PART ONE

THE BACKGROUND OF NAVAL ADMINISTRATION

CHAPTER I

THE SHIP AND THE LINE

Between the summer of 1688 and the winter of 1689, the three great sea powers of Europe, the English, the Dutch and the French, had occasion to survey their naval resources, and in particular the size of their fleets. The occasions were not all of the same type. In France the survey was made by the revision of the *Ordonnances du Roi* in the edition of 1689, which had been maturing for a considerable time. In Holland, it arose from the conflicting necessities of foreign commitments, leading before William's expedition to England in November 1688 to a comparison with the English, and after the French declaration of war at the end of that month to a comparison with the French. In England, it was undertaken during 1689 by the outgoing Secretary of the Admiralty, to record for his own satisfaction the results of his term of office.[1] At the end of 1688, the fleets and their auxiliaries upon which this attention centred, stood in each case as shown in the table on p. 4.[2]

To ourselves, whose training in such figures has been provided by our contemporary wars, lists of this type are merely a starting point for an analysis of their contents in other terms, such as those of total and individual fire-power and the performance and age of the ships. It is axiomatic to us that in naval warfare numbers in themselves mean little. But we must be careful not to read into the figures of another age more than in fact is in them. In the late seventeenth century, it was precisely and almost exclusively numbers that did matter. The quality and amount of equipment and the nature of the ships' performance were taken for granted as more or less equal within their rates; and, provided that they were in a state of repair, the date of construction was of minor importance. An examination of the lists, therefore, leads us to the same simple process of addition that was practised by their original compilers.

[1] Samuel Pepys, *Memoires relating to the State of the Royal Navy of England* (1690).

[2] In each case, the figures given are those of the ships as rated in 1688; occasionally, they were built under different rates or gun-power.

English*		Dutch†		French‡	
1st rates	9	*Over 90 guns*	4	*1st rates*	13
2nd rates	11	*80–90 guns*	4	*2nd rates*	20
3rd rates	39	*70–80 guns*	9	*3rd rates*	40
4th rates	41	*60–70 guns*	20	*4th rates*	20
		50–60 guns	16		
		40–50 guns	16		
	100		69		93
5th rates	2	30–40 guns	12	5th rates	21
6th rates	6	20–30 guns	7	Light frigates	17
Fireships	26	12–18 guns	4	Fireships	11
Bombvessels	3	Fireships	6	Bombvessels	10
Yachts	14	Yachts	3	Storeships	23
Auxiliaries	22	Snows	1	Sloops	10
				Galleys (Mediterranean only)	36
Total	173		102		221

* See Appendix I(A), p. 625. The italics represent the line of battle.

† *Society for Nautical Research, Occasional Publications*, no. 5, pt IV ('List of Men-of-War 1650–1700, United Netherlands'; compiled by A. Vreugdenhil), *passim*. The numbers given above exclude those which appear as 'not afterwards mentioned' after the date of their original construction; cf. list in John Charnock, *History of Marine Architecture* (1802), II, pp. 352–5.

‡ *Soc. Naut. Research*, op. cit., pt II ('French Ships', compiled by Pierre le Conte), *passim*; cf. list in Charnock, loc. cit. p. 310, for 1681, which excludes galleys.

To understand what we are adding up, we must approach the lists historically rather than directly by analysis. For since the latter is not an absolute process, in this way its factors may fall into place, and be given their proper emphasis within their appropriate conditions. These conditions will necessarily be material, for it is material that must be examined; and such an examination is of strictly limited importance. For in the last resort, the material out of which a process is formed is not its effective but its contingent cause. However direct the influence which it exerts, there must at some stage be the intention to use it in a certain way. It was because the sea powers of Europe wished to develop their maritime resources that the characteristics of these resources will be investigated; and while national ambition and the general conditions of national expansion alone were not directly responsible for the greater fleets and the more complex naval organization of the later over the earlier seventeenth century, neither did these develop inevitably and exclusively from the qualities of the material which built and maintained them. Throughout the account which follows, the foundations of national consolidation and rivalry must be taken as supporting the technical developments with which we are particularly concerned.

In turn, it is not for its own sake that the fleet is examined, but for its effects upon the different levels of naval organization. For in all affairs of state, policy and administration meet at one point, where the conditions for the operation of the former are provided by the latter's efforts, and to which the ramifying activities of the lower levels may be reduced and the intentions of policy related. In naval affairs, that point is represented by the ship, and in particular by the class of ship which forms the nucleus of the fleet. At once the climax and the foundation of naval achievement—the climax of the system of naval supply and distribution, the foundation for the direction of naval policy—she is the pivot of naval endeavour. In the later seventeenth century, the unit which occupied this position was the largest ship of the line.

'It will always be said of us with unabated reverence, THEY BUILT SHIPS OF THE LINE. Take it all in all, a Ship of the Line is the most honourable thing that man, as a gregarious animal, has ever produced.'[1] The ship of which Ruskin was writing had for over 150 years evoked in the national consciousness the same image and the same response, for the essentials of naval architecture had not changed since the beginning of the eighteenth century, and the admiration of his generation was anchored in a familiarity which gave to it a particular clarity and warmth. That admiration was not given to the great ship for her beauty alone, but because she was the embodiment, throughout the first and longest phase of its long period, of English maritime supremacy. She became largely a symbol; and it was to her symbolic rather than to her actual qualities that the poets and pamphleteers of the eighteenth century alluded. The properties of the ship herself, her size, her complexity, the mechanics of her construction and her management, could by then be taken for granted as conventional knowledge. But in the first decade of the century, and for forty years beforehand, it was precisely on these facts that contemporaries liked to dwell; and the well-worn phrases which had been used since the Renaissance to describe sea affairs, were used during these decades in a new setting and became imbued with a new sense of technical achievement, seldom expressed in technical language, but running through verses and pamphlets

[1] John Ruskin, *The Harbours of England* (1895), ed. T. J. Wise, pp. 24–5.

alike[1] and even, in James II's reign, finding its way into the usually laconic pages of the directory of government offices.[2] The dimensions of the great ship, and the demands which they made upon men and material, were still worthy of remark, for she was still a recent development. There were men alive in 1688 who could remember the launching of the first of the leviathans in 1637; it was still possible to recommend, as did one elderly official a few years later, that they should be abolished, and that the top-heavy organization and new-fangled tactics which they brought in their wake should be replaced by the more modest establishments and manœuvres of an earlier day.[3]

How recent this development was, could be seen in the nomenclature of the period. The very term 'ship of the line' appeared only during the reign of William III, as an alternative to the prevalent 'capital ship', itself a product of the Dutch wars;[4] and although older and miscellaneous phrases were falling into disuse, they had not entirely disappeared. Even in the next reign, Rooke employed on separate occasions the terms 'ship of war', 'ship of force', and 'great ship' to convey the same information.[5] Terminology lags behind practice. Rooke was a veteran of the Dutch wars, and his language reflects the persistence of earlier and less precise tactical conceptions. Ten years later, when the young men of the Dutch wars were replaced in command by the young men of William's war, the older terms disappeared. For in fact, although the secondary process, by which the line imposed itself as a generic term on the great ship, had not taken place by the beginning of the French wars, the first and most important stage had already been reached. By the end of the Dutch wars the great ship had evolved the line, which set the type and virtually became the arbiter of the major action at sea.

[1] For a good example of this combination, see the unlikely instance of the first chapter of Edward Ward's tract *The Wooden World Dissected* (1707).

[2] See the description of a first rate in Edward Chamberlayne, *Angliae Notitia* (13th ed. 1687), pt II, p. 162.

[3] Richard Gibson's 'Reflections', in B.M.Addnl. 11602, ff. 37–41, 57–61.

[4] L. G. Carr Laughton, 'Capital Ship', in *M.M.* XII, pp. 396–405, summing up previous articles in that journal. His earliest example of the term is from the year 1694. Its immediate predecessor was 'ships fit to lie in the line', which was used several times in 1690 (e.g. *H.M.C. Finch*, II, p. 315).

[5] *The Journal of Sir George Rooke*, ed. O. Browning (*N.R.S.* 1897), pp. 180, 251. He also referred to 'ships of the line of battle' on occasion (ibid. pp. 231, 256).

Her tactical contribution had been made, and it awaited only the sanction of use and time to be confirmed in the language of the fleet.

As the line was the product of the great ship, so the great ship was the product of the gun.[1] If the naval ordnance of the second half of the seventeenth century is examined, three main characteristics may be observed. First, that to develop the most considerable gun-power available, a heavy weight of metal had to be carried aboard ship; secondly, that within the limits of the heavier pieces, the greater their power the shorter their range; and thirdly, arising from the technical reasons for these characteristics, that both in appearance and performance the weapons had hardly changed since the end of the sixteenth century.

For the nature of the pieces themselves, as of their powder and shot, was limited by technological processes which were not modified appreciably between the reign of Elizabeth and the reign of Victoria.[2] The balance of development lay between the chemist and the metallurgist, and was normally tilted in favour of the former. Improvements in the refining of gunpowder since the later years of the sixteenth century had made it possible, thanks to a higher rate of combustion, to envisage a heavier shot.[3] But this process had its limitations, for the greater the explosion, the greater the recoil; the greater the recoil, the greater the mass required to take the stress; and, under the metallurgical conditions of the time, the greater the mass the greater the weight of metal. Certain improvements in the casting of brass and then of iron enabled the cannon of a given weight to take a stronger charge, but after a varying process in which its weight alternately increased and decreased, the heaviest piece, the Cannon of Seven, settled in the middle of the seventeenth century at between 7000 and 8000 lb.—much what it had weighed seventy years before, but with a greater strength of

[1] See the excellent statement of this argument in *Samuel Pepys's Naval Minutes*, ed. J. R. Tanner (*N.R.S.* 1926), pp. 425–6.

[2] See F. L. Robertson, *The Evolution of Naval Armament* (1921), pp. 69–82; C. Ffoulkes, *The Gun-Founders of England* (1937), pp. 1–37; Ernest Straker, *Wealden Iron* (1931), pp. 1–60.

[3] For details of the process in the later seventeenth century, see Thomas Sprat, *The History of the Royal Society of London* (1667), pp. 273–83; see also Nathaniel Nye, *The Art of Gunnery* (1674); Sir Jonas Moore, *A General Treatise of Artillery* (1683); and Gaya's *Traité des Armes* of 1678 (ed. C. Ffoulkes, 1911).

explosive. At this stage the gunfounder had exhausted the resources of his technique. He had also produced a gun with a performance on which it was inadvisable to proceed further. For since weight was the determining factor in increasing power, the shorter the gunbarrel the greater must be its calibre, and this in turn led to a decrease in range. With an effective range for the heavy cannon of perhaps about 400 yards,[1] the stage had clearly been reached beyond which it was pointless to go until penetrative power could be reconciled with distance of shot. As it was, the principles of English gunnery in the seventeenth century, unlike those of earlier[2] and later days, directly opposed to each other the two complementary qualities of the weapon and, where destruction and not damage was the object, sought incessantly to narrow the distance.

Although its performance had improved in the interval, the characteristics of the gun had thus not changed between the late sixteenth and the late seventeenth centuries, and the various types of ordnance in William's war were all known at the time of the Armada. They were divided into three main classes: the heavy cannon, 'of Battery' as it was sometimes called,[3] with its great weight of shot, its short barrel, and its short range; the culverin, throwing a shot of between a half and two-thirds the weight, with its long barrel and medium range; and the minor pieces—saker, minion, falcon and robinet—designed at short range to damage the decks and upperworks. The great difference between the two wars lay not in the design of the gun, but in the emphasis placed upon the different available pieces, which was made possible only by a revolution in ship design. It was through this medium that the principles of gunnery, and of the sea fight, changed even though the pieces themselves did not. The figures best illustrate the tale. At the beginning of the seventeenth century, the heaviest ship afloat, the *Prince Royal*, carried two cannon, and of her 55 pieces 35 consisted of demi-culverin, sakers and port pieces.[4] Twenty years later,

[1] It is difficult to ascertain exact ranges, for, with an eye to security, they were seldom tabulated. The conventional unit of measurement was the geometrical pace of five feet (cf. Sir Jonas Moore, *General Treatise of Artillery*, p. 91).

[2] See M. A. Lewis, 'Armada Guns', sections I and II, *M.M.* XXVIII, nos. 1 and 2.

[3] Moore, *General Treatise of Artillery*, p. 18.

[4] M. Oppenheim, *A History of the Administration of the Royal Navy, 1509–1660* (1896), p. 212.

the *Sovereign of the Seas* carried 20 cannon, and of her 104 guns only 44 were demi-culverin or below.[1] The figures of weight emphasize the nature of the change even more clearly:[2]

Prince Royal: total weight of guns	83	tons	8	cwt.
Sovereign of the Seas: total weight of guns	153	,,	10	,,
Weight on lower tier	64	,,	16	,,
Weight on middle tier	45	,,	4	,,
Weight on upper tier	27	,,	12	,,
Weight above deck	15	,,	18	,,

The *Sovereign* carried all her cannon and demi-cannon on the lower tier, which held no other type of gun. They alone therefore represented between a half and two-thirds of her total weight of ordnance, and three-quarters of the total weight of the armament carried in her greatest predecessor; and although she herself was over-gunned, and had soon to be reduced to 91 pieces, the marked and sudden change which had been inaugurated was a permanent one. The typical great ship of the Commonwealth had 91 guns, distributed in much the same way as those of the *Sovereign*,[3] and the establishment of 1677, which was still in force in 1689, laid down an armament for the first rate of 98 guns, of which 26 were cannon, 28 culverin and 44 sakers.[4]

The first and greatest requirement of the contemporary ordnance—that its most powerful pieces could be taken to sea—had thus been satisfied. This did not mean, however, that the lighter pieces disappeared to a proportionate extent. Indeed, their variety remained bewildering. The reason in this case lay not in any technological process, but in an attitude of mind; not in the nature, but in the popularity of the gun. The Elizabethan successes, in which it played a major part, had increased the reliance which seamen were already placing upon it, while the steady improvement in the techniques of casting in brass and iron and

[1] Ibid. p. 262. Both Oppenheim and W. Laird Clowes (*The Royal Navy, A History* (1898), I, p. 12) state that the *Sovereign* carried 102 guns; but both give the same details, which add up to 104. R. C. Anderson ('The *Royal Sovereign* of 1637' (III), in *M.M.* III, no. 6, pp. 168–9) compares Oppenheim's figures with other lists.

[2] Oppenheim, loc. cit. pp. 212, 262. [3] Ibid. p. 341.

[4] *Catal.* I, p. 236. The 'sakers', as defined in this case, weighed between 16 and 22 cwt.

in corning powder spread the fame of English products abroad, particularly as the advance of English technique was paralleled by the stability of its European competitors after the earlier decades of the seventeenth century.[1] Working upon this conscious superiority of manufacture, English gunners became as renowned as their weapons. Throughout the seventeenth century the name of gunner was, where possible, synonymous with that of Englishman, in foreign warship, foreign merchantman and Barbary corsair alike.[2] With all the limitations and inaccuracies which to a later age seem overwhelming, to contemporaries English gunnery was the finest in the world.

With a conscious superiority in gunnery and at the same time an inadequate appreciation of its principles, it was not unnatural that the fashion under the Stuarts should have been to emphasize the number and variety of the weapons. Some of the earlier types, it is true, were already disappearing; the cannon pedro had gone, and basilisk and bastard cannon, bastard culverin and serpentine were going. But the habit of overgunning continued, in the belief that the superiority originally gained by quality would automatically be increased according to the increase in the quantity of the superior pieces. In terms of naval architecture, this meant decks. In James I's reign, an attempt had been made to build a three-decker in the *Prince Royal*, but although she was able to mount three tiers of guns above each other she did so not on the three flush decks of the later three-decker, but on two decks with a half deck above.[3] With the *Sovereign*, however, the impossible was achieved, and the first and typical reaction of the age was displayed by Charles I, when with a stroke of the pen he altered her projected establishment of 90 guns to an establishment of 102.[4] It was a tendency which defeated

[1] Oppenheim, loc. cit. pp. 159–213; J. U. Nef, 'The Progress of Technology and the Growth of Large-Scale Industry in Great Britain, 1540–1640', in *Ec.H.R.* v, pp. 11–12, 23.

[2] E.g. *Adventures by Sea of Edward Coxere*, ed. E. W. H. Meyerstein (1946), p. 43; *Samuel Pepys's Naval Minutes*, pp. 203–4.

[3] R. C. Anderson, 'The *Prince Royal* and Other Ships of James I' (I) in *M.M.* III, no. 9, pp. 272–5, and further articles loc. cit. (V), no. 1, pp. 10–15, and (VI) no. 11, pp. 329–32, forming part of a controversy on decks in that journal; and (VII) no. 12, pp. 362–7.

[4] Oppenheim, loc. cit. p. 262.