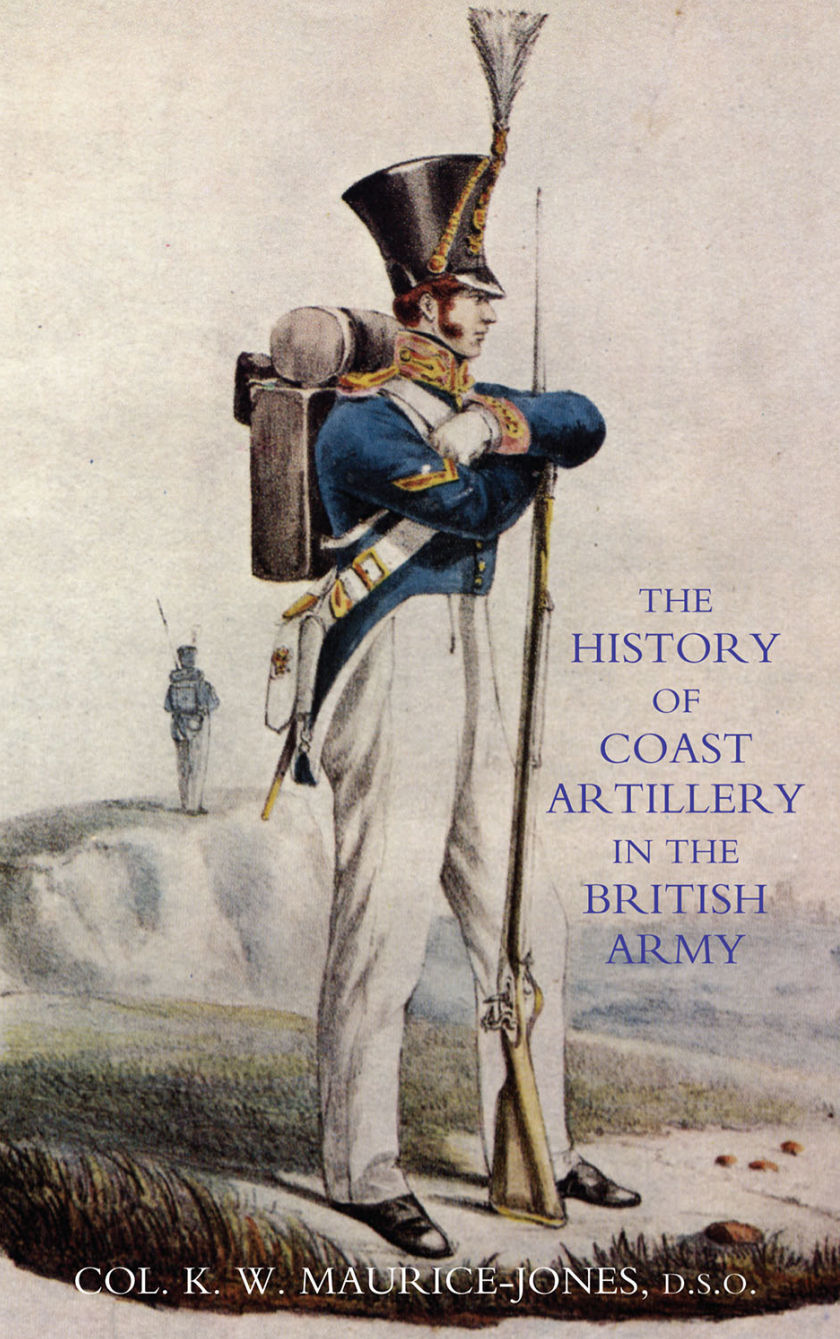

THE HISTORY OF COAST ARTILLERY IN THE BRITISH ARMY

COL. K. W. MAURICE-JONES, D.S.O.

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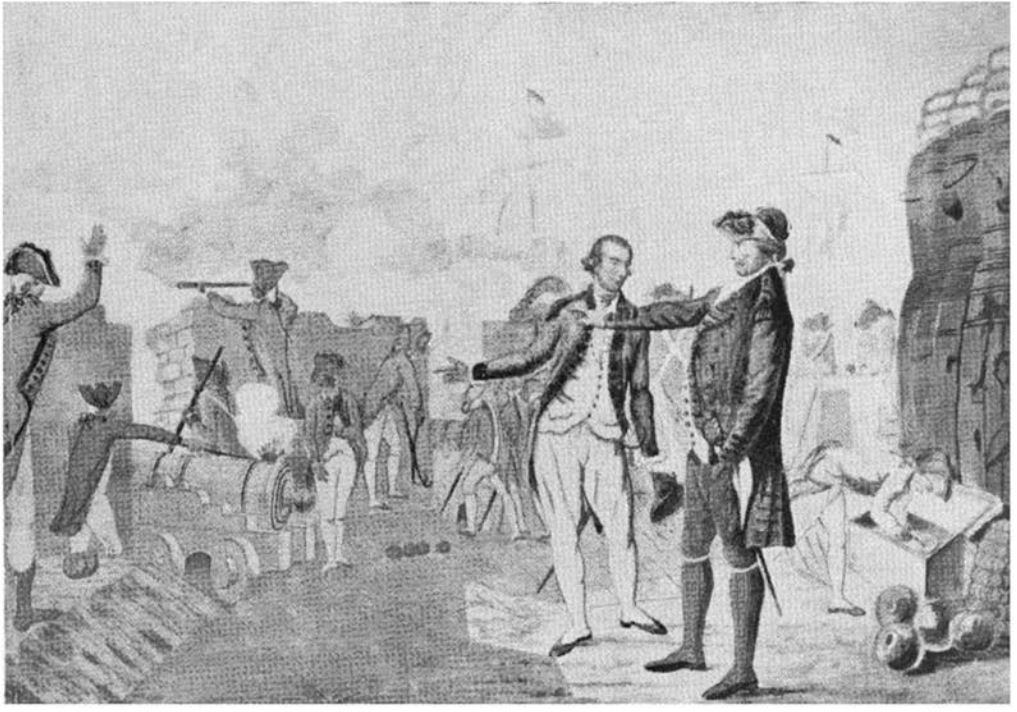

General Eliott on the King's Bastion, Gibraltar. September 13th, 1782.
General Eliott (The Governor) stands in the foreground, with Koehler (hat off) talking to him.
Drawn by G. F. Koehler. Lieutenant, Royal Artillery.

THE HISTORY OF COAST ARTILLERY IN THE BRITISH ARMY

COL. K. W. MAURICE-JONES
D.S.O., *late* R.A.

with a foreword by

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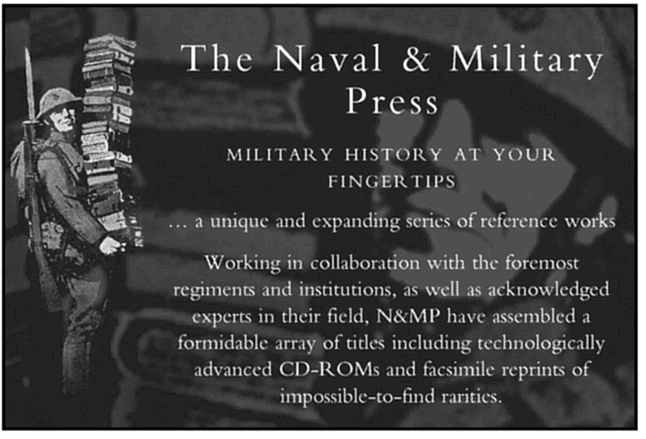

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FOREWORD

BY

GENERAL SIR CAMERON NICHOLSON, G.C.B., K.B.E., D.S.O., M.C.

Master Gunner St. James's Park; Col. Comdt. Royal Horse Artillery.

On the 17th February, 1956, the Army Council announced their intention of discontinuing Coast Artillery in the British Army. This was an historic decision and one which could not fail to have far-reaching repercussions throughout the Commonwealth and Empire, the Army as a whole and in particular the Royal Regiment of Artillery.

The decision was historic because it was a complete break with the organization and traditions of the past in that the defence of our ports and bases by Coast Artillery had been for centuries an integral part of our imperial strategy. But in the light of scientific and technical advances it was clear that there was no longer any justification for maintaining Coast Artillery and as a result the decision was made and the disbandment of Coast Artillery was ordered and completed within the year. Territorial Regiments changed to other duties, and the Regular element in the defences was posted elsewhere and the guns and equipment disposed of or withdrawn to be put to other uses.

During the period of disbandment the thoughts of many coast gunners turned introspectively to the passing for ever of this historic branch of the Regiment and to considering whether the opportunity should not be taken now to write a comprehensive history of Coast Artillery. It was true that individual actions and episodes had been recorded but a consecutive history had never been attempted. It was thereupon decided that a short history should be written forthwith, and the result is this excellent book by Colonel K. W. Maurice-Jones which in under 300 pages highlights the vicissitudes through which Coast Artillery passed from its earliest days until its recent disbandment.

I commend this short history to military and civilian readers alike, not only because it is a well written and graphic story of the tribulations through which our sea defences have passed over the centuries but because it also throws into relief a number of minor episodes of historical interest which occurred during the many wars in which we were involved during the past 400 years. Not least it is a well deserved tribute to those officers and men who have steadfastly done their duty in all parts of the world, and maintained watch and ward over our imperial communications.

C G Nicholson.

Master Gunner.

PREFACE

WHEN I was given the task of compiling this history, I was asked to produce a book of not more than 300 pages, taking no longer than six months over the writing of it. This book therefore does not pretend to be an exhaustive history of Coast Artillery in the British Army, neither time nor space would allow me to collect the material for such a work. The sources for a detailed history of Coast Artillery lie hidden deep in the mass of Board of Ordnance and War Department papers at the Public Record Office, and it would have taken many years to go through them all and to pick out those which refer to Coast Artillery, its story and its development. Nevertheless I have done my best in the time allowed to go to the original sources and have spent many hours—most interesting and fascinating ones I might say—at the Public Record Office, delving into the records of the Board of Ordnance and War Department.

I was surprised, when I began this work, to find that I was apparently the first ever to set about writing the history of Coast Artillery in the British Army. Most of the historians of the Royal Artillery have concentrated on the story of the mobile guns, horse, field, mountain, heavy, and siege, and, except for the great siege of Gibraltar, have paid very little attention to the branch which manned what was only too frequently called "the Fixed Defences". Only Callwell and Headlam, in their History of the Royal Artillery from 1860 to 1914, have given Coast Artillery its fair share and place. I therefore had to start right from the beginning, and plough a field which, as far as I could ascertain, had never been ploughed before.

A word about the sources which I did employ, and firstly those for the guns and garrisons which form such an important and essential part of the history of Coast Artillery. The details of the guns up to 1815 were obtained from the Board of Ordnance ledgers kept at the Public Record Office; during the nineteenth century from the annual "Distribution of the Army" kept in the War Office Library; and for the period 1939-45 from the returns in the War Office files. The guns at the outbreak of war in August 1914 were compiled from a variety of sources, not perhaps so reliable as the others. The official War Office returns of that period were unfortunately lost or destroyed when the department of the Master General of the Ordnance was transferred from the War Office to the Ministry of Supply in 1938. As for the garrisons, those before 1771 were compiled from the State Papers Domestic at the Public Record Office, from the Journals of the House of Commons at the War Office Library, and from "Military Pamphlets and Papers" held in the Royal Artillery Institution. For the period 1771 to 1859

they were gathered from the Muster Rolls of the Invalid Companies, Royal Artillery, at the Public Record Office, and from Lieut.-Colonel M. E. S. Laws' most accurate and wonderful volume "Battery Records of the Royal Artillery 1716-1859", a book which no historian of the Royal Artillery can possibly do without. After 1859 the garrisons were obtained from the official Army Lists.

There is a fiercesome bibliography printed in the book which gives all the sources I have used. Much of the story up to 1815 was gleaned from the correspondence and papers of the Board of Ordnance and War Department kept at the Public Record Office. Also for this period I was again greatly assisted by Lieut.-Colonel Laws' book. Many of the stories of Coast Artillery actions have been taken from articles published in the Journal of the Royal Artillery for which I am much indebted to the authors. All the material for the Second World War was collected direct from the War Office files. It was unfortunate that I had to write of this war before publication of most of the official histories. I trust I have not fallen into error nor omitted anything important because of this.

The question of maps to accompany this volume has caused me some worry. The original arrangement was to provide ten maps and six illustrations, but the period to be covered was too long and the area so large that it was soon evident that ten maps would not be sufficient. After some discussion it was decided to have seventeen maps and one illustration (a frontispiece only), six of the maps being small scale showing large areas, and eleven of them large scale showing comparatively small areas where operations described in the text have occurred. As this decision was taken only at the last moment, it is possible that some of the places mentioned in the text have not been entered on the appropriate map. If this has happened I must apologise for the omissions. I must also express my heartfelt gratitude to Sergeant-Major J. C. Camies, Royal Artillery Clerks' School, who so kindly and readily volunteered to design and draw the maps. Without his help I do not know what we should have done.

I owe my thanks to a number of people for their kind help and assistance in producing this work. Firstly to the Coast Gunners themselves who so willingly subscribed the money without which this book could never have been written and published, and to their Brigadiers who chose me for the task and organised the whole business. Next to the Secretary (Brigadier J. H. Frowen) and Staff of the Royal Artillery Institution who, despite their efforts to destroy my poor writings by fire and water, have borne with me for six months and during that period given me every possible support and co-operation. Also to Mr. D. W. King and Mr. C. A. Potts of the War Office Library who never failed to produce the answer no matter how difficult the conundrum. To Lieut.-Colonel M. E. S.

Laws for his most helpful advice and guidance concerning my researches at the Public Record Office, and to the staff of that admirable institution who so quickly and willingly always produced the documents I was seeking. To Brigadier F. W. Rice of the Royal Artillery Directorate at the War Office who was my mentor, counsellor, and ally when I was carrying out my researches at that formidable establishment, and to Major J. H. N. Weston R.A. of the Seaward Defence Wing of the School of Anti-Aircraft Artillery who so kindly aided me with the technical side of my work. To Mr. N. Lush and Mr. C. B. Bramley of the Directorate of Fortifications and Works at the War Office who volunteered so cheerfully and with such good nature to produce the answer to a problem of which I had almost given up hope of finding the solution. And finally to my old friend and fellow-countryman, Mr. G. J. Roberts of the Central Registry at the War Office, who never gave up helping me, who pursued files for me to the very depths of the archives, and who always produced a cup of tea for me when I was feeling depressed and exhausted. My thanks are also due to the proprietors of the *Gunner* Magazine for allowing me to reproduce the article by "Cascable".

In conclusion let me tell you my own story of Coast Artillery. William Hickey, the Calcutta lawyer, tells us in his Memoirs how during the War of American Independence, while he was at Madras, a French Squadron under the famous Admiral de Suffren appeared off the port one evening and leisurely bombarded Fort St. George, the guns of the fort failing to reply with one single round. Next morning the worthy citizens and merchants of Madras went to the Governor in a body and complained bitterly of this failure on the part of the Coast Artillery manning the guns of the fort. The Governor sadly agreed with the complaints, but said the guns could not answer the fire of the enemy warships as there was no ammunition available, the magazine being locked and the master gunner in the bazaar with the key in his pocket. During the second World War, close on 200 years later, I was sent to Madras to command the Coast Artillery at that important port. Shortly after my arrival, I went to inspect the 6 inch battery, the principal battery of the coast-defences. Having finished my round of the guns etc., I wished to look at the magazine. I was unable to do so, the magazine was locked, and the master-gunner in the bazaar with the key in his pocket.

Woolwich,
May, 1957. K.W.M-J.

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ABBREVIATIONS

A.A.	Anti-Aircraft.
A.P.	Armour Piercing.
A.T.C.	Anti-Torpedo Craft.
B.C.	Battery Commander.
B.L.	Breech Loading.
B.R.A.	Brigadier, Royal Artillery.
C.A.	Coast Artillery.
C.A.T.C.	Coast Artillery Training Centre.
C.C.C.A.	Commander Corps Coast Artillery.
C.D.	Coast Defence(s).
CD/CHL.	Early Warning Radar.
C.R.A.	Commander Royal Artillery.
C.R.H.	Calibre Radius Head.
D.A.G.R.A.	Deputy Adjutant General, Royal Artillery.
D.C.M.	Distinguished Conduct Medal.
D.E.L.	Defence Electric Light.
D.P.F.	Depression Position Finder.
D.R.F.	Depression Range Finder.
D.S.O.	Distinguished Service Order.
F.C.	Fire Commander.
F.O.O.	Forward Overvation Officer.
G.H.Q.	General Head Quarters.
G.O.C.	General Officer Commanding.
H.E.	High Explosive.
H.K.S.R.A.	Hongkong-Singapore Royal Artillery.
H.M.S.	His or Her Majesty's Ship.
H.Q.	Headquarters.
I.G.	Instructor of Gunnery.
M.D.	Cordite. Modified Design.
M.Ex.B.	Motor Explosive Boat.
M.L.	Muzzle Loading.
M.M.	Military Medal.
M.T.B.	Motor Torpedo Boat.
N.C.O.	Non-Commissioned Officer.
O.C.T.U.	Officer Cadet Training Unit.
O.P.	Observation Post.
P.F.	Position Finder.
Pdr.	Pounder.
P.W.S.S.	Port-War Signal Station.
Q.F.	Quick Firing.
R.A.	Royal Artillery.
R.A.F.	Royal Air Force.
R.B.L.	Rifled Breech Loading.

R.E.	Royal Engineers.
R.G.A.	Royal Garrison Artillery.
R.H. & R.F.A.	Royal Horse and Royal Field Artillery.
R.I.A.	Royal Irish Artillery.
R.M.A.	Royal Malta Artillery.
R.M.L.	Rifled Muzzle Loading.
R.N.	Royal Navy.
S.P.	State Papers (Domestic).
S.R.	Special Reserve.
T.A.	Territorial Army.
T.B.D.	Torpedo Boat Destroyer.
T.F.	Territorial Force.
W.O.	War Office (Public Record Office).

INTRODUCTION

IT was not until 1911 that the War Office laid down clearly and definitely the object, role and functions of Coast Artillery. In that year was published a manual entitled "*The Organisation and Fighting of the Fixed Armament of a Coast Fortress or Defended Port*". This important text book stated that, while the Navy was carrying out its customary business of seeking out the enemy's fleets and ships wherever they were to be found, there might be occasions when there would be a temporary loss of command in certain waters left uncovered by our main fleets and squadrons. Fixed defences, manned by Coast Artillery, were therefore necessary for the protection of Naval Bases, to secure harbours whose positions were of strategic value, and to protect commercial ports so that trade might be disturbed as little as possible.

From their very designations, Coast or Fixed Defences have always been considered a strictly defensive arm, but this is not fundamentally true. A coast fortress or defended port executed its role mainly through the fleet or warships for whom it provided a safe base or protected harbour. For four centuries, the batteries and guns, served by Coast Artillery, enabled the British Navy to carry out its proper offensive duties by guaranteeing to it supplies, repairs, and shelter whenever it required them. It is therefore clear that coast defenses were really implements of offence or, as Admiral Mahan so concisely put it "The essential function of a coast fortress is offensive because it conduces to defence only by facilitaitng offence". (*Naval Strategy*, Chapter XV.) There has, of course, always been a school of thought, chiefly in the Navy, which has considered coast defence to be unnecessary. The Blue Water School, as it was known, asserted that coast defences only served for defence, that the Navy was able to defend more efficiently than any coast defences, and therefore money lavished on such defences was wasted and should be put to much better use by being spent on the Navy itself. This, of course, was obviously wrong. It was the coast defences that made it possible for the Navy to enact its offensive role by sustaining and securing that service in time of war. Strategically therefore, coast defences were maintained for offence.

Unfortunately, the views of the Blue Water School, especially as they came mainly from the Navy itself, have ever since the sixteenth century, carried great weight with the British Government. There never has been sufficient money available to cover the whole defence requirements of the British Isles, and the Government of the day

has only too often been ready to listen to a doctrine which would enable it to cut down expenditure on the Army and spend the money instead on the Navy or even save it altogether. Moreover the Army itself has never been very enthusiastic about the coast defences for which it was responsible so that the combined economies of both Government and Army have only too frequently down the centuries resulted in neglected defences, out-of-date guns, and unfit and senile garrisons.

The object of coast defences was always to prevent hostile men-of-war from engaging or attacking our own ships while at at anchor in port, or from bombarding the wharves, go-downs, dockyards and such like installations which usually surround important harbours. Furthermore, the coast batteries were expected to deter enemy warships from supporting a landing operation directed at the port or harbour itself and to destroy boats carrying the attackers. In times of threatened invasion, it has even been attempted to defend with coast-defence batteries almost the whole of the coast line of Great Britian at points suitable for landing. The object of these batteries was to engage and sink the transports and small craft bearing the invading army. However, it is obvious that coast defence on this scale could only be provided at times of great national danger, and normally it was confined to important naval bases, ports and harbours.

The strength of the defences, the size and number of the guns defending any one place, depended upon the scale of attack to be expected against it and on its importance and value as a naval base, harbour or commercial port. As the chief danger to be feared was always attack by hostile warships, the type and calibre of the guns employed in coast defences were strictly tied to those used in Naval ships of the period, but, as the Navy had first call on the country's purse, and as it was accepted as an axiom right from the earliest days of coast defence that a gun on a steady base had great superiority over one on a pitching and rolling platform, the guns in coast defence batteries were normally somewhat smaller and of older pattern than those carried by their opponents.

The history of any portion of our fighting services should consist mainly of the records of the campaigns, battles, and fights in which it has taken part, of the dangers, trials and hardships which the men composing it have undergone, and of their valour and bravery in face of the enemy. However, throughout almost the whole of the period during which coast artillery existed as an integral part of the British forces—from about 1540 to 1956—Great Britain has held command of the seas, and the coast batteries guarding our ports and harbours have very rarely been called upon to open fire on hostile men-of-war. It has only been during those

times when we lost control of certain areas of the ocean that coast artillery has really been called upon to fight face to face with the enemy. The loss of the command of the North Sea to the Dutch in 1667 brought about the attacks on the defences of Sheernees and Harwich; of the Western Mediterranean to the French in 1756, the first assault on and capitulation of Minorca; of the Mediterranean and Mid-Atlantic to the French, Spanish and Dutch from 1779 to 1782, the famous siege of Gibraltar and the second and final surrender of Minorca; and of the Western Pacific to the Japanese in 1941, the fall of the great coast fortresses of Hong Kong and Singapore. There have also, of course, been innumerable minor attacks and raids on ports and harbours protected by coast defences, and countless actions between warships and coast batteries, but for most of those long days and nights when Great Britain was at war during the four centuries between 1540 and 1956, the coast artillery has spent its time manning the batteries and ramparts, looking grimly out to sea for those enemy warships which never came. In addition, there have been those periods when Great Britain was threatened with invasion, 1588, 1756, 1779, 1797-98, 1801, 1803-05, and 1940-41. At these times of crisis vigorous efforts were made to defend all the likely coves and beaches where the enemy might make a landing, and vast numbers of temporary batteries and defence works were rapidly constructed to house the guns which were to protect and cover these possible lines of invasion. However, Britain's command of the narrow seas—and in the last case, command of the air over them as well—prevented invasion from materialising, the enemy ships and landing-craft never closed our shores, Philip of Spain, Louis of France, Napoleon and Hitler were never able to land their Armies in our country, and the coast gunners still continued to gaze out over the waters of the Channel for those hostile flotillas which never even set out from their ports of embarkation.

So the history of Coast Artillery must largely be one of lonely garrisons vegetating for years in distant ports and batteries, of changes in organisation, methods, armament and fortification, and very rarely of the roar and smoke of battle and sudden death. It must also be remembered that, until the industrial revolution and the gradual introduction of steam and armoured warships mounting rifled guns, methods, armament and fortifications altered very little and very slowly. The target was always the wooden man-of-war, carrying smooth bore, muzzle loading guns firing round-shot, and depending upon the wind for its motive power. The coast gunner who manned a culverin on the rampart of Pendennis Castle, Falmouth, in 1588 would have found but slight change in method if called upon to fire a 24 pdr. from the same spot in 1805.

Indeed if he had looked around at the fortifications themselves, he would have had no difficulty in recognising them. It was not until the latter half of the nineteenth century when steam-powered armoured warships mounting rifled guns firing tubular and pointed shell filled with high explosive made their appearance, that coast artillery really began to develop. To deal with these fast potent opponents, fresh methods had to be brought into use, novel instruments designed, new and more powerful guns mounted, and much stronger fortifications constructed, with the result that Coast Artillery became the leaders in accurate and effective shooting and the pioneers in scientific gunnery. Coast Artillery, which had marked time for so long, suddenly sprung to life and became a vigorous and virile branch of the Royal Artillery for what was to prove to be the last century of its existence.

CHAPTER 1

1540 *to* 1603

IT will be recalled that the manual of "*The Organisation and Fighting of the Fixed Armament of a Coast Fortress or Defended Port*, 1911" stated that fixed defences, manned by coast artillery, were necessary to provide for the protection of naval bases, to secure harbours whose positions were of strategic value, and tc protect commercial ports so that trade might be disturbed as little as possible. And it was exactly for these reasons that the government of Henry VIII found it necessary to originate coast artillery with its forts, guns, and gunners towards the middle of the sixteenth century. The discovery of the New World was turning the English into a nation of sea-farers, and they were pushing out westwards and southwards in their small ships to discover new lands, to open up fresh opportunities for trade and commerce and to seize a share in the treasure and loot which were pouring forth from the Americas and Indies in such astonishing quantities. But the English were not the only nation to be out and about on the high seas on the make. Spanish, Portuguese and French were there also, and were more than prepared to struggle desperately to hold what they had already and to grab more if opportunity offered.

Moreover the foreign policy of Henry VIII made it necessary for England to be strong in the narrow seas. Henry had quarrelled irrevocably with the Pope and fallen out at different times with France and Spain, and either of these powers could threaten our overseas wool trade with Flanders which was the very life-blood of England's existence at that time. Henry therefore built and maintained great ships of war to protect his trade-routes so that the narrow seas were full of English ships—the King's ships going about their lawful occasions, ships of merchant adventurers, armed to the teeth, setting out for the high-seas and newly discovered lands, fierce privateers preying on whatever French and Spanish ships could be found, and capacious traders sailing to and fro' Flanders, the Hanseatic Towns and the Continental ports. And all these ships needed safe bases and secure harbours in which to refit, take on supplies, load and unload and find shelter.

By the third decade of the sixteenth century all ships of war and most others were mounting guns, and the mediaeval castles which had stood on guard so long over the narrow creeks and havens were not of sufficient strength to stand up to the battering of round-shot, nor in many cases were the waterways over which they watched

deep enough to take the new sea-going ships. So Henry VIII set about building a series of forts (often called castles) which would carry guns, would be strong enough to withstand the shock of round-shot, and so could protect the more important ports and harbours around the coasts of his realm, from Hull to Milford Haven. These were begun about 1540 and work continued on them throughout Henry's reign. The most imposing of them were constructed at Tilbury and Gravesend—to guard the entrance of the *Thames*—Deal, Walmer, Dover, Sandgate, Rye (*Camber Castle*) Portsmouth (*Southsea Castle*), Sandown, Cowes, Hurst, Yarmouth (I.O.W.), Calshot, Portland, Dartmouth, Falmouth (*Pendennis* and *St. Mawes Castles*), and Guernsey (*Castle Cornet*). In some cases, such as Dover, Dartmouth and Guernsey, mediaeval castles, already standing, were adapted to suit the demands of the new conditions.

These forts formed the hard cores around which our coast defences gradually developed through the next four centuries. They were of course, being the first of their kind, experiments. The basis of their design was that the whole fort should be built in one compact block with all-round defence. They were constructed of stone with thick walls and rounded bastions and parapets, and were low and squat. The guns were mounted on emplacements in tiers, those on the top platforms firing through embrasures and those on the lower tiers through gunloops with wide openings, sloping rapidly down at the sills and splayed outwards at the sides. These forts of course, varied very much as to size, Deal, about one of the largest, measuring approximately 50 yards by 70 at the base. All the forts were surrounded by ditches and moats.

However, stone was not a good material to meet round-shot; it splintered, and its fragments caused casualties. Casemates were not suitable either for the firing of big guns; their enclosed spaces filled with fumes and smoke and almost suffocated the gunners while the gunloops were easy marks for close-range fire. As soon as these defects were appreciated, the Tudor engineers set to work to correct them. They began to construct ramparts or bulwarks of earth, closely packed and held together by turf, around the outside of the central keep. Earth formed a better protection than stone for it absorbed round-shot and could be rapidly repaired. On the rampart top the big guns were mounted under cover of the bulwark and, firing over the parapet, thus had a much wider field of fire. During the reigns of Edward VI and Mary some of the original forts were altered and had bulwarks added to them, but it was the war with Spain and the threat of invasion during the reign of Elizabeth I which set the engineers once again building new forts or reconstructing old ones. Forts were erected or new fortifications

raised at Berwick-on-Tweed, Tynemouth, Chatham (*Upnor Castle*), Sandwich, Plymouth and many other harbours, and the basis of their designs was a central massif surrounded by earth or rubble ramparts and bulwarks with angled bastions at the corners.

The guns mounted on the Tudor forts were of many types, patterns, calibres and weights and were made of both brass and iron. The main types were:-

Type	*Calibre in inches.*	*Approx. weight of shot in lbs.*	*Approx. extreme range in yards.*
Cannon	8	60	2,000
Serpentine	7.5	53	2,000
Demi-Cannon	6.5	30	1,700
Culverin	5.5	17	2,500
Basilisk	5	15	2,000
Demi-Culverin	4.5	9	2,500
Saker	3.5	5	1,700
Minion	3.25	4	1,600
Falcon	2.33	3	1,500
Falconet	2	1	1,800

These guns were smooth-bore, muzzle-loaders which fired solid iron round-shot, cannister, grape, chain, or bar shot, propelled by a charge of gunpowder. They had no sights, and were laid for line by looking along the top of the barrel and for elevation by using the "Gunner's quadrant", wedges being driven under the breach according to the elevation required. It is difficult to discover how many guns these various forts carried, but it is known that in 1547 the Portsmouth Defences mounted 6 Cannons, 2 Serpentines, 4 Demi-Cannons, 4 Culverins, 16 Sakers, 24 Falcons, and 2 Bombards while *Yarmouth Castle* (I.O.W.) held 12 pieces of brass and iron ordnance of different calibres, one piece being unserviceable.

Now these coast-defence forts had to be manned continuously, their guns efficiently maintained and always ready for action so that permanent garrisons of gunners and infantry had to be found for them. Thus somewhere about 1540 there came into existence the very first and earliest establishment of regular artillery in England. The personnel were paid direct by the Exchequer but were under the Master-General and Board of Ordnance for appointments, efficiency, discipline and administration. This was a wise arrangement as the Master-General and Board were also responsible for the forts themselves, their fortifications, guns, ammunition, arms, stores etc. and it was one of the duties of the Master Gunner of England—unfortunately only too rarely carried out—to inspect the forts and the detachments of gunners stationed in them. These detachments consisted of a Master-Gunner or Chief-Gunner in charge—who was responsible to the Commander, usually known as

the Captain of the Fort—and a squad of gunners (gunners, gunner's mates, quarter-gunners and matrosses.) At the time of the *Armada* (1588), the permanent artillery garrisons of some of the more important coast forts were as follows:-

Fort	*Master Gunner or Chief Gunner*	*Gunners*
Calshot	1	7
Camber (Rye)	1	16
Deal	1	16
Dover	1	47
Gravesend	1	4
Hurst	1	10
Plymouth	1	8
Portland	1	6
Portsmouth	1	16
Falmouth	1	7
Sandgate	1	7
Sandown	1	7
Tilbury	1	8
Tynemouth	1	5
Upnor (Chatham)	1	6
Walmer	1	16

It is obvious from these numbers that there were not sufficient gunners to find the detachments for the guns. In fact the permanent party was only a "District Establishment", responsible for the maintenance of the guns, ammunition, and stores, and possibly for providing the layers in action. The detachments were found from the infantry garrison, or from militia and trained-band soldiers brought into the fort specially for the purpose. They were usually quite untrained and could not have been very efficient.

It was war with Spain and the threat of Spanish invasion that furnished coast artillery with its first real alarm and call to action. By 1586 it had become clear to the Queen's Government that Spain was preparing a great effort so that her fleet could obtain command of the narrow seas and open the way for her army to invade England. The Queen's advisers considered that the enemy would have to seize a good, sheltered port immediately after the initial landing and were of the opinion that the most threatened harbours and havens were, from west to east, Falmouth, Plymouth, Dartmouth, Southampton, Isle of Wight, Portsmouth, The Downs, Sheppey and the Thames Estuary, and Harwich. Orders were therefore sent out to Lord Lieutenants of Counties and Captains of Forts to strengthen their existing defences and construct new ones to cover all exposed

points and likely landing places. Bulwarks were to be constructed, pits and trenches dug, parapets raised, and stockades planted, especially at places where the depth of water would admit hostile vessels. The batteries on St. Nicholas (later Drake's) Island were not considered sufficient to safeguard *Plymouth Sound* and plans were made to build a new fort on the *Hoe* (It was not begun until after the defeat of the *Armada*), blockhouses and bulwarks were ordered to be erected along the south coast and at special points of danger such as around Dover and the *Cinque* Ports, at Clay, Milton and Higham on the coast of Kent, on Sheppey Island, and at Harwich. Unfortunately, although it was fairly easy to find the labour and materials for these works, the provision of guns for them was quite another matter, and one lieutenant complained bitterly that he had only bowmen and billmen to man the bulwark he had been detailed to hold. Finally Captains of Forts were told that every harbour and haven must be guarded by adequate fortifications and defended to the utmost but, if the harbour or haven did fall into enemy hands, the fort and fortifications were to be abandoned, the guns withdrawn inland, and the fight continued.

On July 20th, the great *Armada* was sighted approaching the Channel, the beacons were aflame, and the coast defences were alerted from Falmouth to Tynemouth. The Spanish plan was to gain control of the Channel, the Straits of Dover, and the southern narrows of the North Sea by defeating the English Fleet, and then to cover the crossing to England of the Spanish Army under Alexander Farnese, Duke of Parma, which was gathered, ready to embark, at the ports of Flanders. The expected chief opponent of the coast artillery was the Spanish Galleon, a four-masted ship, rather long in the beam, somewhat straight and flat, varying between 1,000 and 500 tons burthen, and mounting between 50 and 25 guns according to its size. There were 20 of these galleons with the *Armada* which totalled 126 ships. The Spanish Army, which was to be landed in England at the mouth of the *Thames* and march directly on London, consisted of about 5,000 horse and 20,500 foot and was to cross from Ghent, Bruges, Nieuport, Gravelines and Dunkirk in 70 landing craft and 200 flat-bottomed boats besides many other small ships. Fortunately the *Armada* and not the English fleet was defeated, the Spanish Army was never able to embark, and the Coast Artillery, in spite of many false alarms and excursions, were not called upon to enter into combat with the Spanish Galleons nor to defend their ports, harbours and havens.

CHAPTER II

1603 *to* 1667

THE Tudors passed away and were succeeded by the Stuarts who, quarrelling with their Parliaments, were always short of money so that defence was neglected, and coast defence, only too often the Cinderella of the forces, almost forgotten altogether. England of course, was frequently at war with either France or Spain, but Europe was distracted by the Thirty Years War, and the defeat of the *Armada* had drawn the teeth of Spain at sea. Therefore, it was possible to economise on defence, and, as the result of a commission set up by the King (James I) in 1623, it was decided to demolish most of the temporary bulwarks and defence works which had been erected during the war against Spain and to cease to make arrangements for manning them. On the other hand, the Commission did recommend that certain new permanent forts should be constructed at places where there had been only temporary works previously, amongst which was Harwich (*Landguard Fort*) later to become famous in the Second Dutch War.

From 1623 to the outbreak of the Civil War (1642) the coast defences and their garrisons were allowed to rot. The Stuart Kings were attempting to govern the country without Parliament, the forces were administered by Commissioners of the Treasury, and these found it extremely difficult to raise money with the result that the coast artillery and defences got nothing at all. The members of the permanent detachments in the forts were never discharged nor even paid so that they grew old, unfit, and disabled, were forced to take part-time—and even whole-time—employment outside their forts to keep bodies and souls together, ran into debt, had no decent clothes to wear and were often in the greatest misery. The ordnance, equipment and fortifications suffered equally, the guns being unmounted because their wooden carriages rotted, the equipment becoming unserviceable for lack of repair, and the ramparts and curtains falling into decay for insufficient money to pay for their renovation.

Such was the state of the coast artillery and defences when the great Civil War broke out in 1642. The Navy sided with Parliament, and each coast fort declared its allegiance according to the politics of its commander or of the port over which it stood guard. Neither side indulged in amphibious operations, and the coast defences were rarely called upon to take action. However, some of the forts had to defend their land fronts, being involved in the defence of their

parent ports. Portsmouth was loyal to the King but, after a very short siege by Waller's Army and Warwick's warships, capitulated on 7th September 1642, *Southsea Castle* apparently being taken on the night of the 3rd while the Captain of the fort "had more drink in his head than was befitting such time and service". Plymouth on the other hand declared for Parliament and successfully survived a three year blockade by the Royalists. *Pendennis Castle*, Falmouth, was one of the last strongholds in the west-country to hold out for the King, and Charles, Prince of Wales, took refuge there when fleeing from Ireton's troopers in February 1646. The forts at Walmer, Deal and Sandgate revolted against Parliament in 1648 when a portion of the fleet in the Downs deserted under Admiral Batten and sailed for Holland to join the Royalists, but were very soon retaken.

With the King executed and Parliament purged and submissive, Cromwell set to work to govern England. He was determined to make his country a first-class, strong military power, and the coast artillery and defences were not forgotten, with the result that the Commonwealth Government took considerable interest in its coast forts, which were reported to be much decayed and ruined after the Civil War, and set about doing what it could to repair them. At the time of the First Dutch War (1652-1654) the artillery garrisons and armaments of some of the leading coast defences were:-

Defences	*Garrison*		*Armament*										
	Master Gunner or Chief Gunner	*Gunners*	Demi-Cannon	Culverins	12 pdrs.	Demi-Culverins	8 pdrs.	6 pdrs.	Sakers	Minions	3 pdrs.	Falcons	Falconets
Berwick ...	1	26		4		4			10	4	2	2	
Cowes ...	1	6		2	4				1				
Deal	1	8		3		11			7	5			
Dover ...	1	21		4		28			18				
Hull	1	19	2	9	3	23			32		2		
Plymouth ...	1	20	10	49	6	55	23	6	25	28	7		5
Portsmouth ...	1	23	21	45	6	78			31	4	8		
Scarborough	1	8		2		2		2	13	1			
Tilbury ...	1	16	48	4		13			6	3			
Tynemouth ...	1	20		1				3	2		2		
Upnor ... (Chatham)	1	8	15	19		9			13		2		

This list of armaments shows that a change was taking place in the naming and grading of guns. The old guns were still called by their picturesque names of *Cannon, Culverin, Saker,* etc. but the new ones were graded by the weight of ball they fired. This reflects the influence of Gustavus Adolphus who was the first to standardise his artillery by weight of shot. Otherwise guns had altered very little. They were still made of cast-iron and mounted on wooden carriages which, on account of long exposure to the elements, were only too liable to rot. On coast forts, the guns and carriages were usually emplaced in embrasures on sloping wooden platforms to take up the recoil with a skid under the rear axletree to assist. Gun-drill was being introduced, and the gun was loaded in 13 movements, *viz*:-

1. Put back your piece.
2. Order your piece to load.
3. Search your piece.
4. Sponge your piece.
5. Fill your ladle.
6. Put in your powder.
7. Empty your ladle.
8. Put up your powder.
9. Thrust home your rod.
10. Regard your shot.
11. Put home your shot gently.
12. Thrust home your rod with three strokes.
13. Gauge your piece.

Gunnery had not progressed, and it was always hoped to engage enemy ships at close or point-blank range.

Nor had there been any alterations in administration. The forts and their permanent artillery garrisons were still under the Master-General and Board of Ordnance for all purposes except pay which was issued by the Exchequer Office. During the reign of Charles I, the post of captain commanding a fort had been abolished, and a governor was appointed instead. This governor would usually be a great lord or person of political importance, very often both, and in time of peace would rarely take up his residence in the fort. The Lieutenant-Governor—who was always a military officer—was the actual executive commander on the spot and did all the work.

The art of fortification had not stood still. *Landguard Fort,* Harwich, which was built in 1628, was a typical example of the bastioned-trace *i.e.* flanks facing each other and connected by curtains. Built round a hollow square, in which were the administrative buildings, stores, and barracks, the earth bulwarks or ramparts were 200 feet long, 18 feet high, and 32 feet thick with an angled

bastion at each corner 36 feet square. The parapet around the whole of the ramparts was 6 feet high and 6 feet thick, and the total exterior circuit of the fort nearly 1,000 yards. On completion this fort was armed with:-

Demi-Cannons	2
Culverins ...	28
Basilisks ...	1
Demi-Culverins	17
Sakers ...	10

In fact the bastioned-trace, once fully developed, remained the dominant form of fortification right through the 17th and 18th centuries. Earth was still the chief material for the construction of ramparts etc., but defences and forts of stone, or earth faced with stone, such as the *Royal Citadel* at Plymouth which was erected during the reign of Charles II, were still sometimes built.

In 1660 the King came into his own again, and once more a Stuart sat on the throne with the usual shortage of money for defence and scant consideration for the Navy and Army. The Second Dutch War, during which England was at war with both Holland and France, broke out in 1665 and lasted for two years. The Navy gained victories over the Dutch in the battles of Lowestoft and North Foreland and fought out a hard draw in "The Four Days Fight". By the spring of 1767, Charles II considered he had defeated the Dutch and expected them to sue for peace, so that, instead of commissioning the main fleet for the summer, he ordered most of the ships to be dismantled and laid up to save money. But the Dutch had other ideas, and, having obtained secret information concerning the shoals and channels at the mouth of the *Thames*, decided to deal a sudden blow at England. A fleet of 100 sail under the command of Admiral de Ruijter, which had been collected in the *Texel*, sailed for England on June 4th and anchored off the mouth of the *Thames* on the evening of the 7th. A squadron of 27 ships of the line, with auxiliaries and fire-ships, was then detached under Rear-Admiral van Ghent, with orders to move up-stream, enter the *Medway*, and do as much damage as possible to shipping and property. However, in order to pass successfully from the *Thames* into the *Medway*, it would be necessary first to silence the coast defences of Sheerness, so the Dutch Admiral decided to capture these defences to ensure they did not interfere with his ships when entering the *Medway*.

The coast-fort (*Garrison Point*) at Sheerness had only been begun earlier in the year (1667), it was indeed the threat of Dutch attack that had decided Charles II—who, with his brother James, Duke of York, had personally chosen the site—that a fort should be built there. By June, the work had not been completed, but the

fort was hurriedly put in a state of defence, 16 guns mounted, and a garrison consisting of a detachment of permanent gunners, a party of seamen (from *H.M.S. Monmouth*) to assist with service of the guns, and a company of Lord Douglas' Regiment (1st Foot, Royal Scots) were quartered in it. When intelligence of the approach of the Dutch Fleet was received, a company of the West Kent Trained Bands was added to the garrison, making a total of about 250 men, all under the command of Sir Edward Spragge, the Governor.

At about 5 o'clock in the evening of June 10th, the enemy squadron appeared off the entrance to the *Medway*, and the Dutch Admiral detailed three ships of the line, two of 46 and one of 40 guns, to engage the fort, while 800 soldiers and marines, under Colonel Delman, an English renegade Roundhead, were landed in small boats. This operation having been successfully carried out, Delman advanced on the fort itself.

The garrison at first held out manfully, but, after about an hour's resistance and only when 9 guns had been put out of action by the fire of the enemy warships, was finally forced to evacuate the place and retire, under the direction of Spragge, up the *Medway* to Gillingham. The Dutch remained in possession of Sheerness fort until 21st June when, after utterly demolishing the defence works, they re-embarked and sailed away.

Meanwhile the enemy squadron had moved up the *Medway* where for three days the Dutch took complete charge of the river below Chatham and Rochester, burning the warships at anchor, capturing the largest, the *Royal Charles*, and destroying the dockyard and naval shore establishments. The enemy ships would have moved farther up the *Medway* had they not been prevented from doing so by the fire of the guns of *Upnor Castle*. At last the Dutch had done enough, and by the 22nd June de Ruijter had again concentrated his fleet at the mouth of the *Thames*. After a reconnaisance up the river had been foiled by the guns of Gravesend and Tilbury forts, de Ruijter determined to capture and destroy *Landguard Fort* at the entrance to Harwich Harbour.

This attack was not altogether unexpected. Suspicion had been aroused sometime previously by the appearance of two small Dutch vessels taking soundings below the fort, and precautions had therefore been taken. The Suffolk Trained Bands had been called out and, horse and foot some 2,000 strong, taken position at Walton under the command of Lord Suffolk, four companies of the Duke of York's Martime Regiment under Colonel Legge had been stationed at Harwich, and eight bulky colliers moored at the entrance of the harbour, ready to be sunk at the first threat of an attack. *Landguard Fort* at this time mounted 59 guns, 18 culverins, 23

demi-culverins, 9 sakers, 4 minions, and 5—3 pdrs. and was garrisoned by a permanent artillery detachment of a Chief Gunner and 6 Gunners, and two companies of the Duke of York's Maritime Regiment, all under the command of Captain Nathaniel Darell of the same Regiment who had just taken over the Governorship of the fort from Lord Suffolk.

At about 11 a.m. on July 2nd, a fleet of 47 Dutch warships appeared off Harwich, 8 of which moved in close and opened a heavy fire upon the fort. Under cover of this bombardment, a force of some 1,200 men under the same Colonel Delman was landed on the Felixstowe beach, about a mile north of the fort. A beach-head was then formed, and a party of about 400 sent along the foreshore to attack the fort. This party, armed with muskets, cutlasses, and grenades and carrying scaling ladders ran along the beach, and, planting their ladders firmly in the ditch, attempted to storm the ramparts. "They came briskly up with their cutlasses drawn upon their arms and their muskets and came up close to the fort, whose reception to them, when discovered was as brisk. This assault, with a continual playing of small shot, lasted about half-an-hour, and they were repulsed. About an hour after, they tried again, but were presently discouraged, and in disorder ran away, leaving some of their ladders, their hand grenades, and a case of very handsome pistols". (Extract from letter from Silas Taylor, Keeper of the King's Store at Harwich, dated 3rd July 1667.) The casualties to the fort's garrison were small, being only about 8 men including their gallant Governor, Captain Darell, who was wounded in the shoulder.

Meanwhile, Lord Suffolk had come up with his trained-bands and set about attacking the beach-head but could make no impression on it, the ground being unsuitable for the use of his horse and his infantry being held off by the fire of two small guns which the Dutch had managed to land. About 9 p.m. the discomforted party returned from the fort, and the whole beach-head was successfully evacuated between 11 o'clock and 2. Unfortunaetly, Colonel Legge only arrived with his four companies of the Maritime Regiment from Harwich after the evacuation had been carried out: had he come earlier it is doubtful whether Colonel Delman could have re-embarked his force at all. By 6 o'clock next morning the Dutch Fleet was under sail and soon disappeared to the northwards. So ended the famous attack on *Landguard Fort*.

CHAPTER III

1667 *to* 1716.

THE comparatively brief period between the restoration of Charles II in 1660 and the death of Queen Anne in 1714 covered no fewer than four great wars. The second Dutch War (which has already been dealt with), the Third Dutch War (1672-73), the War of the Grand Alliance (1689-97) and the War of Spanish Succession (1702-13). The Navy, by the great victory over the French of La Hogue (Barfleur) in May 1692, settled the question of command of the sea until the Peace of Utrecht in 1713. Therefore the coast defences of Britain were as usual neglected and allowed to fall into decay. We hear that "Berwick is getting more defenceless every year and will take £31,000 to be spent at once to prevent the place from being insulted." "For six years Hull has been going to ruin: the earthworks have been abused by the garrison who have suffered all sorts of cattle to tread down the fencings." "This place (Portsmouth) should be made as strong as Toulon. We are suffering from the pernicious and mistaken notion of England's safety being wholly in wooden walls. This and other parts are utterly neglected and gone to ruin. This harbour is like a gate without locks, bolts, and bars, the fortifications being now hardly fit to resist battering rams and arrows." "Most of the buildings in this fortress (*Pendennis Castle*, Falmouth) are entirely gone to ruin." "This place (*Landguard Fort*) is in the most miserable condition of any fort in Europe. Everyone who sees it and considers its importance wonders that no great care is taken to secure it." (These extracts are taken from the reports of engineers to the Board of Ordnance sent to inspect the various fortifications during this period.) A Commission was therefore set up by Queen Anne in 1704 to put into execution "the Act for fortifying the harbours of Portsmouth, Chatham, and Harwich," with the result that during the next few years over £100,000 was spent on Portsmouth, £32,000 on Chatham, and the old fort at Landguard was demolished altogether and a new one built in 1715 in its place.

Moreover, the Board now had in addition overseas commitments. In the course of the War of the Spanish Succession, Gibraltar, Minorca, Nova Scotia and Newfoundland were acquired by conquest, and detachments of permanent gunners had to be found for them. The detachment for Gibraltar was sent out immediately after that stronghold had been captured in 1704 and consisted of 55 gunners with 2 fireworkers and 6 bombardiers for

handling the mortars, while those for Minorca (Port Mahon) Nova Scotia (Annapolis) and Newfoundland (Placentia) were despatched in 1709, 1710, and 1713 respectively. The detachments for these defended ports were as follows:-

Rank	*Port Mahon*	*Annapolis*	*Placentia*
Captain of Gunners ...		1	
Lieutenant...		1	
Master Gunner	1		1
Sergeants		2	
Corporals		2	
Gunners	20	11	20
Mattrosses...	60	40	
Fireworkers } for mortars	3	1	
Bombardiers } for mortars	9	3	

The distribution of ranks is curious, especially when it is borne in mind that 55 gunners were consigned to Gibraltar with neither captain, lieutenant, nor master-gunner to take charge of them, and it is to be noted that a commissioned officer appears for the first time among the ranks of the "permanent artillerymen" allotted to forts and garrisons.

The detachment at Gibraltar had scarcely arrived before its members were pitched into the first siege which that fortress suffered after its capture and occupation by the British. This had taken place on 24th July (1707) when a British fleet under Admiral Sir George Rooke, assisted by some 1,800 British and Dutch marines under Prince George of Hesse-Darmstadt, had seized the place after a short resistance. The French and Spanish were not slow to realize the importance of the stronghold which they had so carelessly allowed to fall into the hands of the British, and by the beginning of October a Franco-Spanish force some 12,000 strong had been concentrated under the Marquis of Villadarias opposite the isthumus, assisted by a French fleet of 22 sail to enforce the blockade from the sea side. Besides the gunner detachment, the garrison of the Rock at this time consisted of 3 battalions of marines (about 2,000) and a considerable party of seamen to help serve the guns, all under the command of Prince George of Hesse-Darmstadt. The armament of the fortress at this first siege would seem to have been about 150 guns—varying from 42 to 6 pdrs.—and 6 mortars. Most of the guns had been landed from warships and were still on their ship-carriages, but a large number of them must have been those

taken from the Spaniards when the fortress was captured in the previous July.

By the 9th October the Rock was truly besieged. The French and Spanish made their major effort on the landside as the French fleet was unable to keep permanent station in Gibraltar Bay due to fear of the British Mediterranean fleet under Sir John Leake which was refitting at Lisbon. To hold off the land attack Prince George had a series of redoubts constructed to cover the Landport and armed them with 20 of his guns. Once the enemy had pushed forward their trenches within striking distance of the fortifications, it was around these redoubts that the main fighting took place. The enemy made several strong attacks on them but on each occasion failed to take them. By the end of November the garrison was rapidly becoming exhausted, but Leake arrived with the British fleet, chased away the French ships, and was able to disembark about 2,000 reinforcements and a quantity of stores and food.

Thus refreshed the garrison was able to withstand a new series of assaults made on the landward defences. One of the generals of Louis XIV, Marshal Tesso, had now arrived to take over direction of the siege, and the enemy redoubled his efforts. During January (1705) his guns opened a heavy bombardment on the redoubts, especially on the Round Tower which formed the bastion at their northern end. A breach having been made in the Tower, on January 27th the enemy launched a great assault with some 1,300 men, captured the Tower, and advanced towards the inner defences of the fortress. However, a counter-attack, promptly delivered, drove back the intruders, retook the Round Tower, and re-established the line of redoubts. After this the siege languished, and on March 10th Leake arrived with the British fleet and, defeating the French blockading squadron, raised the siege. The Rock had successfully survived the first attempt to recapture it.

The artillery detachments at Port Mahon, Annapolis, and Placentia seem to have been left at peace for some years after their first arrival, but foreign service was very unpopular with the British soldier during the eighteenth century, especially on islands. Once shipped off to some far-away isolated sea-girt colony, the Board of Ordnance was apt to forget its gunners, pay being slow and late in arriving, clothing unreplaced, and money for rations, stores, and maintenance unforthcoming. But above all it was death from sickness that the soldier most feared. In those days of little knowledge of hygiene, tropical diseases, and medicine generally, the rate of mortality among British garrisons abroad was very high. During the year succeeding the first siege of Gibraltar "more than half of the garrison was disabled through disease brought on by

exposure, while even in 1711 the men were obliged to burn their own miserable quarters for want of fuel." (Fortescue). Furthermore, posting to the West Indies was practically a death sentence, for yellow fever quickly decimated any body of troops sent there.

To return to the home front, the Peace of Utrecht, agreed to in 1713, brought about the usual plans for effecting economies and re-organisation. In 1716 the Board of Ordnance brought out a great scheme for the reduction of coast-defence armaments. The list, which set forth the reduction in guns to be carried out, is of great interest as it shows, under the heading "Present Armament" what must have been the complete coast-defences of England, Wales and the Channel Islands at the close of the War of Spanish Succession. Here is the list:-

Place.	*Present Armament. (No. of Guns.)*	*To be reduced to:- (No. of Guns.)*
Portsmouth: *Southsea Castle*	474	143
Gosport	125	34
Isle of Wight: Yarmouth ...	73	13
Sandown ...	26	12
Carisbrook ...	10	7
Cowes ...	20	10
Hurst Castle	34	18
Calshot Castle	25	15
Portland Castle	15	7
Plymouth	311	70
Falmouth	109	30
Scilly Islands	118	30
Berwick	76	50
Holy Island	20	12
Tynemouth	30	20
Scarborough	12	8
Hull	117	50
North Yarmouth	27	15
Landguard Fort	63	20
Sheerness	150	70
Gillingham Fort	54	40
Chatham	109	37
Tilbury Fort	161	60
Gravesend Fort	17	10
Dover	98	36
Deal Castle	29	12
Walmer Castle	17	10
Sandgate Castle	16	10
Guernsey	97	80
Jersey	147	100

The naval bases and defended ports at home were evidently strongly protected by the end of the war. Reductions and re-organisation were also carried out at Gibraltar and Minorca, the guns at these two fortresses "a great part thereof being unserviceable and of improper nature". (Board of Ordnance Minutes, 1717.)

The ordnance in general use in coast defences was:-

Piece.	*Approx. extreme range in yards.*
42 pdrs.	3100
32 pdrs.	2900
24 pdrs.	2700
18 pdrs.	2600
12 pdrs.	1800
9 pdrs.	1800
6 pdrs.	1500
4 pdrs.	1200

The old names had quite disappeared, and all guns were now known by the weight of shot they threw. These were of course all naval guns as issued to the warships of the Navy. "Ships of the Line" had greatly increased in size and armament since the Dutch wars. First-rates now carried 100 guns, second-rates from 84 to 90 guns, third-rates from 64 to 80 guns, and fourth-rates from 50 to 60 guns. Three deckers were becoming normal, the larger ships being up to 2,000 tons burthen. There was very little urge to advance the art and skill of naval—and therefore of coast-defence—gunnery. In battle the aim of the warship was to close the enemy and fight him at point blank range. Therefore quick and efficient gun-drill was more important than accurate laying.

In the art of fortification the methods of the great French engineer Vauban were now supreme. He was no believer in systems, saying that one does not fortify by systems but by common sense. He elaborated the "bastion-trace", introducing ravelins, tenailles, and traverses. In Britain, such new coast forts and batteries as were constructed at this period, followed as near as possible the tenets of the master. Brick was now used to face the earthworks, and bastions were of diamond shape and thrown well forward, being not only built at the corners but also at intervals along the ramparts. Forts were normally of the closed lunette type, that is to say a fortified work of more than four sides with parapet and ditch all round. The guns were mounted on platforms out in the open on the ramparts and bastions, firing through embrasures and covered by breast works and parapets. Quarters, barracks, stores, etc. were built inside the hollow square of the fort, being protected by the height of the ramparts.

The small detachments of permanent gunners—now usually referred to as garrison gunners to distinguish them from the gunners of the artillery trains—each with its master gunner in charge, still maintained the armament of the coast defences. They were as in the past far too few actually to man the guns—and unfortunately only too often too old and decrepit as well—and these had to be