peak during this period and was rarely exceeded for the rest of the century, although there may have been an improvement in stability and sea-keeping commensurate with the increase in size.

1 Remarks: 137.
Figure 1. A sketch by Van de Velde of a Fifth-rate, probably the *Dartmouth*.
By courtesy of the National Maritime Museum
Figure 2. A painting of the *Charles Galley* by the elder Van de Velde. By courtesy of the National Maritime Museum.
Figure 3. Drawing of the Charles Galley, built by Sir Phineas Pett (2) at Woolwich in 1693. Broken up in 1710.

L. GD 131 ft. 1 in. Length / Beam 4.6
L. Keel 106 ft. Depth / Beam 3.3
Breadth 28 ft. 6 ins. Midsection coefficient .81
Depth 8 ft. 7 ins. Prismatic coefficient .58
Burthen 492 tons. Deadrise 10°

The original drawings are not contemporary with the ship and may have been made showing a proportionately long, narrow and shallow hull with a large midsection coefficient to produce an extremely low prismatic coefficient. They suggest she would have been fast but not particularly well-balanced being given a higher priority than in later galley-ships and while influential, she was not
1676. Rebuilt by Lawrence at Woolwich

½ angle at the waterline  39°
½ angle at ½ depth  20°
Buttock at ¼ beam at bow  38°
Buttock at ¼ beam at stern  20°

Shortly before the rebuild. The lines show to provide the necessary buoyancy but an particularly weatherly, with rowing ability not imitated.
Figure 4. Illustration of a Chaillé draught, taken from J. Boudriot, (1993).

The drawing shows the primitive state of French drafting at the end of the seventeenth century. It would nevertheless have provided sufficient information for the builder to determine the shape of the hull.
Figure 6. Drawing of the *Sweepstakes* (32), built by Richard Stacey at Woolwich in 1708. Taken by the French.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>108 ft. 3 ins.</td>
<td>Length / Beam</td>
</tr>
<tr>
<td>L. Keel</td>
<td>90 ft.</td>
<td>Depth / Beam</td>
</tr>
<tr>
<td>Breadth</td>
<td>29 ft. 6 ins.</td>
<td>Midsection coefficient</td>
</tr>
<tr>
<td>Depth</td>
<td>12 ft.</td>
<td>Prismatic coefficient</td>
</tr>
<tr>
<td>Burthen</td>
<td>416 tons.</td>
<td>Deadrise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>½ angle at the waterline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>½ angle at ½ depth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buttock at ¼ beam at bow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buttock at ¼ beam at stern</td>
</tr>
</tbody>
</table>

Not designed to established dimensions, she was one of the last British demi-batteric ships to be built. Her dimensions compared with those of the *Gloire* (fig. 7) and it will be seen that Sweepstakes has less deadrise and a fuller run. Although probably stiffer, she would undoubtedly have been much the slower ship. Never very successful, survivors of the 32-gun class were converted into 20-gun ships in 1719.
built Her lines can be very successful, the

- waterline 42°
- depth 30°
- beam at bow 45°
- beam at stern 25°

by the French in 1709.
Gazelle was built by the French in 1709.

- Waterline: 42°
- Depth: 30°
- Beam at bow: 45°
- Beam at stern: 25°

Her lines can be considered more than satisfactory for their time and a fuller entry and more beam would have made her very successful, the
Figure 7. Drawing of the *Play Prize*, formerly *Les Jeux* by W. Van de Velde, by courtesy of the National Maritime Museum.
Figure 8. Drawing of the Gloire (36/44) built by Pangalo? at Lorient in 1707. Captured in 1716. Sold 1716.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>LGD</td>
<td>122 ft.</td>
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<tr>
<td>L. Keel</td>
<td>102 ft. 4 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>34 ft. 9 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>13 ft.</td>
</tr>
<tr>
<td>Burthen</td>
<td>657 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.51</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.67</td>
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<tr>
<td>Midsection coefficient</td>
<td>.75</td>
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<tr>
<td>Prismatic coefficient</td>
<td>.63</td>
</tr>
<tr>
<td>Deadrise</td>
<td>15°</td>
</tr>
</tbody>
</table>

Commissioned as a commerce raider by DuGuay-Trouin, she was perhaps a collaborative effort with Coulomb. When captured she had five extra gun-ports on the lower deck making her a 44. Although she would have suffered somewhat by having an overhauled fast and weatherly ship. Nevertheless, she was overhauled and taken by the slightly larger captained by Thomas Mathews.
Captured in 1709 and renamed *Sweepstakes* (40).

\[
\begin{align*}
\frac{1}{2} \text{ angle at the waterline} & \quad 40^\circ \\
\frac{1}{2} \text{ angle at } \frac{1}{2} \text{ depth} & \quad 24^\circ \\
\text{Buttock at } \frac{1}{4} \text{ beam at bow} & \quad 35^\circ \\
\text{Buttock at } \frac{1}{4} \text{ beam at stern} & \quad 16^\circ
\end{align*}
\]

...a collaborative effort between Pangalo and Pierre...
Figure 9. Drawing of the *Peregrine Galley* (20) designed by Peregrine Osborne, marquis of Carman, William Lee at Deptford in 1700. Converted into a Royal yacht called the *Carolina* in 1716, her lines 1720. Rebuilt by Richard Stacey in 1733 as the *Royal Caroline* and again by Thomas Fellowes in 1749 (10), she was lost at sea in the Bay of Biscay in January 1762.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
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</thead>
<tbody>
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<td>LGD</td>
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</tr>
<tr>
<td>L. Keel</td>
<td>71 ft.</td>
</tr>
<tr>
<td>Breadth</td>
<td>22 ft. 10 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>10 ft.</td>
</tr>
<tr>
<td>Burthen</td>
<td>196 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.83</td>
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<tr>
<td>Depth / Beam</td>
<td>2.17</td>
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<tr>
<td>Midsection coefficient</td>
<td>.81</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>.65</td>
</tr>
<tr>
<td>Deadrise</td>
<td>$5^\circ$</td>
</tr>
<tr>
<td>½ angle at the waterline</td>
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</tr>
<tr>
<td>½ angle at ½ depth</td>
<td></td>
</tr>
<tr>
<td>Buttock at ¼ beam</td>
<td></td>
</tr>
<tr>
<td>Buttock at ¼ beam</td>
<td></td>
</tr>
</tbody>
</table>

Perhaps the most influential small British cruiser, she was designed as a galley-ship to row 9 sweeps as not as extreme as the *Charles Galley* has the relatively narrow and shallow hull of the type. Like the very full midsection coefficient combined with a low prismatic and while the waterlines are not particulate buttock lines are fine, particularly in the run. Highly influential throughout the century, she shows the uniquely English scow-like bow that was to be manifested in more extreme forms in the 1733 *Esto*; was reputed to be very fast, weatherly, and a good sea-boat, riding out a four-day gale in 1736 with th when many of the convoys were damaged and forced to seek shelter.
borne, marquis of Carmarthen and built by Carolina in 1716, her lines were taken off in Thomas Fellowes in 1749 as the Peregrine

\[
\begin{align*}
\frac{1}{2} \text{ angle at the waterline} & \quad 46^\circ \\
\frac{1}{2} \text{ angle at 1/4 depth} & \quad 37^\circ \\
\text{Buttock at 1/4 beam at bow} & \quad 35^\circ \\
\text{Buttock at 1/4 beam at stern} & \quad 13^\circ 
\end{align*}
\]

ship to row 9 sweeps a side and although the hull of the type. Like that ship she has a waterlines are not particularly sharp, the century, she shows the first evidence of forms in the 1733 Establishment. She day gale in 1736 with the king on board
Figure 10. Drawing of the *L'Auguste* (54) built by Pangalo at Brest in 1705. Captured in 1705 and in 1716.

Similar in size to English 60-gun ships, she was built by private capital for the course. With fine lines, small midsection and prismatic coefficients. Although undoubtedly fast and weatherly she would in the way of stores and probably carried her guns low. The drawing shows her with the English-added by her captors.

<table>
<thead>
<tr>
<th>LGD</th>
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<th>Length / Beam</th>
<th>3.62</th>
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<td>L. Keel</td>
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<td>Depth / Beam</td>
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<tr>
<td>Breadth</td>
<td>39 ft.</td>
<td>Midsection coefficient</td>
<td>0.69</td>
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<tr>
<td>Depth</td>
<td>16 ft.</td>
<td>Prismatic coefficient</td>
<td>0.64</td>
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<tr>
<td>Burthen</td>
<td>932 tons.</td>
<td>Deadrise</td>
<td>16°</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\frac{1}{2} \text{ angle at the waterline} & = 44^\circ \\
\frac{1}{2} \text{ angle at } \frac{1}{2} \text{ depth} & = 27^\circ \\
\text{Buttock at } \frac{1}{4} \text{ beam at bow} & = 37^\circ \\
\text{Buttock at } \frac{1}{4} \text{ beam at stern} & = 23^\circ
\end{align*}
\]
renamed August (58). Wrecked
and extreme deadrise she has
been unable to carry much
tyle head and quarter galleries
Figure 11. Drawing of the *Superbe* (56) built by Pierre Coulomb at Lorient in 1708. Captured in 1710 and remodeled.

The drawing is taken from NMM Drg.1348/26, which is wrongly catalogued as the 1736 rebuild. It shows quarter galleries and is probably the 1720 draught. An English style gripe and alterations to the accommodation were normally made to captured ships.

Coulomb was a pupil of Pangalo and *Superbe* has similar midsection and prismatic coefficients to *L'Auguste*, perhaps the best sailing Fourth-rate of the early eighteenth century. She was one of the few French designs to probably influenced the "new method of building", although the fine waterlines were never imitated for ships.
Captured in 1710 and renamed *Superb* (64). Broken up in 1733. The 1736 rebuild. It shows the French style head, hances, cathead and alterations to the accommodation are shown but these were changes that were coefficients to *L'Augus*. Both bow and stern are fine and she was one of the few French designs to be copied by English shipwrights and were never imitated for ships of this Rate.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>143 ft. 6 ins.</td>
</tr>
<tr>
<td>Keel</td>
<td>119 ft. 3 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>40 ft. 2 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>15 ft. 6½ ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>1020 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.57</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.59</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>.69</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>.66</td>
</tr>
<tr>
<td>Deadrise</td>
<td>18°</td>
</tr>
<tr>
<td>½ angle at the waterline</td>
<td>46°</td>
</tr>
<tr>
<td>½ angle at ½ depth</td>
<td>25°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at bow</td>
<td>40°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at stern</td>
<td>18°</td>
</tr>
</tbody>
</table>
Figure 12. Drawing of the Ormonde (50) built by Jacob Acworth at Woolwich in 1711. Renamed Dr

The Ormonde has a short floor with considerable deadrise, long radius reconciling sweep and fine washships and she may have been influenced by some of the ships taken at Vigo. With her flat sheer, simple decoration, she looks distinctly modern compared with her contemporaries. One would expect her to be tender. Acworth did not repeat this hull form.
Red Dragon in 1715. Broken up in 1733.

Fine waterlines characteristic of French ships, single level stern gallery and lack of speed to be fast and weatherly but rather

<table>
<thead>
<tr>
<th>LGD</th>
<th>130 ft.</th>
<th>Length / Beam</th>
<th>3.71</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. Keel</td>
<td>108 ft.</td>
<td>Depth / Beam</td>
<td>2.50</td>
</tr>
<tr>
<td>Breadth</td>
<td>35 ft.</td>
<td>Midsection coefficient</td>
<td>.77</td>
</tr>
<tr>
<td>Depth</td>
<td>14 ft.</td>
<td>Prismatic coefficient</td>
<td>.63</td>
</tr>
<tr>
<td>Burthen</td>
<td>704 tons</td>
<td>Deadrise</td>
<td>10°</td>
</tr>
</tbody>
</table>

½ angle at the waterline 50°
½ angle at ½ depth 31°
Buttock at ¾ beam at bow 43°
Buttock at ¾ beam at stern 18°
Figure 13. Drawing of the *Royal George* (100) built by Acworth at Woolwich in 1715. Reduced to a 90-gun Second-rate in 1756 and renamed *Royal Anne*. Broken up in 1767.

<table>
<thead>
<tr>
<th></th>
<th>Length / Beam</th>
<th>Depth / Beam</th>
<th>Midsection coefficient</th>
<th>Prismatic coefficient</th>
<th>Deadrise</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>171 ft. 9 ins.</td>
<td>2.49</td>
<td>3.49</td>
<td>2.53</td>
<td>85</td>
</tr>
<tr>
<td>L. Keel</td>
<td>139 ft. 7 ins.</td>
<td>19 ft. 6 ins.</td>
<td>130 ft. 7 ins.</td>
<td>19 ft. 6 ins.</td>
<td>7.0</td>
</tr>
<tr>
<td>Breadth</td>
<td>49 ft. 3 ins.</td>
<td>49 ft. 3 ins.</td>
<td>49 ft. 3 ins.</td>
<td>49 ft. 3 ins.</td>
<td>.85</td>
</tr>
<tr>
<td>Depth</td>
<td>19 ft. 6 ins.</td>
<td>19 ft. 6 ins.</td>
<td>19 ft. 6 ins.</td>
<td>19 ft. 6 ins.</td>
<td>.70</td>
</tr>
<tr>
<td>Burthen</td>
<td>1801 tons.</td>
<td>1801 tons.</td>
<td>1801 tons.</td>
<td>1801 tons.</td>
<td>.01</td>
</tr>
</tbody>
</table>

The drawings show the flat floor and high midsection coefficient typical of large line of battle ships, including those of 90, 80 and most 70-gun ships of this period although she has an unusually fine run for a ship of this size. She was a popular and successful ship although the dimensions of Fisher Harding’s slightly larger *Royal Sovereign* were chosen for the 1719 Establishment ships.

An engraving of the *Royal George* by Thomas Baston published by Thomas Bowles in 1723. The drawing shows her with a sprit topsail as well as a jib boom. By courtesy of the National Maritime Museum.
Figure 14. Photographs and drawings of the model probably used by Acworth to explain his proposed structural changes to the Board of Admiralty in October 1715. Taken from J. Franklin, (1989).

The port side of the model shows the old system of construction and the starboard side, the new. The use of cant frames is the most important change although in this early form filling pieces are used rather than the frames being progressively fanned out as became later practice. A fact not clear from the photographs is that the ordinary framing is also significantly different. In the old system, every seventh frame was double with six filling frames in between while in the new system all the frames are single. Franklin suggests that some were intended to be "doubled" by means of filling pieces but Ollivier's Remarks indicates that this was not the case. The model also shows the flush main wale, although the planking is straight-edged rather than hook and butt as described by Olivier. It is possible that the bolting of the butt ends suggested by Acworth was used in lieu of hook and butt at this time. Also evident is the random nature of the framing and the light construction of the upper-works of 50-gun Fourth-rates at this time.
Figure 15. Drawing of the *Falkland* (50) built by Richard Stacey at Deptford in 1720. Broken up for rebuilding.

The *Falkland* was greatly influenced by the *Superbe*, although about 25% smaller. The lines are similar and the deadrise, which is exceptionally steep for an English ship of this period. The prismatic coefficient is the same, but the ship has proportionately more depth and a greater midsection coefficient to compensate for less breadth. It is likely that this was the raison d'être for the 1733 Establishment cruisers, which had these increased deadrises. There is no record as to how she performed although she looks as if she would be both fast and steady.
for rebuilding in 1742.

similar and she has the same amount of...

LGD 134 ft. 5 ins.  Length / Beam  3.68
L. Keel 110 ft.  Depth / Beam  2.40
Breadth 36 ft. 5 ins.  Midsection coefficient  .74
Depth 15 ft. 2 ins.  Prismatic coefficient  .66
Burthen 776 tons.  Deadrise  18°

½ angle at the waterline  45°
½ angle at ½ depth  25°
Buttock at ¼ beam at bow  35°
Buttock at ¼ beam at stern  20°

although the Falkland has breadth, which was restricted by the...
Figure 16. Drawing of the *Chatham* (50) built by Richard Stacey at Deptford in 1721. A breakwater in 1749,

In this design, Stacey reverted to a more traditional shape than that of the *Falkland*. The *Chatham* has a significantly sharper turn to the bilge. Waterlines and buttock lines are similarly fine and the prismatic coefficient is smaller than that of the midsection coefficient. She would have had the more buoyant hull and would probably have carried her guns better.
1721. A breakwater in 1749, broken up in 1762.

*land. The Chatham has a shorter, flatter floor and a slightly longer keel. The prismatic coefficient is the same. With her large ballast, she has carried her guns better.

<table>
<thead>
<tr>
<th>LGD</th>
<th>134 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. Keel</td>
<td>109 ft. 8 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>36 ft.</td>
</tr>
<tr>
<td>Depth</td>
<td>15 ft. 2 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>756 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.72</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.36</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>.82</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>.66</td>
</tr>
<tr>
<td>Deadrise</td>
<td>5°</td>
</tr>
<tr>
<td>½ angle at the waterline</td>
<td>43°</td>
</tr>
<tr>
<td>½ angle at ½ depth</td>
<td>27°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at bow</td>
<td>35°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at stern</td>
<td>22°</td>
</tr>
</tbody>
</table>
Figure 17. Two prints of the Royal Academy at Portsmouth, the upper one being produced shortly after 1806 and the lower later in the nineteenth century but both looking much the same as when Acworth designed it. By courtesy of the National Maritime Museum.
This radical design was the prototype of the 1733 Establishment 20-gun ships and the drawing shows a combination of very fine buttock lines that was to become the hallmark of the "new method of building". Talbot was an early proponent of the new method. The point of maximum beam and buoyancy is well forward making distorted. Despite this, she was evidently fast for her Captain had written to Acworth, apprehensive of change, in 1743. Acworth wrote to the shipwright concerned,

Capt. Holbourne ... is under terrible apprehension of your spoiling the sailing of the Dolphin by additional stand of wooden ones betwixt the decks; if any, they must be iron, otherwise she cannot stow her oars.¹

¹ PRO Adm. 91/3, f.136. Acworth to Pool, 24 March 1743.
Deptford in 1732. Taken by the French in 1760.

...and the drawing shows an extremely bluff bow method of building”. It shows that Acworth was well forward making the lower waterlines very apprehensive of changes that it was intended to achieve by additional standards; you must not put any meters.1

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>106 ft.</td>
<td></td>
</tr>
<tr>
<td>L. Keel</td>
<td>87 ft.</td>
<td></td>
</tr>
<tr>
<td>Breadth</td>
<td>30 ft. 5 ins.</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>9 ft. 2 ins.</td>
<td></td>
</tr>
<tr>
<td>Burthen</td>
<td>428 tons.</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length / Beam</td>
<td>3.48</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>3.3</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>0.69</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>0.60</td>
</tr>
<tr>
<td>Deadrise</td>
<td>7°</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>½ angle at the waterline</td>
<td>75°</td>
</tr>
<tr>
<td>½ angle at ½ depth</td>
<td>33°</td>
</tr>
<tr>
<td>Buttock at ½ beam at bow</td>
<td>32°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at stern</td>
<td>20°</td>
</tr>
</tbody>
</table>
Figure 19. Drawing of the *Fox* (20) designed by Acworth and built by Buxton of Rotherhithe in 1740. Wre

A 1733 Establishment 20-gun ship, she is a refinement of the *Dolphin* design. She has a finer bow and the centre of buoyancy further aft, which should have improved the balance and reduced pitching. On the other hand, she has been raised to accommodate two lower-deck gun-ports. As a class, they seem to have been weatherly and increasingly leewardly in strong winds. They were fast for their size; discounting one obvious exaggeration, they could attain 15 knots to windward in a topsail gale and 11 knots with the wind free. Most of the 6 examples studied were 91 feet 3 inches and 1 foot 3 inches by the head. This would have had the effect of giving the gripe more purchase to windward and the run aft. Advanced when first built, they were to be made obsolete by the new “classic” frigates built from 1750 onwards.
of Rotherhithe in 1740. Wrecked in 1745.

She has a finer bow and fuller stern, bringing the reduced pitching. On the other hand, the topsides have seem to have been weatherly in light winds but one obvious exaggeration, they could make 8 of the 6 examples studied were trimmed between 8 the gripe more purchase on the water and easing the new “classic” frigates built in France from 1744

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>106 ft.</td>
</tr>
<tr>
<td>L. Keel</td>
<td>87 ft.</td>
</tr>
<tr>
<td>Breadth</td>
<td>30 ft. 6 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>9 ft. 5 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>442 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.47</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>3.24</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>0.77</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>63</td>
</tr>
<tr>
<td>Deadrise</td>
<td>11°</td>
</tr>
<tr>
<td>½ angle at the waterline</td>
<td>67½°</td>
</tr>
<tr>
<td>½ angle at ½ depth</td>
<td>33°</td>
</tr>
<tr>
<td>Buttock at ½ beam at bow</td>
<td>27½°</td>
</tr>
<tr>
<td>Buttock at ½ beam at stern</td>
<td>26°</td>
</tr>
</tbody>
</table>

Speed potential related to \( \sqrt{\text{of waterline length}} \) \( \frac{V}{\sqrt{\text{LWL}}} \) 1.1
Figure 20. Drawing of the *Elizabeth* (70) built by Ward at Chatham in 1737. Broken up in 1766.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>151 ft.</td>
</tr>
<tr>
<td>L. Keel</td>
<td>122 ft. 2 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>43 ft. 5 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>17 ft. 9 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>1224 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.47</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.45</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>0.81</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>0.67</td>
</tr>
<tr>
<td>Deadrise</td>
<td>7°</td>
</tr>
<tr>
<td>½ angle at the waterline</td>
<td>8°</td>
</tr>
<tr>
<td>½ angle at ½ depth</td>
<td>7°</td>
</tr>
<tr>
<td>Buttock at ¼ beam</td>
<td>8°</td>
</tr>
<tr>
<td>Buttock at ½ beam</td>
<td>7°</td>
</tr>
<tr>
<td>V/√LWL @ 12 kn</td>
<td>8°</td>
</tr>
</tbody>
</table>

This was the first of twelve 70-gun ships built to the 1733 Establishment proposals. Her sailing qualities informative but a later sister ship, also by Ward proved to be fast in the right conditions and very manoeuvrable staying under her courses. The lines show the “new method” in a less extreme form than is seen in the small deadrise and a full midsection coefficient. Nevertheless she is reported to have ‘rolled deeply’. A respectability seems to be typical for these ships and can be compared with a figure of 0.84 for the *Princesa* or 1.0 for the *Ivy*.

NMM drawing no. 1051 with the addition of buttock lines at ¼ beam and a ½ depth waterline at the bow.
1766.

½ angle at the waterline 67½°
½ angle at ½ depth 39°
Buttock at ¼ beam at bow 35°
Buttock at ¼ beam at stern 23°
V/√LWL @ 12 kn. 0.99

Her sailing quality report is not very
and very manoeuvrable, being capable of
is seen in the smaller classes with less
deeper. A respectable V/√ of 0.98-0.99
esa or 1.0 for the Invincible.

e at the bow.
Figure 21. Drawing of the Hampshire (50). Designed by Acworth and built by Barnard at Ipswich in 1741.

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>134 ft.</td>
</tr>
<tr>
<td>L. Keel</td>
<td>108 ft. 8 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>38 ft. 6 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>15 ft. 9 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>853 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.48</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.44</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>.76</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>.69</td>
</tr>
<tr>
<td>Deadrise</td>
<td>$16^\circ$</td>
</tr>
<tr>
<td>$\frac{1}{2}$ angle at the bow</td>
<td>$2.44$</td>
</tr>
<tr>
<td>$\frac{1}{2}$ angle at $\frac{1}{2}$ dead</td>
<td>$1.76$</td>
</tr>
<tr>
<td>Buttock at $\frac{1}{4}$ bow</td>
<td>$1.69$</td>
</tr>
<tr>
<td>Buttock at $\frac{1}{4}$ beam</td>
<td>$1.69$</td>
</tr>
</tbody>
</table>

One of four 1733 Establishment ships built to the same draught in private yards, they were reputedly good. There are no sailing quality reports to confirm this. The draught is characterised by the extreme hollow to Ollivier admired the concave runghead ribband of English ships as it carried a full section well forward, but excessive. The design is typical of the "new method" although the convexity has produced unusually fine. She has frigate-style quarter galleries with no windows to the very small poop.
Armard at Ipswich in 1741. Broken up in 1766.

½ angle at the waterline 65°
½ angle at ½ depth 29°
Buttock at ¼ beam at bow 30°
Buttock at ¼ beam at stern 26°

They were reputedly good performers although by the extreme hollow to the lower waterlines. Section well forward, but in this case it appears produced unusually fine half-depth waterlines.
Figure 22. Drawing of the Drake class sloops (8/10). Designed by Acworth and built by contract, all ten of the class were rigged as snows. Drake, Hawk and Swift were built to this draught.

Despite lines that would have appeared very bluff above the water, they are extremely fine below and the prismatic coefficient is the lowest of all the ships studied. The reports confirm that they were both fast and weatherly being capable of 8 knots to windward and 11 knots with the wind free. Captain Bertie stated that,

What ships I have been in company with, have been able to spare them one third of my sail.
As to leeway, in any sort of moderate weather, as she has such quick way through the water, it is mine and my officers opinion that half a point is sufficient.

Although rigged as snows, they seem to have had boomed rather than loose-footed mainsails and care was needed in heavy weather (see page 152 above). Note that although pierced for 14 guns they only carried 8 four-pounders although this was later increased to ten. Acworth had to constantly resist demands by sea-officers for increased firepower.

1 Based on the most conservative of 3 sailing quality reports.
Figure 23. Drawing of the Culloden (74) Designed by Acworth in 1745 and launched at Deptford in 1747. Sc

<table>
<thead>
<tr>
<th>LGD</th>
<th>161 ft.</th>
<th>Length / Beam</th>
<th>3.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. Keel</td>
<td>132 ft. 3 ins.</td>
<td>Depth / Beam</td>
<td>2.38</td>
</tr>
<tr>
<td>Breadth</td>
<td>46 ft.</td>
<td>Midsection coefficient</td>
<td>84</td>
</tr>
<tr>
<td>Depth</td>
<td>19 ft. 4 ins.</td>
<td>Prismatic coefficient</td>
<td>69</td>
</tr>
<tr>
<td>Burthen</td>
<td>1487 tons.</td>
<td>Deadrise</td>
<td>&gt;1°</td>
</tr>
</tbody>
</table>

Modified from a 1741 Establishment 80-gun ship at an early stage in construction, this was the first British eighteenth century. Acworth has retained the 80-gun ships mid section but the ends are much finer. Her car she worked well and was 'as weatherly as most of her height'. However, while she was not slow the lines so not perform particularly well on the wind.

NMM drawing no. 668
ptford in 1747. Sold in 1770.

| ½ angle at the waterline | 69° |
| ½ angle at ½ depth       | 39° |
| Buttock at ¼ beam at bow  | 48° |
| Buttock at ¼ beam at stern| 30° |
| V/√LWL @ 12 kn.           | 0.95|

was the first British 74-gun ship of the much finer. Her captain considered that not slow the lines suggest that she would
Figure 24. Drawing of the *Newark* (80) built by Ward at Woolwich in 1747. Hulked in 1770.

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>161 ft.</td>
</tr>
<tr>
<td>L. Keel</td>
<td>130 ft. 3 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>46 ft.</td>
</tr>
<tr>
<td>Depth</td>
<td>19 ft. 4 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>1466 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.50</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.38</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>.83</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>.75</td>
</tr>
<tr>
<td>Deadrise</td>
<td>$&gt;1^\circ$</td>
</tr>
</tbody>
</table>

This was the only 1741 Establishment 80-gun ship to be completed as such, two others being converted to ships either after or during construction. *Newark* has a similar midsection coefficient to the *Culloden* but with a lower Prismatic coefficient. There is no sailing quality report but the lines would suggest a rather slow and unweatherly ship, more suitable for offence, but a formidable opponent in the line of battle in moderate conditions.

NMM drawing no. 467 with the addition of buttock lines at $\frac{1}{4}$ beam and a $\frac{1}{2}$ depth waterline at the bow.
1770.

½ angle at the waterline     73°
½ angle at ¼ depth          56°
Buttock at ¼ beam at bow    47°
Buttock at ¼ beam at stern  23°

rs being converted to two-decked 66-gun
o the Culloden but with much fuller ends.
atherly ship, more suited to defence than

rline at the bow.
Figure 25. Drawing of the Renommée (30) built in Brest by F. Clairin-Deslauriers in 1744. Captured in September by the Amazon, ex Panthère (20) and taken into the navy as the Renown (30). Broken up in 1771.

Similar in shape to Ollivier’s Médée, the lines show the hexagonal shape that was typical of many French directions, while her short, flat floor would allow for the effective placement of ballast. Her performance was bettered during the eighteenth century, approaching the limit of what is possible in a displacement hull. Her shallow hull with a low prismatic coefficient but due to distortion her performance deteriorated as she got older.
Captured in September 1747 by the *Dover* (40) aided by 1 of many French frigates. The lines are fine in both performance when new was exceptional and perhaps not as she got older and she proved expensive to maintain.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed potential (V/LWL)</td>
<td>1.2+</td>
</tr>
<tr>
<td>LGD</td>
<td>126 ft. 2 ins.</td>
</tr>
<tr>
<td>L. Keel</td>
<td>103 ft. 7 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>34 ft. 10 ins.</td>
</tr>
<tr>
<td>Depth</td>
<td>11 ft. 8 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>694 tons.</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.62</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>2.98</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>0.73</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>61</td>
</tr>
<tr>
<td>Deadrise</td>
<td>4°</td>
</tr>
<tr>
<td>½ angle at the waterline</td>
<td>43°</td>
</tr>
<tr>
<td>½ angle at ½ depth</td>
<td>22½°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at bow</td>
<td>27½°</td>
</tr>
<tr>
<td>Buttock at ¼ beam at stern</td>
<td>19°</td>
</tr>
</tbody>
</table>
Figure 26. Drawing of the *Ambuscade* (38) built in Le Havre by Chaillé in 1745. Captured in September 1748.

Ambuscade (40). Sold in 1762.

The midsection is more typical of English than French frigates having a greater midsection coefficient than that of other French vessels. She received a great deal of attention from the Admiralty and her lines were analysed in great detail. While a reasonable fine weather performer, she suffered from heavy seas and had difficulty in staying, probably due to her rather full bow.\(^1\)

---

\(^1\) Information from a sailing quality report dated April 1761 towards the end of her working life. Quoted in R. Gardiner, (1992)
Figure 27. Drawing of the Lyme (24). Built at Deptford to the lines of the privateer frigate Tygre. Re-classified in 1756. Broken up in 1766. Wrecked in 1760.

LGD 117 ft. 10 ins. Length / Beam 3.48
L. Keel 96 ft. 4½ ins. Depth / Beam 3.45
Breadth 33 ft. 10 ins. Midsection coefficient .78
Depth 15 ft. 9 ins. Prismatic coefficient .57
Burthen 587 tons. Deadrise 10°
⅓ angle at the waterline
⅓ angle at ⅓ depth
Buttock at ⅓ beam
Buttock at ⅓ beam
Speed potential

The first British "classic Frigate", this was also the first ship whose lines were a direct copy from a French or a Chaillé design. The lines are fine without being extreme and have the favoured semicircular mid-section. A report for her sister ship, the Unicorn shows her to be very fast, handy, reasonably weatherly and a good strong influence on future frigate designs although later ships were made deeper for the better accommodation.
used as a 28-gun ship in

- Waterline 45°
- Bow 29°
- Beam at bow 33°
- Beam at stern 20°
- (V/LWL) 1.2

...ship that was probably a sea-boat. She had a

*The sailing quality of men and guns*.
Figure 28. Drawing of the *Seahorse* (24) designed by Acworth in 1748. Sold in 1784.

Acworth’s design for a replacement for the Establishment 24-gun ships, she was a development of his *Ceres*, abandoned the lower deck guns. She retains the characteristic hollow waterlines but has moved away from the *Lyme* and the *Unicorn* she formed part of Keppel’s fast squadron sent to the Mediterranean to suppress the Succession. The sailing quality report shows that she was fast for her size and a match for Allin’s *Mermaid*. S
pment of his *Centaur* design of 1745, which had already moved away from the “new method” of building. Along witherranean to suppress piracy after the war of the Austrian Illin’s *Mermaid*. She was retained in service for 36 years.

Speed potential. ($\sqrt{V/\text{LWL}}$) 1.1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LGD</strong></td>
<td>112 ft.</td>
</tr>
<tr>
<td><strong>L. Keel</strong></td>
<td>92 ft. 6 ins.</td>
</tr>
<tr>
<td><strong>Breadth</strong></td>
<td>32 ft.</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>10 ft.</td>
</tr>
<tr>
<td><strong>Burthen</strong></td>
<td>504 tons.</td>
</tr>
<tr>
<td><strong>Length / Beam</strong></td>
<td>3.50</td>
</tr>
<tr>
<td><strong>Depth / Beam</strong></td>
<td>3.20</td>
</tr>
<tr>
<td><strong>Midsection coefficient</strong></td>
<td>.78</td>
</tr>
<tr>
<td><strong>Prismatic coefficient</strong></td>
<td>.64</td>
</tr>
<tr>
<td><strong>Deadrise</strong></td>
<td>$6\frac{1}{2}^\circ$</td>
</tr>
<tr>
<td>$\frac{1}{2}$ angle at the waterline</td>
<td>$48\frac{1}{2}^\circ$</td>
</tr>
<tr>
<td>$\frac{1}{2}$ angle at $\frac{1}{2}$ depth</td>
<td>$22^\circ$</td>
</tr>
<tr>
<td>Buttock at $\frac{1}{4}$ beam at bow</td>
<td>$39^\circ$</td>
</tr>
<tr>
<td>Buttock at $\frac{1}{4}$ beam at stern</td>
<td>$21\frac{1}{2}^\circ$</td>
</tr>
</tbody>
</table>
Allin's design for a replacement for the Establishment 24-gun ships was built in competition with the *Seahorse*. French than English ships of the period and may have influenced Slade's *Niger* class (see page 167 above) first built and seems to have been reasonably fast and handy although her captain expressed doubts as to her value.
ition with the Seahorse. The bow waterlines are more akin to (see page 167 above). She excited considerable interest when used doubts as to her windward ability.

Speed potential. \((V/\sqrt{LWL})\) 1.09

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LGD</td>
<td>115ft.</td>
</tr>
<tr>
<td>L. Keel</td>
<td>96 ft. 8 ins.</td>
</tr>
<tr>
<td>Breadth</td>
<td>32 ft.</td>
</tr>
<tr>
<td>Depth</td>
<td>10 ft. 2 ins.</td>
</tr>
<tr>
<td>Burthen</td>
<td>526 tons</td>
</tr>
<tr>
<td>Length / Beam</td>
<td>3.59</td>
</tr>
<tr>
<td>Depth / Beam</td>
<td>3.10</td>
</tr>
<tr>
<td>Midsection coefficient</td>
<td>.72</td>
</tr>
<tr>
<td>Prismatic coefficient</td>
<td>.63</td>
</tr>
<tr>
<td>Deadrise</td>
<td>8(\frac{1}{2})°</td>
</tr>
<tr>
<td>(\frac{1}{2}) angle at the waterline</td>
<td>39°</td>
</tr>
<tr>
<td>(\frac{1}{2}) angle at (\frac{1}{2}) depth</td>
<td>21°</td>
</tr>
<tr>
<td>Buttock at (\frac{1}{4}) beam at bow</td>
<td>39°</td>
</tr>
<tr>
<td>Buttock at (\frac{1}{4}) beam at stern</td>
<td>22°</td>
</tr>
<tr>
<td>Name</td>
<td>Year</td>
</tr>
<tr>
<td>---------------------</td>
<td>------</td>
</tr>
<tr>
<td>Charles Galley (32)</td>
<td>1676</td>
</tr>
<tr>
<td>Sweepstakes (32)</td>
<td>1708</td>
</tr>
<tr>
<td>Gloire (36)</td>
<td>1707</td>
</tr>
<tr>
<td>Peregrine Galley (20)</td>
<td>1700</td>
</tr>
<tr>
<td>Auguste (54)</td>
<td>1705</td>
</tr>
<tr>
<td>Superbe (56)</td>
<td>1708</td>
</tr>
<tr>
<td>Ormonde (50)</td>
<td>1711</td>
</tr>
<tr>
<td>Royal George (100)</td>
<td>1715</td>
</tr>
<tr>
<td>Falkland (50)</td>
<td>1720</td>
</tr>
<tr>
<td>Chatham (50)</td>
<td>1721</td>
</tr>
<tr>
<td>Dolphin (20)</td>
<td>1732</td>
</tr>
<tr>
<td>Fox (24)</td>
<td>1740</td>
</tr>
<tr>
<td>Elizabeth (70)</td>
<td>1737</td>
</tr>
<tr>
<td>Hampshire (50)</td>
<td>1741</td>
</tr>
<tr>
<td>Drake (8-10)</td>
<td>1740</td>
</tr>
<tr>
<td>Culloden (74)</td>
<td>1747</td>
</tr>
<tr>
<td>Newark (80)</td>
<td>1747</td>
</tr>
<tr>
<td>Rénomnée (30)</td>
<td>1744</td>
</tr>
<tr>
<td>Ambuscade (38)</td>
<td>1745</td>
</tr>
<tr>
<td>Lyme (24/28)</td>
<td>1748</td>
</tr>
<tr>
<td>Seahorse (24)</td>
<td>1748</td>
</tr>
<tr>
<td>Mermaid</td>
<td>1748</td>
</tr>
</tbody>
</table>

Dimensions and performance factors of other ships mentioned in the text but whose lines have not been analyzed are:

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Dimensions</th>
<th>Tons</th>
<th>L/B</th>
<th>B/D</th>
<th>Mcf</th>
<th>Pcf</th>
<th>DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eltham (40)</td>
<td>1736</td>
<td>124'x100'3&quot;x35'8&quot;x14'6&quot;</td>
<td>678</td>
<td>3.48</td>
<td>2.46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fougeux (64)</td>
<td>1747</td>
<td>159'11&quot;x135'x44'2½&quot;x18'6½&quot;</td>
<td>1402</td>
<td>3.60</td>
<td>2.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princesa (70)</td>
<td>1730</td>
<td>165'4&quot;x130'3&quot;x49'9&quot;x22'1</td>
<td>1714</td>
<td>3.32</td>
<td>2.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invincible (74)</td>
<td>1744</td>
<td>171'3&quot;x139'0½&quot;x49'3&quot;x21'3&quot;</td>
<td>1793</td>
<td>3.48</td>
<td>2.32</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 30. Collated data on the ships considered in the text.
The speed factors have been taken from the fastest recorded speed in the sailing quality reports or from the average where more than one is available. (For example, three exist for the **Drake-class** sloops). In the case of the **Invincible** and the **Rénommée**, their captains thought that they could go faster, so that the figures are perhaps on the low side.

The importance of a low prismatic coefficient is evident from the results as well as of a fine run aft, this being of more significance than the shape of the bow.

<table>
<thead>
<tr>
<th>B/D</th>
<th>Mcf</th>
<th>Pcf</th>
<th>DR</th>
<th>½ angles</th>
<th>Buttock lines</th>
<th>V/WL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WL ½ D</td>
<td>Bow</td>
<td>Stern</td>
</tr>
<tr>
<td>3.31</td>
<td>.82</td>
<td>.58</td>
<td>10°</td>
<td>39° 20°</td>
<td>38° 20°</td>
<td></td>
</tr>
<tr>
<td>2.45</td>
<td>.78</td>
<td>.63</td>
<td>5°</td>
<td>42° 30°</td>
<td>45° 25°</td>
<td></td>
</tr>
<tr>
<td>2.67</td>
<td>.75</td>
<td>.63</td>
<td>15°</td>
<td>40° 24°</td>
<td>35° 16½°</td>
<td></td>
</tr>
<tr>
<td>2.17</td>
<td>.81</td>
<td>.65</td>
<td>4½°</td>
<td>46° 37°</td>
<td>35° 13°</td>
<td></td>
</tr>
<tr>
<td>2.43</td>
<td>.69</td>
<td>.64</td>
<td>16°</td>
<td>44° 27°</td>
<td>37° 23°</td>
<td></td>
</tr>
<tr>
<td>2.59</td>
<td>.69</td>
<td>.66</td>
<td>18°</td>
<td>46° 25°</td>
<td>40° 18°</td>
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<tr>
<td>2.5</td>
<td>.77</td>
<td>.63</td>
<td>10°</td>
<td>50° 31°</td>
<td>43° 18½°</td>
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<tr>
<td>2.53</td>
<td>.85</td>
<td>.70</td>
<td>&gt;1°</td>
<td>67° 42°</td>
<td>46° 21°</td>
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<tr>
<td>2.40</td>
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<td>18°</td>
<td>45° 25°</td>
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<td>2.36</td>
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<td>5°</td>
<td>43° 27°</td>
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<tr>
<td>3.30</td>
<td>.69</td>
<td>.60</td>
<td>7°</td>
<td>75° 33½°</td>
<td>32° 20°</td>
<td></td>
</tr>
<tr>
<td>3.24</td>
<td>.77</td>
<td>.63</td>
<td>11°</td>
<td>67½° 33°</td>
<td>27½° 26°</td>
<td></td>
</tr>
<tr>
<td>2.45</td>
<td>.81</td>
<td>.67</td>
<td>7°</td>
<td>67½° 39°</td>
<td>35° 23°</td>
<td></td>
</tr>
<tr>
<td>3.45</td>
<td>.78</td>
<td>.69</td>
<td>&gt;1°</td>
<td>69° 39°</td>
<td>48° 30°</td>
<td></td>
</tr>
<tr>
<td>3.20</td>
<td>.72</td>
<td>.63</td>
<td>6°</td>
<td>48° 47°</td>
<td>39° 22°</td>
<td></td>
</tr>
<tr>
<td>3.10</td>
<td>.72</td>
<td>.63</td>
<td>8½°</td>
<td>39° 21°</td>
<td>39° 22°</td>
<td></td>
</tr>
</tbody>
</table>

whose lines have not been analysed

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<td>2.46</td>
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<td></td>
<td>1.0</td>
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</tbody>
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