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**HISTORY OF
THE SECOND WORLD WAR
UNITED KINGDOM CIVIL SERIES**

Edited by SIR KEITH HANCOCK

WAR PRODUCTION SERIES

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THE
ADMINISTRATION
OF WAR
PRODUCTION

BY
J. D. SCOTT
AND
RICHARD HUGHES



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PREFACE

THE STORY of the administration of British war production, as it is told in the following pages, involves an examination, more or less extensive, of the workings of six departments of State, and of a complex and ever-changing structure of central committees. The departments are the Admiralty, the War Office and the Air Ministry; the Ministries of Supply and of Aircraft Production; and the Ministry of Production. Yet the story of these six entities is woven out of only four themes—the administration of naval production, the administration of military production, the administration of aircraft production, and the theme of how war production was, from time to time, in the words of Ernest Bevin, ‘gripped and controlled at the top’.

Yet although there are only four themes, it will be observed that the book is divided into five parts. This division is mainly a chronological one. In Part I the four themes are discovered, introduced, and carried up to the beginning of the war, or a little further, for while the War Office drops out of the story (at least as a supply department) with the creation of the Ministry of Supply just before the outbreak of war, the Air Ministry continues in this role until the formation of Mr. Churchill’s Government in the spring of 1940. The Admiralty remains with us, since it did not lose its production responsibilities as did the other two departments, but here also the outbreak of war marks a point at which it is natural to break off. In the case of the committees which, in the pre-war period, devoted themselves to the task of co-ordination, the break in 1939 is, once again, a very real one, since they were then replaced by a new system.

The four themes which are introduced in Part I are, therefore, each resumed in a more ample fashion, in their actual war-time setting, in Parts II, III, IV and V respectively. Parts II, III and IV call for no comment. In Part V the theme is still, at the opening, a theme of committees, the new system already referred to, which itself changed, rather rapidly and rather uneasily, until the emergence of the Office of the Minister of Production and a new method of co-ordination at the centre. The emergence of the Office of the Minister of Production, and of the Ministry of Production itself, is not however in itself a change of theme.

Two names appear on the title-page as co-authors: it should, however, be explained that this does not mean they have collaborated on the volume as a whole. This had already been planned in the shape in which it now appears when it was decided to relieve the original author and general editor of the volume (who is also the author of this preface) of the task of writing about the Admiralty, a department with whose activities and personnel he was little

acquainted. The distinguished writer who then undertook that part of the burden seemed an appropriate choice on the part of the Admiralty, for he had served in the Admiralty virtually throughout the war and had been personally concerned in much that he was now called on to describe, personally acquainted with many of the key figures. It should be understood, then, that while I took some part in compiling material for the Admiralty chapters, all these were planned and written by my colleague Richard Hughes; whereas the whole of the remainder of the volume is my responsibility exclusively.

This is not to say that any part of the volume has been written without assistance. It could not even have been begun without guidance from many departmental officials, past as well as present, and it could not have been carried forward without numerous memoranda, interviews, loans of private as well as official documents, and extensive commentaries upon early drafts, all provided by people who, although they did not show it, had too heavy responsibilities in the present to welcome so extensive an intrusion of the past as was represented by this work. We should like to record our gratitude, although the conventions which have been adopted in the writing of this history prevent us from naming individuals. But the convention does not apply to those past and present members of the staff of the Official History who have, in one way or another, contributed to this volume. They include Mrs. Audrey Parry, who carried out much research, Mr. C. C. Wrigley, who supplied valuable drafts about naval aircraft, Mrs. Margaret Gowing, who read the whole volume, and Miss Edith Upson, who, amongst other tasks which she undertook, shared with the authors many of the exacting labours involved in seeing a book such as this through the press.

J. D. SCOTT

May 1955

LIST OF ABBREVIATIONS

A.A.	Anti-aircraft
A.C.A.S.(T.R.)	Assistant Chief of Air Staff (Technical Requirements)
A.C.(R. & D.)	Assistant Controller (Research and Development)
A.E.W.	Admiralty Experiment Works
A.F.V.	Armoured Fighting Vehicles
A.M.D.P.	Air Member for Development and Production
A.M.R.D.	Air Member for Research and Development
A.M.S.O.	Air Member for Supply and Organisation
A.M.S.R.	Air Member for Supply and Research
A.S.(C.)	Assistant Secretary (Controller)
A.S.U.s	Aircraft Storage Units
A.V.M.	Air Vice-Marshal
B.A.D.	British Admiralty Delegation (Washington)
B.A.T.M.	British Admiralty Technical Mission (Ottawa)
B.B.C.	British Broadcasting Corporation
B.E.F.	British Expeditionary Force
C.G.M.P.	Controller General of Munitions Production
C.-in-C.	Commander-in-Chief
Cmd.	Command Paper
C.M.S.R.	Controller of Merchant Shipbuilding and Repair
C.N.R.	Chief Naval Representative
C.S.C.	Commonwealth Supply Council
D.A.E.	Director of Aircraft Equipment
D.A.M.F.	Director of Air Ministry Factories
D.C.D.	Director of Communications Development
D.C.I.G.S.	Deputy Chief of Imperial General Staff
D.D.G.P.	Deputy Director General of Production
D.G.	Director General
D.G.E.	Director General of Equipment
D.G.M.P.	Director General of Munitions Production
D.G.P.	Director General of Production
D.G.S.P.	Director General of Statistics and Programmes
D.N.O.	Director of Naval Operations
D.P.R.	Defence Policy and Requirements (Committee on)
D.R.C.	Defence Requirements Committee
D.S.D.	Director of Signals Department
D.S.R.	Director of Scientific Research
D.T.D.	Director of Technical Development
F.B.I.	Federation of British Industries
F.R.S.	Fellow of the Royal Society
H. of C. Deb.	House of Commons Debates ('Hansard')
J.W.P.S.	Joint War Production Staff
L.C.P.R.B.	London Combined Production and Resources Board
M.A.P.	Ministry of Aircraft Production
M.D.1	Minister of Defence 1 (a 'cover' title—see p. 275)
M.P.C.	Munitions Production Central

LIST OF ABBREVIATIONS

P.A.S.	Principal Assistant Secretary
P.A.S.(PR)	Principal Assistant Secretary (Priority)
'P' Branch	Priority Branch
P.O.A.E.	Principal Officer of Aircraft Equipment
P.P.O.	Principal Priority Officer
R. and D.	Research and Development
R.A.E.	Royal Aircraft Establishment
R.A.F.	Royal Air Force
R.D.F.	Radar
R.N.	Royal Navy
R.N.V.R.	Royal Naval Volunteer Reserve
S.R. and O.	Statutory Rules and Orders
T.R.E.	Telecommunications Research Establishment
T.U.C.	Trades Union Congress
U.K.	United Kingdom
U.-S.	Under Secretary
U.S.	United States
U.S.A.	United States of America
V.H.F.	Very High Frequency Radio Communication

PART I

The Pre-War Organisation

CHAPTER I

THE ADMIRALTY

(i)

Origin and Status of the Board of Admiralty

THE ADMIRALTY is an ancient institution, subject to continuing growth and change. The Board of Admiralty derives from the royal prerogative, not from Act of Parliament: but its powers and constitution have been defined and modified by successive letters patent, by Parliament—particularly the Admiralty Act of 1832,¹ and by a series of Orders in Council.

The history of the Board, briefly, is this. In the Middle Ages authority for the administration of maritime affairs, for the decision of all maritime causes and for the government of the King's Navy, came presently to be vested in a single functionary, the Lord High Admiral, one of the Great Officers of State. The High Court of Admiralty was established to try maritime causes on his behalf and its profits were his official emoluments. On the assassination of Buckingham in 1628 this high office was put 'temporarily' into commission: that first time, in order that its emoluments might be reserved to pay the late Lord Admiral's debts instead of passing at once to a successor: but by the end of the seventeenth century what had begun as a temporary expedient had been revived to become a habitual practice, and from then on a Board of Commissioners to execute the office usually replaced the Lord Admiral. That is still the position to-day. The Board of Admiralty is in law a collective 'person', the Lord High Admiral put into commission.

The High Admiral was an officer of state; not necessarily also captain-general of the fleet, though usually he did take command in time of war as well. So all appointments of commissioners to execute his office, even including sea lords, were and are now civil appointments. Likewise all subordinate appointments to the Admiralty Department, whether made from naval or civilian sources, are all appointments to a civil department of Government: such naval officers have to be concurrently appointed to the sinecure complement of H.M.S. *President*, so that their naval careers may not be interrupted.

¹ 2 & 3 Wm. 4, Cap. 40.

The Commission, being one 'person', is created by letters patent as a whole; if a single commissioner has to be changed, the whole patent has to be revoked and a new patent issued. But the statutory definition of 'Admiralty' is only 'any two or more of the Commissioners for executing the office of the Lord High Admiral of the United Kingdom'.¹ Symbolically, though the Admiralty flag cannot be worn by a ship or vessel carrying the First Lord alone, or the First Sea Lord, or any other member of the Board alone, it can be worn when any two or more commissioners are present with (traditionally) a member of the Secretary's department authorised to represent him.²

Official letters, then, and orders to naval authorities, are signed by the Secretary or an authorised deputy not on behalf of the Minister (the First Lord), but by *Their Lordships'* command. Indeed, nothing in the patent used ever to give peculiar or overriding powers to the First Lord. If apparently he could override his fellow commissioners, even all of them and even on an important issue,³ in this eminence he acted, it would seem, not as First Commissioner nor indeed as a commissioner of Admiralty at all: he acted as member of a higher executive authority still, the King's Government,⁴ and spoke on its behalf. Doctrinally, it would then be the King's voice commanding his High Admiral. It has rarely happened of course, and is considered so grave an occurrence that Parliament has usually been told of it. In short, the collective responsibilities and powers of the Board and the paramount responsibilities and powers of the First Lord have jointly been taught to march with the modern cabinet system—so that, for instance, the First Lord alone⁵ has to answer to the Crown and Parliament for the whole business of the Admiralty. Nevertheless constitutionally, and historically, and in the public mind, these powers and responsibilities are shared by the Board of Admiralty as a whole.

The fundamental of Admiralty organisation, then, was this doctrine of collective Board responsibility. But within the formula of collective responsibility, each member of the Board had his own

¹ 52 & 53 Vict., Cap. 63.

² See also Part II, Chapter V (ii). The tradition of a 'Secretary' is strictly observed, but there is still some obscurity about the position. Perhaps the flag is regarded as advertisement not only that the authority of the Board is present, but that the Commissioners are ready to transact Board business.

³ Subject to a special reservation in professional questions to the First Sea Lord, who is directly 'Chief naval professional adviser to H.M. Government'.

⁴ It was unquestionably the practice in the eighteenth century for First Lords, as members of the Government, to exercise supremacy over the Board of Admiralty, though this supremacy was not given formal recognition of any kind until the Admiralty Order in Council of 14th January 1869 and even thereafter there continued to be no reference to it in the Admiralty Patent. Nor has it been recognised in any of the relevant Acts of Parliament.

⁵ Except for the usual direct responsibility to Parliament of the Permanent Secretary as accounting officer in respect of the spending of money.

diocese—almost as within a cabinet each minister has. This diversity of function at the top was echoed throughout the organisation of the *work* of the Admiralty as a whole: but it did not—and here it diverged, rather, from the cabinet analogy—it did not quite entirely march with the organisation of Admiralty *staffs*. The doctrine was this: a superintending lord superintended particular work, whoever it might be done by, rather than commanded particular staffs, whatever they might be doing.

This diversity of function within collective responsibility, introduced tentatively by Lord Barham in 1804 and confirmed in the Admiralty Act of 1832 and by later Orders in Council, was a particular feature of Admiralty organisation. Lord Esher's Committee deliberately copied it, when the Army Council came to be set up in 1904. It had by that time successfully survived the stormy inquests of the 'fifties and 'sixties: it was the keystone of a department which had once been a byword but was by that time looked on as exemplary. Sir Oswyn Murray, writing in 1925, considered it exceptionally well suited to a department whose activities were so diverse and wide-ranging and yet so interwoven as Admiralty business is; moreover, he felt that it served well the principle of clear-cut personal responsibility for decision and advice in every issue and at all levels, an administrative principle by which the Admiralty (he wrote) set great store. The system has its critics, but the balance of opinion would seem to endorse this view. The system lightened not only the minister's burden, but even more the burden on the permanent secretary; and the Admiralty device of the circulation of papers for advice to appropriate authorities, and their submission by the secretariat to appropriate members of the Board for decision, was a valuable routine which derived from it. This at least seems certain, that the survival into modern times of the Board of Admiralty as an effective administrative instrument—in contrast to other Boards, such as the Board of Trade and the Lords of the Treasury—was due to it.

(ii)

Functions of the Admiralty Department

When comparing the functions of the Admiralty with those of the other Service departments, we must bear in mind that historically the Navy is the prototype wholly mechanised force: a general in the field commanded *men*, but an admiral at sea always commanded *ships*.¹ Consequently Admiralty problems have from ancient times been

¹ Strictly speaking, a 'ship' is a composite entity, compounded of the vessel and her complement considered together.

problems of construction, maintenance and material supply to a rather greater extent than have the problems arising in the administration and control of the land forces. A glance at inter-war Navy and Army Estimates shows that the Navy needed to spend more money on material than on men, whereas the Army usually spent on men up to ten times what it spent on material. This should not be misunderstood: qualitatively, the lasting basis of British naval thinking from Armada days had been to rate seamen and seamanship higher than ships and guns; but quantitatively, the bulk of the work of the Admiralty—if taken to include the subsidiary Navy Board, which it finally digested in 1832—had to concern material supply and maintenance.

Traditionally the Admiralty's other principal function was recruitment, training and administration of officers and men. Not until lately, be it noted, operations of war: indeed, at one period it was not unknown for the King in person (or even his Secretary of State) to issue important orders to naval commanders-in-chief without so much as informing Their Lordships.¹ Moreover, until the development of modern means of communication it was hardly possible to control naval operations from a land headquarters even to the extent that armies could be controlled. Thus the detailed control of naval operations by any part of the Admiralty was a very recent development. The naval staff was not brought into existence until 1911; it certainly had not found its feet in the early years of the first World War. In the modern Admiralty however it was customary to regard the functions of the Department as having come to fall under three, not two, principal heads: naval operations; the recruitment and care of officers and men; and supply and maintenance. Whether measured in terms of headquarters staffs employed or money spent, the last still bulked as the predominant business done. But these distinctions should not be over-stressed. In the Navy, men and ships, operations and maintenance are too closely integrated for any complete divorce in organisation ever to have been found satisfactory in practice or even in theory. For example, in 1917 the Board was tentatively divided into two committees for current business, a Maintenance committee and an Operations committee; but the experiment was short-lived and never repeated. In 1939 the larger part of the Admiralty—generally speaking the part responsible for supply—was removed to Bath, while the whole Board and the naval staff remained in London: but in spite of geographical difficulties the Admiralty obstinately and indeed necessarily remained an organic whole. It was generally felt that the greatest reform in the history of naval administration had been the absorption in a cohesive Admiralty of

¹ Etymologically the word Admiral is of Moorish origin. The Moorish 'sea-lord' was normally a kind of port-captain whose jurisdiction did not extend to the high seas at all.

the Navy Board, the Victualling Board and other subordinate boards in 1832, and there was a determination not to reverse it.

For purposes of this volume a hard dividing line has to be drawn through the Admiralty, a ring fence round the organisation for production and supply; but it can only be arbitrary. At times we shall be forced to overstep it.

(iii)

The Limits of Admiralty Responsibility

Before taking a look at the Admiralty production organisation, perhaps it would be as well first to take a brief glance at the clear limits, above and below, which are regarded as bounding Admiralty responsibility.

First, it is a matter of government, not of admiralty, to lay down from time to time in broad terms the naval policy of the Crown: to decide the Navy must be adequate to do *this*, but not necessarily adequate to do *that*: adequate to fight any other two Powers together, for example, but not three: or, to fight the combined navies of Ruritania and Whipperginny but not the combined navies of either of them and Atlantis: or again, to declare that a major naval war is not likely within so many years, but may occur thereafter. Within the terms of this naval policy of the Crown it is then for the Admiralty to advise the Government as to the naval strength such a policy would require and to translate actual deficiencies into an annual programme of new construction and modernisation. But once more the final word does not lie with the Admiralty; nor even, this time, with the executive government. Since these programmes call for public expenditure they have to be laid before and voted by Parliament itself. Only within the precise and detailed terms laid down annually by Parliament was the Admiralty ever free, in peacetime, to build ships.

Secondly, the Admiralty did not latterly for the most part build warships and manufacture arms and equipment itself. Only a small proportion of new building took place in the royal dockyards, with resources and labour under direct Admiralty control; and only a few items, such as naval cordite and some torpedoes, were normally made by direct labour in Admiralty-run factories. Most new warships were built by contract in private shipyards, the dockyards being reserved mainly for repair and maintenance work. Most arms and equipment and machinery were likewise made by private firms. This prevalence of contract work marks the lower limit, then, of Admiralty responsibility, which used not in peacetime normally to extend beyond design and ordering in the first place, and then inspection. Some

items and components were 'Admiralty supply items'; but for the most part firms placed and saw to their own sub-contracts, bought their own materials, recruited and managed their own labour. Technical or industrial advice might be offered to the firms; but only when it was needed. In some industries of course—armour-plate is an example—firms were largely or entirely dependent on Admiralty orders, and in these cases the Admiralty took a measure of responsibility (particularly with war potential in mind) for seeing that orders were so placed as best to benefit the firms, within reasonable limits, as well as the Navy. Particularly this applied to shipyards: the placing of orders for warships could not without courting disaster be made blindly subject to competitive tender, the good of the industry as a whole had to be considered. But throughout the greater part of the range of Admiralty production competitive tender ruled (not always, as will be seen, with the happiest results).

These, then, are the upper and the lower limits. Above, the laying down of naval policy was the responsibility of the Government, and authorisation of the means required to carry it out was the responsibility of Parliament. Below, the actual making of ships and equipment was, with certain very important exceptions, the responsibility of private industry.

(iv)

The Admiralty Production Machine

Neither in the period of rearmament, nor on the outbreak of the second World War, was there any change in the administration of Navy material supplies comparable with the setting up for the other two Services of the Ministry of Supply and the Ministry of Aircraft Production. Such changes as were made in the Admiralty at that time, or followed in the course of the war, were merely variations on a theme—with a much fuller orchestration of course, and the belated tuning of certain discordant instruments. Consequently to describe now the pre-war organisation in any detail would only lead later to the dilemma in describing the war-time organisation of constant recapitulation or constant reference-back. Something perhaps must be said here of the mechanism governing policy decision at the highest level; but in regard to the technical and executive levels of the organisation it will be more convenient to postpone *description* till we reach the part of this volume devoted to the Admiralty entirely, confining ourselves at this stage to general preparatory *comment*.

In material matters, as in everything else, the fountain of authority within the Admiralty was, of course, the Board. The actual composition of the Board, its members and the distribution of its business

have been changed periodically, particularly as special responsibilities (the building and repair of merchant ships, for example) were added or taken away. But in modern times the main direct responsibility for naval production and supply rested continuously on two members, the Third and Fourth Sea Lords.

Indeed, the oldest surviving Board Office (although he did not actually become a commissioner until 1865) was that of the Controller of the Navy, latterly held by the Third Sea Lord. A post and title of 'Comptroller of the Navy' was created by Henry VIII in 1524, and a distinguished seaman appointed; his particular duty being then to see that any moneys the King spent on navy material were spent properly and economically. In modern times the post had lost its specifically financial preoccupations; but the Controller remained the superintending lord responsible for building and repairing H.M. ships and their offensive and defensive armament. Generally speaking he was responsible for all material forming an integral part of a ship or of its permanent equipment or its armament: for research and development, for production and for maintenance. Thus the work of what were loosely called the technical and specialist departments—the naval construction department, the departments of the engineer-in-chief, of the director of naval ordnance and so on—and also the more generalised directorate of scientific research, naturally fell under his superintendence. Equally naturally, where the work of a specialist division of the naval staff embraced material¹ that phase of its work fell under the Controller's superintendence, although the work of the naval staff as a whole came under the superintendence of the First Sea Lord.

There remained, however, a considerable part of the production field which came under the superintendence not of the Controller but of the Fourth Sea Lord. The latter was responsible for the provision, or for the production and provision, of a very wide range of naval stores and interchangeable equipment generally (with the exception of armament stores); for fuel, for victualling, and for medical stores. His responsibilities, however, were not precisely parallel with the Controller's—there was not a mere division of the production field. His principal title was 'Chief of Supplies': that is, his chief preoccupation was not with production but with provision, with storage, and with distribution at home and abroad to the bases and fleets. As well as what he 'produced', he 'provided' much of what the Controller 'produced'. Further, he was given general control of the transport, both by land and sea, of goods and men: his full title was 'Chief of Supplies and Transport'. The oldest and one of the biggest of all Admiralty Departments, the Naval Store Department—

¹ e.g. Directorate of Signals. See pp. 109, 110.

there was a 'Keeper of the Stores' in 1514—came under his superintendence, as did the Victualling Department (which was under a separate Board till 1832) and the Medical Director General's Department on its supply side.¹

The First Sea Lord, as Chief of Naval Staff, together with his immediate subordinates with seats on the Board, had no direct production responsibilities: nevertheless he played a very important part in relation to naval material: for he was the authority for formulating in detail the Navy's material needs. His Plans division, in the light of information from the Naval Intelligence division as to the strength and probable strategic intentions of foreign navies, had to advise him upon the strength and composition as well as upon the deployment of the Navy the Crown would need to possess if the naval policy laid down by the Government was to be carried out. Likewise, when any new class of warship was under consideration, or an existing class seemed to need modification, it was for the Tactical and Staff Duties division of the naval staff to collate the opinions of the other staff divisions concerned in particular fields, in order to furnish designers with a written description of the ship that was needed—its size, speed, endurance, strength, stability, armament and equipment: these 'staff requirements', of course, had to secure the First Sea Lord's approval. Later, when alternative sketch designs had been prepared, it was for a meeting of sea lords presided over by the First Sea Lord to choose the design to be proceeded with. The First Sea Lord was responsible, then, for deciding the numbers of ships of different types that needed to be built, and also for specifying the armament and equipment they should carry, their speed and endurance and other fighting qualities and for approving their design. His interest in production was the all-important interest of the architect's *client*.

The particular responsibilities of the junior ministerial members of the Board were habitually described in Orders in Council as being at the First Lord's discretion: but traditionally the Civil Lord was made responsible not only for buildings and works (thus Superintending Lord of the work of the Civil Engineer-in-Chief's Department), but as well for labour policy in respect of the very large numbers of men employed at the royal dockyards, the royal naval torpedo factory and other Admiralty establishments of an industrial sort—a labour force of the order of 50,000 men. Questions of financial policy, on the other hand, particularly those likely to excite the interest of Parliament, were the province of the other junior minister (he usually doubled the post of Parliamentary Secretary), the

¹ The Fourth Sea Lord, as Junior Sea Lord, carried also certain miscellaneous responsibilities with which this enquiry is not concerned.

Financial Secretary. Thus organisational 'trees' at that time commonly showed the Director of Navy Contracts as coming under the Financial Secretary's superintendence: but it was equally arguable that contracts business was really in the province of the Permanent Secretary, as Accounting Officer for Navy Votes.¹ In practice it was the Permanent Secretary who usually handled at Board level questions of contract policy; he only referred them to the Financial Secretary if they had a distinctly political tinge. Perhaps we might put it this way: it was for the Permanent Secretary to see that there were no grounds for scandal, and for the Financial Secretary to see that no scandal arose.

But the Permanent Secretary's influence was by no means limited to questions of financial propriety. As permanent head of the department, he was of course concerned in all questions of administrative organisation throughout the Admiralty. Even more important however in this connection was his function as secretary of the Board. Although it was not till 1940 that his name was first added to the Admiralty Patent as a Lord Commissioner in title, he had always in modern times enjoyed the status of a full member of the Board (for the Board was not necessarily conterminous with the Commission). Moreover he was the only permanent member of the Board. Ministerial members changed as often as governments fell or were reshuffled, and sea lords always itched to exchange their office desks for high naval command. Between 1920 and the outbreak of war, the average Admiralty 'life' of ministerial and sea lords both was between two and three years: Sir Oswyn Murray was Permanent Secretary from 1917 to 1936—nearly twenty years. Thus an experienced permanent secretary might attain a position of great if intangible influence in all Admiralty affairs: an influence moreover that might legitimately be exercised to the full in virtue of his position as co-ordinator of all Board business.

It should be borne in mind, however, that before the war this influence, so far as it concerned production and supply, should be regarded as personal to the secretary rather than as a function fully rooted in the secretary's department. In that department he had a 'Military branch',² with a roving commission covering all questions of policy affecting the work of the naval staff—particularly the organisation of the fleet, movements of ships, and relations with

¹ See pp. 163, 176.

² In Admiralty usage, a secretariat 'Branch' was normally an assistant secretary's charge, equivalent in status to a naval staff 'Division'; a secretariat 'Division' being a group of one or more Branches whose work, but not internal administration, would come under the guidance of a particular principal assistant secretary. A submission to the Board arising out of daily business would be signed by or 'for' the title of a Head of Branch (not in the name of any lower authority), and would then go to one or more appropriate principal assistant secretaries for comment before reaching the Board itself.

foreign Powers: on the naval personnel side he had three branches dealing with questions affecting officers and men of the Royal Navy and their discipline and welfare: on the establishment or 'office' side, other branches administered the organisation and staffing of the whole Admiralty Department and its outport offices: but the only secretariat branches dealing administratively with production questions, in pre-war days, even indirectly, were the finance branches. True, since 1932 practically every production question of importance passed through their hands, because practically every such question had its financial aspect, and on occasion they might be called on to furnish more than financial advice: but it was the financial aspect which normally concerned the branches, not what we have come now to call 'production' policy. Again, from time to time an assistant secretary—known as the A.S.(C)—might be appointed as civil adviser to the Controller; but this too was a personal appointment, drawing comparatively little nourishment from any secretariat branch. True, too, that there was a branch called 'Labour branch', but it was only concerned with the pay and the conditions of work of men in direct Admiralty employ at the royal dockyards and elsewhere: it had no interest in the work they did, nor even in the *supply* of such labour. It had no interest of any kind in contractors' labour. In short, Labour branch work was establishment work with only this difference, that it dealt with industrial instead of office workers: it reported (latterly at least) through the head of the establishment division. Again, there was at one time a 'Ship branch': but this was little more than a correspondence section, handling correspondence with contractors on behalf of the Director of Naval Construction usually at an executive level.

On the production side, then, it was normally financial control and that only which brought questions within the purview of any branch of the secretary's department. But it is inherent in financial control that it is a restrictive rather than a constructive influence. This tradition was to prove a serious handicap when the time came later, under a war economy, for the secretariat to play a rather more positive role in production questions. For the ingrained suspicion among established Admiralty production authorities (in contrast to naval staff authorities, whose relations with Military branch could be almost affectionate) that the character and habit of the secretariat branches *they* were used to was to 'go and see what little Tommy is doing and tell him not to' took a lot of killing, as it turned out.

We have seen, then, how responsibility for deciding questions of policy, the prerogative of the Board, was concerted between particular superintending lords. Executive and technical responsibility is responsibility of a different kind, and we must of course look for it elsewhere.

Lowering the line of sight below Board level, the eye was met (after 1912) by an array of a number of independent departmental directors. These headed technical departments (responsible for design and inspection) or provisioning departments (responsible for quantity ordering and distribution). These were the 'production authorities' referred to above: but in those days they were seldom called on to act as 'production' departments in the full war-time sense—management, in that golden age, was the responsibility of contractors alone and the Admiralty's direct contacts with material in the making were mostly confined to inspection.

Each director had the privilege of working to his own standing orders from the Board. His 'Board Instructions' were his charter—issued by the Board, be it noted, not privately by any single superintending lord: a measure of his personal professional and executive responsibility, and a definition of his sector of the field. None the less, we shall not even then appreciate properly the status of a major departmental director in the Admiralty, if we conceive the building, arming and equipping of the fleet as a single whole which was ever at one time arbitrarily parcelled out between them by higher authority. It is a truer picture to conceive (even at the peril of exaggeration) an assembly of professions, each with its own specialist activities which together *added up* to the building, arming and equipping aforesaid. In civil life there was, after all, at no time a decision taken deliberately to divide the care of the human body between the provision merchants, the doctors, the tailors and the architects: each of these professions developed on its own lines—but there is very little which, between them, they do not provide. Likewise, these Admiralty Departments had come into being independently and at different times. Usually each was as old (in one form or another) as the particular naval need which had engendered it. Some of them were older than the contemporary shape of the Board of Admiralty itself, and their directors—the 'Principal Officers' under the Board—were the lineal descendants of the Commissioners of the Navy Board which, until 1832, had enjoyed its own Patent from the Crown. In short, these Departments were organisms rather than organisations—covering between them the production field more like naturally grown trees filling a wood than like hewn timbers in a structure. Their order and symmetry had not been imposed from above but had grown up with the departments themselves out of the need over many generations to work with other Admiralty authorities in peace and usefulness.

Thus each department developed a tradition and a marked individual character of its own. You could almost tell an officer of one from an officer of another, off duty, by 'the cut of his jib', as a Wykehamist could be told from an Etonian. For the lines on which

each department was recruited and organised were dictated rather by tradition and the nature of the work it had grown to undertake, than by conformity to any catholic plan. Some of them recruited their higher staff from civilian sources: here, whether or not professional qualifications were concerned, service in a particular department would usually be lifelong. A young man entering the Department of Naval Stores for example, though entering the Admiralty by the same non-technical door as a budding Contracts officer or Armament Supply officer, would expect to remain with Naval Stores till retirement: he might cherish dreams of becoming Director of Stores (with a knighthood too, perhaps): but he never became Director of Navy Contracts or Superintendent of Armament Supply, in the way that officers in the 'administrative' branch of the Civil Service were moved about: far less could he become Director of Naval Construction or Electrical Engineering, purely professional departments with different doors of entry altogether. There were other departments, on the other hand, which drew their supervisory staff from engineer officers or specialist executive officers of the Navy. In these, a different system prevailed: appointments were for strictly limited terms only, since every naval officer spends the greater part of his career in appointments at sea. Thus in the naval directorates, unlike the civilian directorates, there was a constant coming-and-going—between sea and shore: a constant exchange as it were of the customer and the man behind the counter.

These two were of course entirely contradictory administrative principles. For the former it was chiefly argued that it gave a man a lifetime to learn his job to perfection: for the latter, that it maintained the closest possible contact between design and use—designing guns one year, fighting them at sea the next. But nevertheless critics have been known to object to both extremes: that the former system could breed a parochial view—the director with no outside experience had no yardstick to rate his department's efficiency against others: as for the latter, that it might take a director his whole term of office to discover how his department *did* work—by the time he was ready to consider how it *should* work it was time for him to go.

As we have seen, most of the work of most of these departments came under the superintendence of the Controller. The practice, therefore, of dubbing the majority of them 'Controller's Departments'¹ and the remainder of them 'Fourth Sea Lord's Departments' was near enough for usage; but it will already be apparent how important it is for purposes of this analysis not to forget the element of misnomer the practice contained. Strictly, it was not the

¹ For a considerable period prior to 1912 they were actually lumped together in a single 'Controller's Department', but the conglomeration does not seem ever to have been more than notional.

department but some or all of the work it did which belonged to the Controller or the Fourth Sea Lord.¹ For example, naval construction would seem to be work entirely under the Controller's superintendence; yet the Director of Naval Construction was not exactly the Controller's personal subordinate, his official description was 'principal technical adviser to the *Board*'. Any member of the Board requiring his technical advice might call for it direct, it appears, provided the occasion of the enquiry lay within his and entirely outside the Controller's sphere of interest. Again, in the pre-war Signal Department much of the work was virtually naval staff work; only the material side (the production of wireless equipment and so on) came under the Controller's ægis at all. Again, consider the Fourth Sea Lord's Naval Store Department. It was sole production and supply authority over a wide range of articles requiring no special technical qualifications, and was responsible (under the Fourth Sea Lord) for organising distribution of these stores to the fleets and shore establishments. But it was also the provisioning authority—determining quantities to be ordered and undertaking distribution of the finished article—for many items coming within technical and production jurisdiction of one of the Controller's technical departments. Moreover distribution in this case might not be as a store to the fleet at all, but as a component to a ship under construction, a ship still in the Controller's hands. In sum, certain phases of the work of this 'Fourth Sea Lord's Department' were so closely knit in with the work of certain 'Controller's Departments' as severely to strain the hypothesis of exclusive allegiance of any department to one or other of two parallel authorities.

Theoretically we might group the departments according to their material interests: for example, we might group those concerned with shipbuilding and machinery and fitting out: those concerned with offensive armament: those with more miscellaneous interests such as stores, signals, charts or compasses. In fact there was almost no diagrammatic grouping of this or of any kind.² On the other hand, in contrast to their formal independence of each other in organisation we find the closest possible contact throughout in the course of their work: for the designing and building and armament and equipment of a warship was an intricate complex in which almost every one of them had a co-ordinated part. Indeed it seems to have been felt that the freedom of this contact was best served by the lack of more formal ties. Their work moreover entailed constant contact with the naval staff as well as with each other. In the formulation of the 'staff requirements'³ their technical advice would be

¹ See p. 5 for a statement of the underlying doctrine.

² See pp. 194 *et seq.* for proposals to effect such a grouping.

³ See pp. 10, 90.

needed from the first, if the ballooning ideal desires of the naval staff were to be kept down to earth. The Director of Naval Construction must be at hand with an early warning, if the speed and endurance contemplated were mutually incompatible or equipment was likely to imperil seaworthiness: the Director of Dockyards, if size or draft raised peculiar difficulties in berthing and maintenance. The gunnery division of the staff must consult the Department of Naval Ordnance about *available* weapons. In the completed design there would always in the end have to be a considered compromise between ideal strength, ideal speed, ideal hitting-power; and as building progressed moreover there would have to be a further series of compromises between the utmost modernity of equipment and getting the ship finished at all.

To sum up. A system which has thus developed functionally rather than artificially can be trusted (as in the civil analogy quoted) to work better in practice than any stranger would guess from a diagram. It will have particular qualities and perhaps defects dictated by its nature. Within its limits it will prove for the initiated hand a fairly flexible tool of policy. One can expect to find inherent in it a vigour and independence: a detailed erudition in its own problems and techniques and the readiness born of expertise to take full responsibility: a multiplicity of traditional and pragmatistical points of contact far more numerous than any organisational diagram could record: an adherence to a traditional spirit rather than to red tape: a preference perhaps for adapting existing institutions rather slowly to serve new ends instead of setting up new institutions. It follows however that one must expect to find it almost completely impervious, as a system, to all attempts at radical alteration imposed from above.¹

(v)

A Joint Ministry of Supply?

Even recital of the names of these technical and provisioning departments, of which the Naval Construction Department was after all only one, must arouse the surmise that the calls made by the Admiralty on industries other than shipbuilding were in fact very considerable. It is probably safe to say that little more than a third of the work done in building a warship, even in pre-war days, was actual shipyard work: two-thirds of the effort was spent in 'inland' industries, on armament and equipment and components. These were specially

¹ See pp. 195, 199. It must be borne in mind that the Controllorship of the Navy was a short-term appointment, an interlude in an Admiral's tour of commands. For the advantages and disadvantages of this cf. the remarks on the directorship of the naval departments, on p. 14 above.

designed and made for naval uses, it is true; but they were built often in the same engineering and electrical works that supplied the Army and the Air Force and civilians. Had this not been so, had Admiralty production interests been really confined (as the layman might perhaps suppose) to the shipyards with their specialised facilities and labour, there would of course have been almost no competition for general production resources even in wartime between the Navy and the other Services. But the shipyard was already, in a sense, merely an assembly shop; as warships became more and more 'floating boxes of tricks', so this two-to-one ratio had even tended to widen: under the congested conditions of wartime, competition with the other Services was inevitable.

The Government were fully alive to this danger. In the previous war this competition had amounted to a major scandal. Early in the inter-war period, therefore, the conception of a joint Ministry of Supply to take over the material needs of all three Services came up for discussion. But this would have entailed severing from the Admiralty all the departments concerned with production and supply for the Navy, and it hardly needs saying that the Admiralty regarded the proposal with abhorrence. The War Office, its historic pre-occupation being with *men*, might suffer an amputation of the kind without risk to the organisation as a whole: but for the Admiralty, with its preponderant interest in *material*, the knife would have to pass right through the middle.

Some of the arguments put forward by the Admiralty¹ at that time were, perhaps, a little disingenuous; particularly, as we have just seen, the argument that their shipbuilding interfered with nobody else and concerned nobody else. But even if it had been openly admitted that in wartime Admiralty work (though much of it was in the hands of specialist firms) would in fact be bound to compete for common industrial resources with work for the other services, did that necessarily call for a unitary Ministry of Supply? With wisdom after the event, we may perhaps feel that it did indeed call for a Ministry of *Production*, such as was actually set up in 1942—a central department, without supply responsibilities of its own, to arbitrate and to allocate disputed industrial resources. But it might still be argued that the case for a common *supply* ministry would only hold water if it could be shown not that the three Services competed for the same capacity, but that they competed for the same equipment—equipment which could be manufactured in bulk and afterwards distributed for the several Service needs. But of what, in fact, did such 'common equipment' consist? Hardly anything used in a ship was precisely similar to its shore counterpart—even when

¹ For a full account of the discussion see Chapter IV, particularly p. 77.

there was a shore counterpart at all. For example, the safety standards of naval explosives had to be the highest possible: the Army could keep its ammunition in a dump, but the Navy kept it, so to speak, under the cabin table. Even the electric light bulbs in a ship had to be specially designed and made if they were to stand, without blacking out, the enormous shock of big guns firing.

Again, the assembly programme of a modern warship's construction was a most complex business, requiring such particularly close adherence to a time-table that the Admiralty was most reluctant to trust even part of it to any outside authority. After all, if a single gun-mounting for the Army was late, it might mean a proportionate reduction in one battery's hitting power, but it did not mean that a whole division must stay in barracks! But if one of the principal gun-mountings of a battleship was late it meant just that; for the main gun-mountings had to be built in at a certain early stage, and without them work on the entire ship was held up. For a delay in a single gun-mounting, the whole ship might be still in the builder's hands at a time when her employment at sea was vital.

At the time, of course, the Air Ministry followed the Admiralty lead and stood out, retaining their own responsibility for production. Thereafter, however, the paths of the two departments diverged: for shortly after the outbreak of war a separate Ministry of Aircraft Production was set up. It would be interesting to consider why the two Services handled their problems differently, for on the face of it there would seem to be greater similarity between the situation as it affected the Air Force and the Navy than between either of them and the Army. But perhaps the real answer is that the similarity did not go very deep. For one thing, the M.A.P. was called into being to effect an enormous expansion of production; but there could be no question of expanding naval production in wartime proportionately with aircraft production. The shipyard might be only an assembly shop, but nevertheless shipyard capacity must remain a limiting factor on the output of ships, and in these islands at any rate shipyard capacity could not be suddenly and drastically expanded, as airframe capacity could, without an intolerable cost in economic upheaval. Secondly, the production organisation for building aircraft did not perhaps need to have quite as many and different and intricate links with other departments of the Air Ministry. There is this fundamental difference between an aircraft and a ship, that an aircrew occupies its aircraft at the most for a few hours at a time; the rest of their lives is lived outside, on the ground. Thus after all an aircraft is essentially merely a weapon, as a tank is. But a ship is a microcosm.

CHAPTER II

WAR OFFICE

(i)

Reorganisation for Rearmament

THE ORGANISATION of supply¹ for the Army has of course a history which extends far beyond the origins of that comparatively recent institution, the War Office. The Board of Ordnance was established in the fifteenth century, and it was from the Board of Ordnance, and from the office of Master General of the Ordnance, that the War Office organisation of the inter-war period was descended. The line of descent is clear, although it is true that a gap exists. The original Board of Ordnance was abolished in 1855, and the old ministerial office of Master General died with it, and was revived only as a result of the Esher Reports of 1904.² The new Master General was not, of course, a minister, but a high-ranking officer serving as a member of the Army Council, and thus sharing the responsibilities laid by statute upon that body.

At the opening of the rearmament period in the 'thirties the Army Council consisted of three ministerial members, four military members, and one civilian member. The ministerial members, in addition to the Secretary of State, were the Parliamentary and Financial Secretaries. The military members were the Chief of the Imperial General Staff, the Adjutant-General, the Quarter-Master-General, and the Master General of the Ordnance. The civilian member was the Permanent Under Secretary. These eight members of Council were jointly responsible for the whole task of preparing the Army for war, and the task of provision, at this date, fell mainly upon Master General of the Ordnance as the 'supplier' and the Chief of the Imperial General Staff as the 'user'.

This task of provision was divided by the War Office into three main stages. In the first stage the general characteristics of the types of weapon required to satisfy the technical needs of a given disposition of forces were stated and the scales of the reserves necessary to meet the requirements of operations and of wastage were indicated. The

¹ The word 'supply' is used here and generally throughout the volume in its wider sense as covering all the material of the armed forces. The word 'supplies' has a technical meaning for the War Office; it generally covers food, fuel, petrol, oil, water, forage.

² Cmd 1932, 1968 and 2002.

second stage consisted of advising those responsible for the first stage about the technical possibilities and developments, preparing designs, and the holding of trials; it also included responsibility for the physical production of the weapons by placing the necessary manufacturing contracts, and the inspection not only of the finished product but also of components during manufacture. The third stage covered transporting, storing, repairing and issuing of the products. Some such process takes place at all times in the supply of stores to any fighting service whether there be a separate supply department or not, and in the War Office of 1934 it is broadly true to say that the General Staff were responsible for the first stage of the business and the department of the Master General of the Ordnance for the second and third stages. We shall see in fact that a division of labour along these lines held good even when the 'supplier' side of the responsibility was taken out of the War Office.

The responsibilities of the Chief of the Imperial General Staff were discharged, until 1937, by an organisation which, in its simplicity, bore the marks of post-1918 retrenchment and continued financial stringency. It consisted of three directorates, those of Operations and Intelligence, Staff Duties, and Military Training. Each of these directorates had its separate responsibility in determining the quantity and nature of the weapons required: Operations and Intelligence forecast the type of warfare for which provision should be made, and provided evidence of the opposition anticipated; Staff Duties prepared the general specifications for weapons themselves and stated the quantities needed to satisfy the Order of Battle which they had drawn up; and Military Training was responsible for training the troops in the tactical doctrine of the employment of the weapons produced.

On the supplier side the Master General of the Ordnance was, by 1934, provided with four directors to assist him in discharging his responsibility of producing the required quantities of the best possible weapons. The directors were those of Artillery, of Mechanisation, of Ordnance Services and of Ordnance Factories. 'Mechanisation' was a title which had appeared only in 1927; despite the importance of tanks and transport in the first World War a second director of artillery had carried responsibility for them up to that date, and organisationally the Director of Mechanisation was and remained the junior partner. Nor was the organisation clear-cut and free from anomalies; it was only in 1934, for example, that the Director of Artillery assumed responsibility for small arms and in exchange the Director of Mechanisation took over the responsibility for engineer and signal equipment. Moreover it was the Quarter-Master-General, and not the Master General of the Ordnance, who was responsible both for the initial provisioning, and also for the inspection, storage, and

so forth of Royal Army Service Corps and medical vehicles, and these responsibilities he retained until after the outbreak of war. The realm of the Director of Ordnance Services falls in large part outside the scope of this study. His supply responsibilities were confined to 'general', as opposed to 'warlike' stores, and in any case he was concerned as much with storage, distribution, and repair as with supply. His province was, in fact, much the same as that of the Fourth Sea Lord in naval matters. Operating through the Royal Army Ordnance Corps and employing in addition a considerable body of civilian industrial personnel—some 7,000 at the outset of the rearmament period—he was responsible for the ordnance workshops and depots in which all the multifarious operations of repair, inspection, storage were carried out. With the Director of Ordnance Factories we are more directly concerned. The Royal Ordnance Factories, as an institution, are much older than the War Office, and the origins of the Woolwich group are to be found in the seventeenth century. At the onset of rearmament the Factories employed between 8,000 and 8,500 people,¹ and were continuing to play their long-established role of providing artillery and equipment to the Services. They had accepted new users—colonial for example—and new weapons, such as tanks and aircraft bombs, but they continued throughout the rearmament period and for that matter throughout the war to be directly administered by the state. For this administration the Director of Ordnance Factories was responsible. His task was analogous to that of the general manager of an industrial firm controlling a number of factories, and dealing with all the problems of production, capacity, labour, costs, and so on. This then was the picture of the War Office organisation for supply in the year 1934: a small and indeed exiguous General Staff organisation for provisioning; a supply side consisting of the Master General of the Ordnance assisted by four directors; and some residual responsibility still falling upon the Quarter-Master-General.

The supply problems with which this organisation had been called upon to deal up to 1934 had in the main been problems of managing a trickle of production hardly large enough to keep the wheels turning. Britain's annual expenditure on weapons was not large, but such as it was less than a tenth of it was upon army weapons and war stores. This averaged about £2 million, and sufficed to keep in being a regular army of four divisions. The mechanisation of this army in accordance with the doctrine of a small but well-equipped force was accepted policy, but by 1934 the implementation of the policy had not proceeded beyond an elementary stage. Mechanisation of the infantry, for example, only began in that year. The supply of tanks,

¹ See Gordon, Hampden. *The War Office*, Putnam (The Whitehall Series), 1935.

in industrial or strategic terms, was negligible. Nor was the state of development either of tanks or of other weapons more satisfactory. The weapons in existence were last-war weapons; the field gun in use was the old eighteen-pounder; there was no modern tank in use. In some fields the Army was simply not equipped at all; there was for instance no specialised anti-tank gun.¹

Yet if, by 1934, the scene had changed little since 1924, changes were being prepared, and much greater changes were in mind. The 'ten-year rule'—the Cabinet instruction that no major war should be expected for ten years—had been repealed in 1932, and proposals for the re-equipment of an Army of five divisions were being discussed in the new Cabinet committees which had been set up to deal with supply problems.² Territorial support, and consequent further re-equipment, were also officially envisaged. The decisions that were made, and the steps that were taken, are recounted elsewhere in this series;³ here, we must look upon them through the eyes of those responsible for organising the War Office to deal with its share of the responsibilities. It was becoming clear, in 1934, and soon became clearer, that the War Office would have to deal with problems of industrial capacity and potential, with the opening of new sources of supplies, with the education of industrialists and business men in matters of military requirements, and with the education of its own officers in the methods of large-scale industry and business. For this purpose the existing department of the Master General of the Ordnance was not well fitted. Barely large enough or well enough staffed for the routine maintenance of a small peace-time army, it now required assistance unless the whole rearmament programme was to break down from the start through lack of adequate control. This was well recognised; and by none more clearly than by those who served in the department. Each of the four directors was deeply engaged in his own particular function and only at Council level could there be any far-sighted co-ordination. And even for this there was no adequate secretariat provided on the establishment. The Director of Ordnance Services was not deeply concerned with industrial matters, and of the other directors, the Director of Ordnance Factories was engrossed in the expansion of his own resources. The Directors of Artillery and Mechanisation were both first and foremost soldiers, who did not pretend to the kind of training and experience necessary for mobilising industry; they had in any case responsibilities of a staff nature to distract them from this task. Nor was the Director of Army Contracts in a position to fill the gap, since he had not the technical knowledge, and more important, from the

¹ See M. M. Postan: *British War Production* in this series (H.M.S.O. 1952); p. 7.

² See Part I, Chapter IV.

³ See M. M. Postan: *British War Production*, *op. cit.*, Chapter II (iv) and later.

point of view of organisation, since he served under the Finance Member of the Army Council, he was not well placed in regard to the Master General of the Ordnance.

The position of the Director of Army Contracts was indeed the key to the War Office administration of production at this period. That the Director of Contracts should be independent of the 'production' authorities was a War Office doctrine which had been evolved over a long period and frequently reaffirmed. Even before the contracts department of the War Office had been set up in 1855, its predecessor the Board of Ordnance had maintained a civil contracts section which was separate from the sections dealing with design, quantities or inspection. In 1901 the Dawkins Committee had referred to the administrative advantages derived from maintaining a separate contracts department. From 1904 to 1907, as the result of following the recommendations of the Esher Committee, a decentralised system had been adopted which did away with the contracts department as such, but this was not considered to be a success, and its abandonment naturally greatly increased the prestige of the alternative scheme which was then re-adopted. In 1915, some, but not all, sections of the contracts department were transferred to the Ministry of Munitions, and in that department came under a Surveyor-General of Supply who combined responsibility for supply and purchase. The dissolution of the Ministry of Munitions led to the return of all responsibility to the War Office, and provided an occasion for discussion of the responsibility of members of the Army Council for contracts. There was a certain amount of disagreement among the military members of Council on the subject, but in 1921, when the war-time office of Surveyor-General was abolished, the Director of Army Contracts was placed under the Finance Member, not only because it was considered that contracts ought to be subject to immediate ministerial control, but so that the Director might be beyond even the suspicion of being in collusion with the supply branches. War Office doctrine in this respect was once again endorsed by an interdepartmental meeting held at the Treasury in February 1936, which foresaw grave dangers in allowing economy to be overruled by a dominant production interest: 'the man who is forcing on production is the last man to whom settlements of prices should be trusted'. The supply branches on the other hand were apprehensive that a parochial outlook on the contracts side and a too exclusive attention to the relative financial attractions of possible different contracts might cause the special production interests—for instance willingness on the part of firms to accept educational contracts—to be disregarded. The question was difficult and delicate, and a committee which was set up, under the Finance Member, Sir Victor Warrender, to consider supply organisation, discussed it at

length. Major changes in organisation were considered by this committee, no fewer than six different schemes of reorganisation being put before it. One of these was radical; it proposed removing the production responsibilities of the Master General of the Ordnance to a new supply department within the War Office, leaving him responsible for research and development, design, some provisioning, and inspection. This proposal however was rejected, and the committee's report also failed to make any radical proposals about the Director of Contracts. The report did however propose to give the Master General of the Ordnance responsibility for planning functions which were to be operated on his behalf by the Director. Thus the anomaly—as some thought it—of the Master General's having to work through a director whom he did not control, instead of being removed, was made if anything more striking.

Yet the continued doubt of the War Office about the wisdom of putting contracts responsibility into supply hands did not mean any lack of awareness of the need for a new kind of planning, or any failure to realise that this planning was as closely associated with contracts as it was with supply. If the Warrender Committee in the end had not recommended radical changes, it had aired the possibilities, and in its minority reports had revealed the extent to which opinion diverged. It was becoming increasingly clear that there ought to be some body capable of providing the contracts and design authorities with the kind of information about industrial capacity which they both required. The Warrender Committee had recognised that in design and specification close association with capacity was very important, and had remarked that a military design might be susceptible of modification to facilitate production. In other words the idea of design-for-production had appeared. Who was to do this sort of planning? By the end of 1935 a great deal of anxious thought had been given to this subject in the War Office, but it had not yet achieved a definitive statement.

It was left to Lord Weir, who had been called into consultation by the Government, to give it form, force and effectiveness. Lord Weir had played a prominent part in munitions production in the first World War, and had a long and profound experience of the workings both of government and of industry. In an important paper which he put up to the Defence Policy and Requirements Committee in January 1936 he surveyed the field and drew certain general conclusions. His memorandum covered the whole field of armament production, naval and air as well as military, but it was upon the problems of the War Office that he concentrated. They were, he pointed out, exceptionally severe. The Admiralty had already in being their own body of professional contractors; the Air Ministry, although faced with new problems, had already made a successful

beginning in adapting their organisation to the new conditions. The War Office on the other hand were facing 'an entirely novel task for which their Supply Machinery had not been designed'. Lord Weir put his main recommendation as follows:

That there must come into existence at the War Office a Munitions Supply Department covering every phase of supply, able not only to buy something which someone makes and desires to sell under normal commercial procedure, but a Department with sufficient technical, production, inspectional, commercial and financial experience, coupled with the spirit of 'drive', to enter into and settle promptly, effective business negotiations with, for example, a hundred selected firms under which these firms will, mainly in a spirit of national service, create new and adapt existing facilities to enable them to supply highly technical products of which they have perhaps no previous experience. In addition to this the Department must make the fullest use of the professional sources of supply and be responsible for the State Factories and their expansion . . . this is the crux as regards immediate constructive action. Somehow the War Office will have to adapt and rearrange its internal machinery so that it will have a Munitions Supply Department with a Head responsible for Munitions Supply in every phase and responsible as a member of the Army Council to the Secretary of State for carrying out this programme.

Lord Weir was also anxious that the War Office should have, like the Air Ministry, in order to check excessive profits, a small committee of prominent business men associated with the Director of Army Contracts, and that a statistical section should be set up to supply progress reports relating promises to performance for discussion at weekly meetings. A note of urgency and realism ran all through this memorandum, which in its spirit and even its phrasing set the tone of many other memoranda which appeared during the following years. Nothing in it perhaps was more remarkable than its statement that 'the conditions are in some measure akin to war conditions', a grim and blunt remark which in January 1936 was ahead of its time.

War Office organisation for supply had now become an issue of the highest Defence policy, and decisions had to be awaited. The most important immediate result inside the department lay in decisions to set up, first, an organisation for supply and production of munitions under the Master General of the Ordnance, with its own directors and secretariat representation, and secondly the creation of an additional branch of the Master General's organisation to co-ordinate questions of general policy affecting more than one directorate of his department. It was in the Committee of Imperial Defence that action was taken which was to prove decisive. The Committee, upon the instructions of the Prime Minister, set up a sub-committee under the chairmanship of the Permanent Secretary

of the Treasury to consider War Office organisation and advise on desirable changes in order to ensure the most rapid possible execution of the Government's plans to recondition the Army. In their report the committee stated that:

Owing to the increased programme thrown on to him in connection with the Deficiency Programme of the Army . . . the Master General of the Ordnance during the last six months has been unable to devote any time to his other duties.

These 'other duties' were nothing less than research and experiment, design and demand, and inspection of war materials, and this finding made it clear that radical measures could not be further delayed. The most important of these was that the Master General of the Ordnance should be relieved of his responsibility for the production of warlike stores, which should now become the province of a Director General of Munitions. Under the new Director General, who should be a member of the Army Council, would come the Director of Ordnance Factories and his organisation, and the munitions branches of the contracts department. The Director General's was to be a full-time appointment and he and all his staff were to be accommodated in a single building near the War Office. These were the natural—it might be said that they had become the obvious—steps to take to put the War Office supply organisation upon a rearmament footing. They did not however take all production responsibility out of military and put it into civilian hands. Supplies¹ and stores covered by Vote 6 of the Army Estimates—for example road transport—were to be obtained by the Quarter-Master-General as before, and clothing and general stores were to be obtained by the Master General of the Ordnance. Nevertheless what was proposed was a great step forward, and the War Office was ready for it.

This time there were no half-measures. Already on 17th June, in anticipation that the recommendations would be accepted, the Office of Works had been asked for accommodation for at least 500 so that the new Director General and his staff, as well as the non-munition branches of army contracts, could be housed together. The recommendations were approved by the Committee of Imperial Defence on 25th June and by the Cabinet on 1st July, the Secretary of State for War being left to make the appointment of the Director General. The Prime Minister's Committee had recommended that the nominee should be 'an engineer of proved experience', with 'drive' yet 'able to work with the official staff without friction', and possessed of a name of sufficient weight to give assurance to the public. On

¹ In the technical sense—see footnote (1) on p. 19.

23rd July the post was offered to Engineer Vice-Admiral Sir Harold Brown, Engineer-in-Chief of the Navy, for a period of three years, and he took it up among many signs that a new era was being inaugurated. Two new directorates were formed to work under the Director General; one, of industrial planning, combined the functions previously performed by the directorates of army contracts and ordnance factories, and the other, progress, relieved the Director of Army Contracts of the responsibility of watching the progress of munition contracts and also reviewed designs from the production point of view. Lord Weir's recommendation that there should be a statistical section was met by the formation of a small co-ordinating section (M.P.C.) directly under the Director General. Of this section much more was to be heard.

In organisation the War Office was now really equipped to meet its obligations. A good deal of trouble was taken in drawing up a clear statement of the division of responsibility. The Master General remained responsible for research, design, and all stages up to 'demanding', while the Director General was responsible for supplying the articles demanded. The Director General accordingly took over the seat occupied by the Master General on the interdepartmental supply committee, and became in effect the Principal Supply Officer of the department. The Master General remained responsible to the Permanent Under Secretary for estimates, and financial control in general remained unaltered, with the Director General assuming responsibility for the financial powers of the directors of army contracts and ordnance factories. The Director of Army Contracts retained his general responsibility for the army contracts, but he ceased to be responsible for finding or watching munitions capacity. Once the Master General had placed his demands he was free of further supply responsibility until the time came to inspect the finished product. However, supply was not the whole of the provision problem; the Director General could hasten the production of munitions by eliminating delays after demands had been formulated but he could not of himself 'provide a remedy for delays before the demand stage'. At least one source of delay was the General Staff itself upon which the first stage of provision so largely depended. This side of the War Office organisation was not placed on a firm footing until 1942, some three years after the Director General, who had by then absorbed almost all the functions of the Master General of the Ordnance, had become with his department a major part of the Ministry of Supply.

Lord Weir having voiced the aims and anxieties of the War Office in 1936, that department was able to make some moves towards achieving the one and ridding itself of the other, although within what were still narrow limits of Government policy. The scale of

rearmament approved for the Army in these two years was not after all such as to make the War Office a very large claimant for industrial potential, or to raise very formidable problems of capacity. These were still years of 'limited liability' for rearmament as a whole, and the Army was not the favoured receptacle of the expenditure that was approved. The Minister for the Co-ordination of Defence made it very clear in 1937 that co-operation on land with allies abroad could not come high on the list of rearmament priorities. Yet in the War Office the trend of events was all to giving more authority to the representative of large-scale industrial rearmament—the Director General of Munitions Production—and removing it from the military controller, the Master General of the Ordnance. There appeared in the War Office to be a strong case for a single authority who should control both the second and third stages of provision, that is to say, development, demand, production and inspection, and who should be able, if pressure of events warranted it, to subordinate other considerations to those of production. And this in fact happened for when Sir Hugh Elles' term of duty ended as Master General of the Ordnance, the appointment was allowed to lapse and the whole of his department, under a newly made Deputy Master General, passed on 1st January 1938 to the control of the Director General of Munitions Production. The beginning of 1938 saw a further re-organisation consequent upon the new status of the Director General.

With the whole of munition production—except for a preliminary statement of the requirement by the General Staff—in the hands of the Director General there was no longer any real need for a separate director of progress; the work could be distributed to those directly concerned. The power of the Director of Army Contracts had been considerably weakened when he passed under the control of the Director General of Munitions Production and had lost the duty of progressing contracts, but the abolition of the directorate of progress and the assumption by the Director of Artillery and the Director of Mechanisation of those same duties was a further triumph for 'supply' at the expense of 'contracts'. At the same time the additional work thrown on the Director of Mechanisation and the increased tempo of rearmament as a whole was reflected in the creation of two deputy directors of mechanisation—one to deal with engineering and signals equipment and one with vehicles. A deputy was provided for the Director of Artillery in October 1938.

By 1938, however, the centre of interest had shifted. The question was no longer what steps the War Office should take to put its supply organisation on a 'rearmament' basis, but whether the organisation for the supplies of the Army should be handled by the War Office at all. The arguments in favour of a separate Ministry of Supply were indeed well-worn by 1938, even though they were being put in

Parliament and in the Press with an ever-increasing urgency. They were based, however, upon a history which lies outside the War Office—that of the interdepartmental measures which were being taken to organise supply in the pre-war period. The approach to a Ministry of Supply, although it is in a sense the history of the supply side of the War Office during 1938 and 1939, is accordingly told elsewhere.¹ Only the organisation of research and development—in so far as the main steps have not already been indicated—remains to be covered in this narrower departmental context.

(ii)

Research and Development

The principal figures responsible for the development of weapons in the War Office in the rearmament period are already familiar; they were the Master General of the Ordnance and the directors of artillery and mechanisation. Responsible for supply, they were responsible also for development, and it was not until 1938, when a director of scientific research was appointed to share their responsibility, that any post existed at this level with an exclusive responsibility for development as against supply. Great as was the responsibility resting upon these officers, the organisation is better displayed in committees and boards than in the responsibilities of individual officers. At the highest level there was the Research Committee, presided over by the Chief of the Imperial General Staff, and responsible for providing a framework of policy in which research and development should proceed. This body, which was later known as the Specification Committee, met as the occasion demanded. Below this policy-making level, in the inter-war period, the Director of Artillery and the Director of Mechanisation were each advised by two committees.

Let us consider first those which are associated with the Director of Artillery, that is to say the Ordnance Committee and the Chemical Warfare Committee. Both of these had responsibilities going beyond the War Office; each in its field covered the requirements of all three Services. The former was officially described as 'a consultative body of experts dealing with all matters connected with construction and efficiency of guns, ammunition and explosives, and with progress in artillery science'. Although it was a consultative body, however, the Ordnance Committee was required by the terms of its instructions to undertake research work and investigation as required by any of

¹ Part I, Chapter IV (iii).

the three Service departments, in the field of metallurgy, the design of guns and ancillary and associated equipment, and thirdly propellants and explosives. The Committee was, moreover, within its field of interest, to 'initiate' any question involving research, experiment and investigation and to 'originate' the consideration of questions affecting progress in artillery science. Although therefore it was nominally consultative it is clear that the Ordnance Committee was endowed with very important responsibilities and rights in the matter of artillery development. Its advice carried great authority not only for this reason but because of the nature of its membership, which was made up from the three Services, and included in addition to a strong body of officials, six unofficial associates. In practice its recommendations were usually given immediate executive authority.

The other body which reported to the Director of Artillery was the Chemical Warfare Committee, later Chemical Defence Committee. It was composed of Civil Service scientists, who in some cases received honoraria for their part-time services in this capacity, and secondly of the holders of various services and departmental posts, *ex officio*.

The two committees which fell within the purview of the Director of Mechanisation were the Mechanisation Board and the Royal Engineer and Signals Board. The Mechanisation Board was set up in 1934 to replace a Mechanical Warfare Board which was characterised by the then Master General of the Ordnance as unwieldy. The new board was to be responsible for the co-ordination and control of the design of armoured fighting vehicles and of mechanical vehicles, for which purposes it was to work through two main sub-committees. It was to direct experiments and trials, and also, in accordance with the movement—as yet tentative and uncertain—towards breaking down the barriers which divided military engineering from the outside world, it was to employ a civilian engineer to look into advances in commercial engineering practice, including manufacturing methods. Also, while civilian scientists and engineers had been associate members of the old Mechanical Warfare Board, they had not played a vital executive role in the development of new equipment. As associate members of the new Board they were to do so.

The Royal Engineer and Signals Board controlled, in accordance with the policy laid down by the General Staff, research, development, experiment and design connected with engineering in its application to the needs of the Royal Engineers and the Royal Corps of Signals. Under the heading of research the Board's responsibilities included that of maintaining contact with activity in the universities, technical institutions and other government departments. Under the heading of experiment it had to allocate work to the establishments

for which it was responsible and to maintain control over their work. Finally, the Board had a very important responsibility for the initiation and conduct of the actual design of equipments either in establishments or on occasion by industry.

These four bodies, in association with these two directors, comprised the higher headquarters organisation to which the various research establishments were responsible. Intermediate between this, which might be called the administrative level, and the research establishments—that is to say the actual laboratories—there was, on the side of the Director of Artillery, a headquarters organisation which was responsible for carrying out his responsibilities in all fields except that of chemical warfare. This intermediate level comprised the Research Department, the Design Department and the Superintendent of Experiments.

The Research Department had its origins in the experimental establishment which was formed in 1902, following upon the recommendations of a committee which had been set up under Lord Rayleigh to examine the defects in armament, and particularly in explosives, revealed by the Boer War. The Armament Research Department—the title by which it came to be known, and which adequately describes its duties—was from its origins the servant of the Navy as well as of the Army, and its chief superintendent came alternately from each service; whichever service he came from however it was to the Master General of the Ordnance that he reported. From the organisational point of view the most notable feature of the Research Department—which it retained up to and beyond the outbreak of war—was its strictly military control, in that the Chief Superintendent, his deputy, and his three assistants, were all serving officers. This was the case also with the Design Department, which did not possess the same definite historical origin. It may be traced, however, to the drawing office of Woolwich Arsenal, where there was a post of Superintendent of Design, filled alternately by a naval and an army officer. His staff consisted of a small number of serving officers and a large number of draftsmen whose task was officially described as ‘the preparation of original designs for the Army, Navy and Air Force, of guns, gun carriages and mountings, ammunition and allied stores, bombs, pyrotechnics and certain torpedo stores, small arms and their mountings’.

It is frequently the case that a description of an administrative machine gives an impression of complexity and clumsiness to the reader who is not personally acquainted with its actual workings. But if the machinery which has just been described in its static position could be put into motion, both complexity and clumsiness would be seen to be real as well as apparent. Yet the theory was simple enough. It was for the Director of Artillery and the Director

of Mechanisation to receive from the General Staff the requirements appropriate to each, to consider them in their wider armament context, and then to pass them to the appropriate board. The board concerned obtained designs either from Woolwich or from Vickers or another armament firm if one could be found to produce a design. But in practice the relationship—to take one of the fields only—between the Director of Artillery, the Ordnance Board, the Research Department and the Design Department involved a channel of communication in which it was not easy to maintain a rapid flow. Moreover even as between the two departments the division of subjects was somewhat arbitrary: the behaviour of a shell in flight was the affair of the Superintendent of External Ballistics under the Ordnance Board, but its behaviour in the gun or on striking a target was the affair of the Research Departments. Even to the extent to which it was possible for the Army in the 'thirties to possess user experience, the organisation as a whole was deficient in it, and also in the ability to make radical departures from the standard methods of development as applied to complete weapons. Thus rockets, being an 'unorthodox' weapon, had to be developed outside the War Office organisation for research and development.

The principal changes in this organisation have already been indicated in their production context. Thus the appointment of a Director General of Munitions Production in 1936 was designed among other purposes to free the Master General of the Ordnance to devote his whole time to the supervision of research and development for which his expanding production responsibilities had left him no time. The appointment of a Director of Scientific Research in 1938, and its consequences, falls rather into the war-time than into the pre-war story, and will be told accordingly.¹ We shall see indeed that uneasiness about the organisation of research and development of army weapons had not been dissipated when war broke out, and that it revived early in 1942. The whole field was then subjected to a searching enquiry, and a fuller study of the subject than has been made here may thus be conveniently postponed until the history of this period is reached. Meanwhile we must turn to the third of the great Departments of State which was concerned with war production.

¹ See Part III, Chapter XIII (i).

CHAPTER III

AIR MINISTRY

(i)

The Control of Development and Production, 1934-38

THE AIR department with which we shall mainly be concerned in this volume is the Ministry of Aircraft Production, which came into being in May 1940. The founding of the new department at a time of supreme and rapidly deepening crisis was a step of great significance, and the M.A.P., under Lord Beaverbrook, made a spectacular début. The creation of the Ministry of Aircraft Production was however only the culmination of a process which had been going on throughout the rearmament period, a process which was designed to elevate in importance and authority the Government agency charged with responsibility for producing aircraft. In Government circles, as in the popular imagination, the menace of Nazi Germany was an air menace. The vision of great fleets of enemy aircraft raining high explosive on London and the other cities of Britain was present in the Air Ministry, the Cabinet and Parliament as it was in humbler quarters. How should Britain's defences be prepared? What reply could she make? It was in the Air Council, the ruling body of the Air Ministry, that many of these questions found their responsible answers, and it is upon the organisation designed by the Air Council that attention now focuses.

From 1922 until the end of 1934 the Air Council was constituted as follows:

- The Secretary of State for Air (S. of S.)—President
- The Under Secretary of State for Air (U.S. of S.)—Vice President
- The Chief of the Air Staff (C.A.S.)
- The Air Member for Personnel (A.M.P.)
- The Air Member for Supply and Research (A.M.S.R.)
- The Secretary of the Air Ministry

Each member of the Air Council, other than the President and the Vice President, ruled over a department of the Ministry organised to deal with his particular field of responsibility. The Secretary, in addition to his special responsibility for finance and other matters, retained administrative control over secretariat divisions which were

'bedded-out' in the departments of each of his three Service colleagues. When, therefore, we turn our attention upon the administration of supply, it is with the department of the Air Member for Supply and Research with which we are mainly concerned. In 1934 this was composed of three organisations: first the Joint Directorate of Scientific Research and Technical Development; secondly the Directorate of Equipment; and thirdly the Directorate of Aeronautical Inspection. There was in addition one of the 'bedded-out' secretariat divisions. It is in the functions of these organisations, and particularly of the Joint Directorate and of the Directorate of Equipment, that we find the embryo of our subject.

The post of director of scientific research had been created in 1924, and filled by a distinguished scientist whose 'sole business it will be'—in the words of the Air Member for Supply and Research—'to organise and direct scientific research'. The appointment of director of technical development had been created in the same year, but unlike that of the director of scientific research it was not really a new post, but only an existing director of research with a new and more accurate name. The Director of Technical Development was responsible for the technical development of supplies of all kinds, and as the appointment, until September 1940, was always held by an Air Force officer, the emphasis was upon the point of view of the user. The relationship between the two directors was, from the administrative point of view, unusual and interesting. The actual work of research and experiment was carried out in Air Ministry establishments, of which the most important was the Royal Aircraft Establishment, and it was carried out by a joint staff. There were separate categories of scientific research and technical development staff who were each administered by their own chief in regard to such matters as recruitment and promotion, but they were to some extent interchangeable in regard to the kind of work which they did. This was reflected in the administration of the Air Ministry by the device of the Joint Directorate, and the drawing up by the two directors in agreement of a joint programme of work to be undertaken by their combined staff in the establishments. The position may conveniently be summarised by regarding the Joint Directorate as a single body, consisting of two kinds of staff working in the closest collaboration, and responsible to what may be considered as a committee of two men, the Director of Scientific Research and the Director of Technical Development, with distinguishable but complementary functions.

The production responsibilities of the Air Ministry before 1934 were, as we have seen, in the hands of the Director of Equipment. To speak of production responsibilities at this period is however to some extent anticipating later events, since before the expansion of

the Air Force began in 1934 the production responsibilities of the Director of Equipment were limited to watching delivery rates and making occasional requests through the Director of Contracts that deliveries should be accelerated. The task of calculating requirements of all the multitudinous items required by the Air Force, that is to say the task generally called 'provisioning', bulked much larger among the duties of the directorate than did the functions which are meant in this volume by the term 'supply'. Repair and maintenance were also the responsibility of the Director General of Equipment and by 1930 showed the first slight signs of developing into a task of importance. In 1932 a deputy directorate had to be established to deal with it.

The third of the organisations which composed A.M.S.R.'s department was the Directorate of Aeronautical Inspection, which controlled the Aeronautical Inspection Department, and was responsible for maintaining by rigorous inspection of all components the internationally celebrated standard of Air Force equipment.

This then was the organisation of the department of the Air Member for Supply and Research in what might be called the pre-expansion Air Ministry. In 1934¹ Mr Baldwin announced in the House the Government's intention to establish air parity with Germany,¹ and in the following year an important reorganisation took place within the Air Council. Hitherto, as we have seen, one Air Member had been responsible for the two functions of Supply and Research, but in place of this office there were now created two new Air Council appointments, those of Research and Development, and Supply and Organisation.

The functions of the Air Member for Research and Development were duly indicated by his title. He was to supervise the activities of the Joint Directorate.

Repair and maintenance proved a bone of contention between the two Air Members, both of whom felt that they had a claim to it. A.M.R.D. argued that the technical information gained from repair work outweighed the supply aspect in value; whereas A.M.S.O. laid stress on the necessity for the Air Force of a quick turn-round in repaired aircraft, and demanded that repair, as part of D.G.E.'s kingdom, should come to him. There was much to be said on both sides, and indeed much was said. Control was however finally granted to A.M.R.D.

The duties attaching to the other new Air Council office, that of the Air Member for Supply and Organisation, were set out as follows:

Organisation of the Royal Air Force in peace and war; Provision of all approved (standard) technical and warlike equipment of the

¹ H. of C. Deb., Vol. 286, Col. 2078, 8th March 1934.

Royal Air Force; Provision of all non-technical supplies and food-stuffs for the Royal Air Force; Transportation; Works services.

In order to carry out these duties the Air Member for Supply and Organisation inherited from the Air Member for Supply and Research the Directorate of Equipment, which continued for the time being to exercise its functions unchanged. He also acquired, from the Chief of the Air Staff, two directorates with which we have not been previously concerned. The first of these, the Directorate of Organisation, was concerned exclusively with the internal organisation of the Air Force (the formation, organisation, location, quartering and so forth of Air Force units) and plays no part in a history of supply organisation. The second was the Directorate of Works and Buildings, which was concerned with the construction of aerodromes, quarters, depots and other civil engineering and building works.

The reorganisation of the Air Council which we have just described, and which took place in 1935, lasted until 1938. The reorganisation was a clear reflection not only of the disturbed international situation, but also of the position which had then been reached in the technical history of aircraft design. In 1934, aircraft development was on the eve of a major evolution. The era of the fabric-covered biplane, with a fixed undercarriage, and low landing speed, was definitely over. The newer types of aircraft on the other hand—the fast monoplane with fully cantilevered wings, retractable undercarriage, variable-pitch airscrew, all-metal construction and stressed skin—was still on the horizon. Research and development were accordingly all-important functions, so important as to justify the exclusive attention of a member of the Air Council. Until research and development bore fruit the Air Force had to be content to carry on with the production of obsolescent models, and similarly with a production organisation, the Directorate of Equipment, which had been drawn up to deal with provisioning rather than with controlling production, especially production which was rapidly rising. The position will best be understood by considering the Air Member for Supply and Organisation, in the years 1935–6, not so much an organiser of production as an organiser (through the Director of Operations) of the Air Force to absorb new production in due course.

But although there were no changes at Air Council level between 1935 and 1938, developments occurred in both the new departments. In each of them a new directorate was created, reflecting the intensification of development on the one hand and the increase of production on the other. An investigation into research and development in armaments, which was carried out in 1937, revealed that it had become impossible for the Directorate of Technical Development to devote to aircraft armament even a proportion of the attention which it required. It was accordingly proposed that a

new directorate should be created. This proposal was accepted by the Air Member for Research and Development, and there thus came into being the Directorate of Armament Development. The administrative principles upon which the Joint Directorate was based were not affected by this new appointment. The position was simply that the Directorate of Technical Development had been split and the new portion strengthened; the Director of Armament Development had the same relationship with his two colleagues as they had had with one another, and the Joint Directorate continued to exist in an enlarged condition. During this period also the deputy directorate of repair and maintenance was upgraded (in 1937) to full directorate status, reflecting the steadily increasing importance of repair.

The development which occurred in the department of the Air Member for Supply and Organisation was a more radical one. The year 1936 was marked not only by the launching of Scheme F, a much more effective programme of aircraft production, but also by the ambitious shadow factory scheme for the creation of war potential. In March it was felt that the load upon the Air Member and the Director of Equipment was becoming too heavy, and there was created a Directorate of Aeronautical Production. The functions of the new directorate, and its relationship with the existing organisations, are a matter of considerable interest. The function of drawing up programmes of production remained of course in the hands of the higher authorities, and the determination of the quantities of ancillary stores, or 'provisioning', remained in the hands of the Director of Equipment and in fact became his principal responsibility. The new directorate was thus truly a production directorate, able from its central position in the Air Ministry to consider the production problems, not only of the airframe and engine contractors, but also of the manufacturers of equipment and armaments.

The new directorate was entrusted to Lieut.-Col. H. A. P. Disney, who was appointed from outside the Air Ministry, and spent some months in studying its problems before he launched out into full activity. In due course however he evolved an organisation divided into four assistant directorates, to each of which was allocated a section of the work. At first, as we have said, the functions of the new directorate were largely those of investigation. Reporting to the Air Member for Supply and Organisation shortly after his appointment, the Director referred to late delivery of equipment and indicated that the essence of his job at that stage was to 'prevent late delivery by finding out the trouble at the contractors' works beforehand'. He added that in addition to all his other work he had had 'numberless requests to examine factories as to the suitability of their goods for

the Services'. The Director also introduced a measure of control—which is however to be distinguished from the great expansion which the Ministry was to launch later—of sub-contracting.

From this survey we may see the creation of the Directorate of Aeronautical Production in 1936 and of its activities from 1936–8 as an important administrative development in an interim period. Before 1936 the Air Ministry had only a general knowledge of the aircraft industry and its production resources. Scheme F, by calling for the production of 8,009 aircraft in three years as against the previous programme (Scheme C) of 3,800 in two years, clearly involved a production effort of a new order: to this call the creation of a special production directorate was a direct and clear administrative response. Two years elapsed before further developments occurred, but when, in the spring of 1938, the position again changed, it was to be a change of the utmost importance.

On 27th April 1938 the Cabinet approved the programme of aircraft production known as Scheme L, which called for the production of 12,000 aircraft in two years. This was a marked advance on the current programme, not only in regard to the numbers of aircraft involved, but because it brought the planning of aircraft production into a new era. Scheme L was the first programme of aircraft production to be conceived without regard to financial limits. Under it the aircraft industry was, broadly speaking, called upon to produce all the aircraft which it was physically capable of producing in the time laid down. April 1938 was thus a notable date in the history of the reconstruction of the Royal Air Force, and it was very quickly followed by changes within the Air Ministry which it is not too much to say inaugurated a new era in the administration of air supply.

Just as, in 1935, when research and development were dominating the expansion, it had been decided that they required the exclusive attention of a member of the Air Council, so in 1938, when the production battle was joined, it became necessary to make new arrangements at council level. It was accordingly decided to bring research, development and production once more under one member. In some ways this may seem a surprising and even a reactionary step, but it was in fact far from being merely a reversion to the pre-1935 position. The new office (to which the title Air Member for Development and Production was given) was supported by a greatly increased staff, and with the authority of the finance divisions weakened by the implications of Scheme L, the Air Member for Development and Production was a much more powerful figure than his predecessor the Air Member for Research and Development. He was in fact a direct forerunner of the Minister of Aircraft Production.

Announcing Air Marshal Sir Wilfrid Freeman's appointment as

A.M.D.P. in the House of Commons on 27th June 1938,¹ the Secretary of State (Sir Kingsley Wood) added that the London Midland and Scottish Railway had agreed, at the request of the Government, to place at the disposal of the Air Ministry their Vice President, Mr E. J. H. Lemon, who would become Director General of Production, with a seat on the Air Council. At the same time the Secretary of State announced the appointment of Air Vice-Marshal A. W. Tedder as Director General of Research and Development. Mr Lemon also was given a production department which was greatly expanded and completely reorganised.

It was at this period also that Air Commodore Roderic Hill succeeded as Director of Technical Development, taking charge of a directorate which had been radically strengthened and expanded in accordance with his own proposals.

The reorganisation which occurred at director level on the production side of the Department was announced in November. Henceforward there were to be four production directorates, supported by four directorates undertaking associated tasks. The production directorates were the Directorates of Aeroplane Production, Engine Production, Armament and Equipment Production and Material Production. The auxiliary directorates, if they may be so described, were the Directorates of Sub-Contracting, Air Ministry Factories (D.A.M.F.), Statistics and Planning, and War Production Planning. The functions of the new production directorates were quite straightforward. They were simply an expansion of existing sections of the Directorate of Aeronautical Production designed in their enlarged and strengthened form to exercise a more extensive and pervasive control over the aircraft industry and its associate industries. We shall examine the nature of this control more closely at a later stage, but it may be useful at this point to give an indication of the functions of the other new directorates.

We have already referred to the control of sub-contracts which had been established in 1936. This had been to some extent a negative control, and it now gave way to a positive and energetic policy of encouraging expansion. The directorate which was now set up was to supervise 'sub-contracting arrangements to see that the fullest possible use was made by main firms of industrial resources of other firms; that main firms have adequate arrangements for control of sub-contracting; and that suitable sub-contractors are put in touch with main firms'. The Directorate of Statistics and Planning was to prepare 'statistics in regard to all aspects of the production programme, report on the general progress of the programme and on the lessons to be learned therefrom, and formulate further plans for increasing

¹ 337 H. of C. Deb. 58, Col. 1532, 27th June 1938.

production, under the direction of D.G.P.' The Director of War Production Planning was alone in not being concerned with the current programme, except in so far as his planning for war was based upon experience derived from a study of it. The directorate was a small one and its task was to formulate plans for production in wartime. For this purpose it proceeded on a basis something like that of a Staff College exercise, assuming various dates for the outbreak of war, and calculating production curves from each date.

We shall consider at a later stage the development of these directorates. We have already, however, reached the end of the year 1938, and before proceeding further it will be necessary to return to the spring of that year and to give attention to a very important development which occurred at that time.

(ii)

The Air Council Committee on Supply

On the 29th of April, two days after the approval of Scheme L by the Cabinet, there was held the first meeting of a special Air Council sub-committee. This sub-committee, which had the Chancellor of the Duchy of Lancaster (Lord Winterton) as its chairman,¹ was charged with the task of formulating 'plans for the accelerated programme of aircraft production and to make such decisions as may be necessary to give executive effect thereto'.² The sub-committee, the members of which included the Air Members for Supply and Organisation and Research and Development, the Deputy Chief of the Air Staff, and representatives of the Air Ministry secretariat and of the Treasury, at once embarked upon the formidable task of turning Scheme L from a mere statement in round numbers to a practical programme of aircraft production. The Committee began by interviewing representatives of all the leading airframe and engine contractors, and by discussing with them all that was involved in the acceleration of the programme. Additional resources in the way of buildings and machine tools were discussed, and the requirements of each firm were either approved in principle on the spot for provision under the financial arrangements which had been made,³ or else remitted for investigation and approved at the next meeting. While a number of the proposals were of course turned down or curtailed, the emphasis was upon rapid approval. In order to carry out its task

¹ Lord Winterton resigned very shortly afterwards and was succeeded as chairman by the Under Secretary of State, Captain Harold Balfour, on 20th May 1938.

² Air Ministry press announcement, 30th April 1938.

³ See W. Ashworth: *Contracts and Finance*, in this series (H.M.S.O. 1953).

the Committee, which from its third meeting was called the Air Council Committee on Supply, met twice a week, and sat for the whole day, generally interviewing the representatives of a firm in the morning and devoting the afternoon to assimilating the results of the morning's work into the programme as a whole. This routine lasted for some three months; thereafter the pace slackened, meetings were held once a week only, and afternoon sessions became exceptional. During May the meetings were generally presided over by the Chancellor of the Duchy of Lancaster or by the Under Secretary of State or, in the absence of a Minister, by the Air Member for Supply and Organisation. Mr Lemon of course became a member of the Committee upon his appointment as D.G.P., and thus added to the concentration of authority. The work continued under full pressure, and by the end of July the Committee had interviewed twenty-seven of the principal airframe, aero-engine and light alloy manufacturers.

Despite the presence of a Treasury representative, and the important part played in the discussions by the Secretary's representative, the Supply Committee did not, in its early days, concern itself primarily with financial questions. Very large sums were approved as capital expenditure, but they were approved as an incidental in the course of working out the most effective contribution which each particular firm could make to the programme. Thus the Committee, which was brought into being to implement the Cabinet's decision that Scheme L should be proceeded with, reflected in its procedure the new policy upon which that decision had been based.

The Supply Committee, as the instrument of the new policy, quickly discovered the functions which the new policy involved. The outlines of the programme emerged from the mass of decisions which were recorded at every meeting, and by 14th May the Air Member for Research and Development was able to say that 'we shall soon have completed the work of placing the orders for aeroplanes and engines for the accelerated aircraft programme. . . .' The Committee, he recalled, had already decided to call for monthly statements of the output of firms, in order that they might ascertain how the total promised output figures had been arrived at, but this, he thought, was not enough. A more detailed investigation into the programmes was essential, not only 'to make certain that nothing has been overlooked, but also to ascertain the weak spots in each programme so that prior steps can be taken to avoid a breakdown'. This detailed investigation was in fact to be an enquiry addressed to each contractor about the details of his plans for carrying out the work, and covering floorspace, machine tools, labour and raw materials, actual and required.

An investigation of this nature was an important new development in the relationship between the Air Ministry and industry. It is true

that since 1936 the Director of Aeronautical Production had been devoting a considerable amount of time to investigations both general and particular. But they had not ventured on quite so thoroughgoing an inquisition. The investigation now proposed was however the natural consequence of doing away with financial restrictions and calling for all the aircraft the industry could produce. If the Cabinet required the Secretary of State for Air to push production up to its physical limits, then the Secretary of State must know what these limits were. It followed, moreover, that whenever possible he must extend them. This was the task of the production expert, and it was clear that in the new era the importance of the production expert would greatly increase, and that changes in organisation would follow. The creation of the Supply Committee was a first step in a reorganisation of the production side of the Air Ministry which, in the course of two years, was to change it from a single directorate concerned with the distribution of orders to the major part of a large Department of State. The Supply Committee during the first month of its existence had already begun to foreshadow the activities of M.A.P.

The unprecedented nature of their work was well understood by the members of the Committee. When A.M.R.D.'s memorandum of 14th May came before the Under Secretary of State the latter stated that he was anxious to set up an organisation which would be independent of the departmental organisation and which would report direct to the Committee regarding progress on the accelerated programme. The Committee, however, when they discussed the proposal, considered that the existing organisation should be used so far as possible. Looking back from a much later date it is easy to see that this was a wise decision, inasmuch as the whole of the supply and research functions of the Air Ministry were shortly afterwards to be reorganised to bring them into line with the functions of the Committee. Nevertheless the Under Secretary's proposal was at the time a far-sighted one and an interesting illustration of the important role in the Air Ministry organisation which the Committee rightly considered itself to be filling.

The history of the Supply Committee between May 1938 and May 1940 may be rapidly sketched. Scheme L was adjusted in September 1938 when arrangements were made 'to speed up the production of the most important types, principally of Hurricanes and Blenheims'. The aim now was to complete production under this Scheme by March 1940, and there appeared to be good hope of realising it. It accordingly became necessary to make plans proceeding beyond that date, and by agreement with the Treasury the Air Ministry placed 'follow-on' orders for a further 5,500 aircraft. No further comprehensive programme was however put into operation until after the

outbreak of war, and it was not until the end of the year that new targets beyond 1940 were clearly set forth.

Thus, by November, the Committee's work under the original terms of reference was complete, and at this date the Treasury withdrew their representative. The period was thus one of adjustments, accelerations and minor additions rather than of far-reaching new plans. On the whole it maintained its character as a general purposes supply committee. Research and development representatives were frequently in attendance, and engaged in fairly detailed planning discussions with their opposite numbers on the production side. Adjustments to the programme were discussed even when no immediate financial issue was involved, and the financial issues which were discussed were frequently not capital-finance questions. At the 44th meeting of the Committee, for example, which was held on 8th May 1939, they discussed the priority of light alloy supplies, stop-gap orders for the Battle, shortage of spares, and the necessity of accepting additional Wellingtons with Pegasus engines. Two of these were not financial matters at all, and the other two involved contract action (which the Committee instructed the Director of Contracts to take) but no capital finance. In August of the same year the Committee was authorising the purchase by the Air Ministry of reserve stocks of aircraft timber, perspex sheet, Swedish iron and steel, and raw magnesite. Meetings of the Committee were also being used for the exchange of ideas and the general publication of proposals on major planning issues: on 29th August, for example, the Air Member for Development and Production announced his proposal for the production of Sabre engines at the rate of 2,000 per year.

The outbreak of war brought about a restoration of full pressure in the work of the Supply Committee. From the beginning of September 1939 until March 1940 it met almost every day in order to make the decisions which were necessary for carrying out the war programme of production. Yet, although activity increased, the tendency was for the functions of the Supply Committee to become more limited, and this was particularly the case during the spring of 1940. Schemes involving the provision of capital assets by the Air Ministry to its contractors tended to oust all other matters from the agenda. The functions which the Committee had appropriated tended to increase in importance during the following year. By that time the Air Council Committee on Supply had become the Air Supply Board of M.A.P., and this new phase of its history will be considered separately. Meanwhile there are other matters which call for attention.

(iii)

Developments Outside A.M.D.P.'s Department

The developments in the organisation of the Air Ministry which occurred during the expansion period could not of course be confined to the departments which dealt directly with development and production. They were found to have repercussions in the organisation of finance and secretariat duties, that is to say in the department of the Secretary of the Air Ministry.

At the outset of this expansion period the Air Ministry was organised for the purpose of keeping a small Air Force in running order. Small as the Air Force was, this was a very considerable task, particularly as financial stringency involved the most extensive and detailed scrutiny of all activity involving financial expenditure. The department of the Secretary of the Air Ministry was accordingly an elaborate administrative machine, and while it is not necessary for our purpose to have an exact knowledge of all its parts it is desirable to be aware of its outlines. It will be convenient to make a survey of the position as it was at the end of the year 1937. There were at this date ten secretariat divisions and seven finance divisions. Of the secretariat divisions three were establishment divisions dealing respectively with general headquarters staff, scientific staff, and civilian staff at Air Force stations and elsewhere. There was a Parliamentary and Legal Division, an Air Council and General Division, while four divisions were bedded-out in the departments of Members of Council. Of the finance divisions one dealt with estimates, one with Air Force pay, one with supplies and transportation, one with material, one with works and lands, one with civil aviation, and one with Capital Clause claims. There were thus sixteen divisions all told, under the control of thirteen assistant secretaries¹ who were assisted by thirty-two officers of the Administrative Class. The higher Administrative staff consisted of three principal assistant secretaries, first and second deputy secretaries, and the Secretary of the Air Ministry.

It will be apparent that, in 1937, the proportion of personnel in secretariat and finance divisions who were dealing directly with the administration of development and production was quite small. A certain amount of the work of the establishment division was of course devoted to this end, particularly in the field of recruitment.

¹ One assistant secretary controlled S.1 and S.5; S.8, 9 and 10 together with F.7 were likewise under the control of one assistant secretary.

Development and production also claimed a share of the work of the Parliamentary and Legal and of the Estimates Division. The divisions specifically associated with what was to be the M.A.P. field were however only the two which were attached to Air Members for Supply and Development, and parts of the finance divisions. For the purposes of this history it is the capital claims division which has the largest claim upon our interest.

During the early years of the expansion period a good deal of uneasiness was expressed by the aircraft industry at the possibility that capital assets which they were providing for the expansion would prove to be redundant when the expansion was complete.¹ A remedy for this uneasiness was devised by the Air Ministry in conjunction with the industry. This remedy was the McIntock Agreement, and in particular the Capital Clause thereof. The Capital Clause provided a formula whereby firms might prefer claims against the Air Ministry in respect of redundant assets, subject to the condition that every asset proposed to be created under this cover must be submitted to the Air Ministry for prior approval. The McIntock Agreement properly speaking covered firms which were members of the Society of British Aircraft Constructors, but cover similar in principle to the Capital Clause was in due course extended to other firms. Capital Clause claims accepted by the Air Ministry were already substantial during the financial year 1936-7, and they increased markedly during the following year. It accordingly became necessary to adapt the Air Ministry organisation to take account of the work thrown up in this way, and in September 1937 a new finance division was set up to deal with 'finance questions relating to the Capital Clause'. It began as a small division presided over by a principal, but as the forerunner of the very large and important capital-finance division of M.A.P. it had to undergo rapid development even before it passed over to the new Ministry.

By 1939, less than two years after its foundation, the volume of capital claim administration had raised F.7, as it was known, to a full-scale division, under the control of an assistant secretary. Its functions had been enlarged and were more elaborately defined. In the first place it was responsible for financial administration of capital grants and guarantee for extensions for contractors' works and for shadow factories; secondly for financial consideration of special supply problems; and thirdly for financial aspects of war potential. The growth of F.7 was the most important development in the Secretary's department between 1937 and 1939, at least so far as the future M.A.P. was concerned. Indeed the increase in Administrative personnel in the Ministry as a whole was not very great, considering

¹ See W. Ashworth: *Contracts and Finance*, *op. cit.*

how great was the burden which the expansion laid upon their shoulders. From thirteen in 1937, the number of assistant secretaries had risen to sixteen in 1939, while the junior Administrative staff had risen from thirty-two to fifty-four.

During the course of 1939 and the first four months of 1940, F.7 expanded still further. By May 1940, when M.A.P. was created, there were already three capital-finance divisions, responsible for airframe schemes and general questions; engines and associated schemes; and armaments, instruments and balloons. Yet another new division was responsible for raw material finance, including capital finance for raw material schemes. These four divisions were transferred to M.A.P. as a comprehensive and experienced capital-finance department.

(i v)

Developments in A.M.D.P.'s Department, 1938-40

Before leaving this pre-history of the M.A.P., however, it is necessary to take note of some of the developments which occurred in the department of the Air Member for Development and Production between the reorganisation of 1938 and the events of May 1940. Such developments in the field of administration were direct reflections of advances in the technique of air warfare, and one of the most important advances during the expansion period was the emergence of new forms of radio communication, and the revolutionary technique of radar, or R.D.F. as it was then called. As was natural, this emergence affected the administration of research and development first, and of production only at a later period.

In 1938 the development of radar had been proceeding for some three years—in fact since the beginning of 1935. The construction of the Home Chain of early warning stations round the coast of Britain was under way as a project of the highest priority, and new devices were on the horizon, only awaiting a period when time could be found to develop them. It became clear to D.S.R. that at a time when his own problems in every field were increasing, he could not give adequate attention to radar; 'the magnitude and variety of the problems', he said, 'justified the title and status of Director for the man responsible'. The Director of Scientific Research was anxious that his office should not lose its special standing; he wanted to continue to exercise a general control over scientific research, and, in particular, to remain in the position of the Air Ministry's channel of communication with the scientific world in general. The proposal

to create a new directorate did not recommend itself to the Treasury. They did not approve of the idea of having more than one director in the scientific field; on the other hand they understood that the creation of a director responsible for both research and development was contrary to the Air Ministry policy which had been realised in the Joint Directorate. The Air Ministry however pressed their proposals, and as a result the post of Director of Communications Development was created in July 1938.

There thus emerged a director, other than the Director of Scientific Research, who had control over a field of scientific research. This was a considerable departure from the long-established structure of the Joint Directorate, but it did not destroy the foundations of that structure. The Director of Scientific Research maintained 'a general supervision over all the work on the research side, and over the research staff'. He was to be consulted by the Director of Communications Development when the annual programme was drawn up, and he was to be responsible for the recruitment and production of the new director's staff. D.S.R. had foreseen that the relationship which he had planned between himself and D.C.D. was not an altogether consistent one; he had in fact said in so many words that it would depend upon good will rather than logic. Recalling this forecast in 1940 he was able to say of the arrangement that 'in fact it has worked smoothly'.

The creation of a corresponding new directorate upon the production side did not occur until 1940. The production of radio equipment had been one of the responsibilities of the Directorate of Aircraft Equipment Production, which was created in 1938. The production of radar equipment, which was not great and was in any case experimental, was entrusted to the Director of Communications Development. In February 1940, however, it was decided to combine the two functions, and a Directorate of Radio Production was created. The Director of Radio Production was responsible for the production of equipment, valves, and components.

As well as by the emergence of radar, the years 1938-40 were marked, upon A.M.D.P.'s side of the Air Ministry, by important advances in aircraft armament. A directorate of armament development, as we have seen, had been created in 1937; it had already, at that date, in the words of a report made at the time, become impossible for the Director of Technical Development 'to devote to the armament programme even a proportion of the attention which it requires'. Among the important projects then calling for attention was the requirement for a gunsight capable of dealing with the large allowance angles which it was now realised that combat in the new fighters would require. Very intensive work, involving formidable problems, was undertaken both in the R.A.E. and in private firms,

and led, in the late spring of 1940, to the very promising tests of the first experimental mark of the gyroscopic gunsight. These two years also saw the first attempts to provide remote control of aircraft guns. The early attempts were mostly the work of private firms, but events were moving towards a clearer realisation of the importance of this project in the Air Ministry itself, and in April 1940 the Air Member for Development and Production placed it on the list of 'war-winners'.

We have now brought this outline account of the Air Ministry institutions with which we are concerned up to the date, May 1940, when they became a new Department of State, the Ministry of Aircraft Production. There had been, in the years since 1934, a fairly rapid expansion of personnel and also an enlargement of administrative functions—for example the activity of the Directorate of Sub-Contracts and the new capital-finance divisions. The Supply Committee was an important new organ of administration, which had begun by assuming a dominating position in every field of production and to some extent of development, but which by 1940 had largely divested itself (in favour of the Air Member for Development and Production) of most of these functions and begun to concentrate on controlling capital finance. On the whole, however, the keynote of administration had been orthodoxy. The traditional construction of the Air Ministry around the various members of the Air Council had not been disturbed even when the Air Council offices had been changed or merged, or even by the admission to the Air Council of a civilian other than the Permanent Under Secretary (as the Secretary of the Air Ministry had now become). We shall see in succeeding chapters how the Air Ministry organisation fared under a new régime.

CHAPTER IV
INTERDEPARTMENTAL
ADMINISTRATION IN THE
PRE-WAR PERIOD

(i)

The Planning of War Potential

THE REORGANISATION of the individual departments of State, important as it was, was not the only kind of administrative measure which was called for if Britain was to attempt to match the vast plans and efforts of Nazi Germany. These plans and efforts were directed towards what was becoming known as total war, and so far as production in Britain was concerned the reply which they called for was an organised demand by the Government upon the entire industrial resources of the nation. In the field of munitions production above all it was vitally important to see that the three great departments concerned spoke in all essential matters with one voice only—the voice of His Majesty's Government. The steps which were taken to this end had an elaborate history in the inter-war period.

When in the early nineteen-twenties the Government set itself to reconsider the lessons which it had learnt in the harsh school of the first World War, co-ordination of supply was among those which provided the most uneasy memories. If the herculean nature of the supply task had been largely due simply to its magnitude, it had been rendered still more difficult and harassing by the autonomy of the pre-war supply departments, and by the jealous rivalry which they displayed when competition for material became necessary. The lesson which the Government had learned had borne fruit in war-time in the creation of the Ministry of Munitions. This, however, was clearly a war-time expedient only, and with the return of peace, or at least with the stabilisation of peace-time conditions, it became necessary to consider how the lessons of war could be given permanent effect.

The lack of co-ordination in the field of munitions supply was particularly noteworthy because it was in the realm of defence that Britain had, in the years before 1914, undertaken a notable

experiment in the machinery of central government. It would be out of place here to give a detailed account of the origin, functions and procedure of the Committee of Imperial Defence. For students of the modern machinery of Cabinet government, which owes so much to this model, it would hardly be necessary to do so. Its peculiar relevance to the history of all measures that were taken for the co-ordination of supply is however such as to call for a brief account in any study that purports to deal with this history. Although the co-ordination of defence had become a subject of discussion at least as early as 1890,¹ and Lord Salisbury had actually set up a Defence Committee in 1895, the Boer War revealed very serious defects in this field. It showed, among other things, that the Government defence machinery failed to provide contact between ministers and Service chiefs; failed to ensure a thorough exploration of defence problems; offered no adequate means for settling inter-service disputes; and provided neither an adequate system of planning nor a proper record of such plans as were made.² Accordingly, in November 1902, the two Service ministers jointly proposed the abolition of the existing Defence Committee, and its replacement by a new Standing Committee. This new committee, they proposed, should be presided over by the Prime Minister or his deputy, and should have the function of considering defence questions which lay between or transcended the sphere of the Service departments, the Foreign Office, the Colonial Office, India Office, the Treasury, and the general body of home departments. Approval of these proposals by the Cabinet resulted in the creation of the Committee of Imperial Defence.³ Formally the Committee of Imperial Defence was a peculiarly negative body. It was not a Cabinet Committee; it had no executive power; apart from the Prime Minister it had no members. Paradoxically its importance and authority was largely derived from these negatives. Because it was not a Cabinet Committee it was freed from the traditional laxity of Cabinet procedure; because it was not an executive body departments offered no objections to its wide range of interest; because those who attended it were present on each occasion by the Prime Minister's invitation and not as of right, it possessed an important flexibility.

One feature of the procedure of the Committee of Imperial Defence was of sufficient importance to have been described in the general introductory volume of this series of histories.⁴ It will, however, bear

¹ See Cmd 5979.

² See Cmd 1932/1904, p. 3. (Report of the War Office Reconstitution Committee, Part I: The Esher Committee).

³ The date may be taken as December 1902, although formal Treasury authority was not given until 1904.

⁴ See W. K. Hancock and M. M. Gowing: *British War Economy*, in this series (H.M.S.O. 1949).

repeating here. The Committee enjoyed from its institution a facility which the Cabinet itself did not acquire until after the outbreak of the first World War; a permanent secretariat which circulated an agenda and memoranda dealing with all major subjects of discussion; took minutes; circulated them for correction; issued corrected copies; indexed and cross-referenced all decisions; and in fact laid down a system of operation without which modern Cabinet government would seem almost inconceivable.

Had the Committee of Imperial Defence turned its attention to supply, and more particularly to the question of co-ordination, there seems little doubt that much of the trouble, inefficiency, inter-departmental rivalry, and scandal of 1914-18 might have been avoided. In fact it did not do so, since no one even guessed at the size of the problem that was approaching. Thus, although in the period before 1914 the main Committee set up a number of standing sub-committees, it is noteworthy that there was no standing committee to deal with supply matters. The gap in Britain's preparations for war was of course even wider than this; the work done by the Committee of Imperial Defence did not include any general survey of economic questions. 'Defence', in the period before 1914, when the concept of total war was unrecognised, was, by comparison with what was later understood by it, a technical term, restricted to strategical and tactical considerations which were in the first place, at any rate, the province of professional Service officers. That the Committee of Imperial Defence widened the boundaries of thinking on this subject is one of its principal claims to fame; it was hardly within the field of possibility, in 1914, to see how much more widely these boundaries would shortly have to be extended.

The development of the machinery of the central government of the United Kingdom during the first World War is, in general, a familiar story. Its most striking feature was the appearance of a small War Cabinet, composed of ministers who were freed from departmental responsibilities in order to devote the whole of their attention and energy to the task of supreme command. Within the field of supply the creation of the Ministry of Munitions in June 1915 was almost as striking. The Ministry of Munitions was formed initially out of the staff of the Cabinet Committee on Munitions, together with the organisation of the Armaments Output Committee which Lord Kitchener had established at the War Office. Its prodigious growth, the immense ramifications of its activities during the first two years of its life, when responsibility for one item of munitions after another was rapidly added to its functions, led Mr Churchill, who became Minister of Munitions in July 1917, to undertake a reorganisation from which the fifty or sixty departments of the Ministry emerged in some ten groups each under the care of a chief

who approximated to a 'superintending lord' in the Admiralty. These chiefs, together with the Minister, formed the Munitions Council which, in the words of a War Cabinet report, acted 'as a General Staff on munition matters'.¹

A few months later, in September, the supply of munitions was more comprehensively organised at the highest level by the creation of the War Priorities Committee of the War Cabinet.² The War Priorities Committee, which was presided over by General Smuts, developed out of a short-lived Aerial Operations Committee which had been intended to undertake a task of determining priorities within the sphere of aircraft production; the members of this committee, however, very quickly came to the conclusion that such a function was too narrow to occupy the attention of a ministerial committee. The War Priorities Committee set up a number of subordinate bodies to deal with particular scarce materials or products; there was a co-ordinating body on the official level, and an Industries Sub-Committee which was responsible for investigating the needs of the non-munitions industry.

The War Priorities Committee consisted, in addition to its chairman, of the Service ministers and the Ministers of Munitions and of National Service. It was not an executive body; its object was to get its members around a table in order that they might arrive at agreement over the problems which confronted them. It was, as we shall see, the prototype of a number of bodies which at one time and another were charged with high production responsibilities during the second World War, but more immediately it set the pattern for a Post-War Priority Committee which was to be responsible throughout the whole field of reconstruction for allocating materials, power and transport facilities in the event of a shortage.

Britain thus emerged from the first World War not only with a dreadful and unforgettable recollection of munitions shortages in the early years of that conflict, but also with the experience gained in building up a great new department of State, and a machinery of interdepartmental collaboration. Since the Committee of Imperial Defence was reconstituted at the end of the war in a form which differed little from that of 1914, and was equipped to study, digest, and take full advantage of the lessons which had been learned, the prospects for supply organisation in peace seemed hopeful. It was clear that munitions supply would now be a major subject of study in the planning of Defence, but the period immediately after 1918 was not of course one in which the supply problem, nor the larger subject of which it was a part, appeared to require urgent attention. The

¹ Cmd 9005: *The War Cabinet Report for the Year 1917*.

² Cmd 325: *The War Cabinet Report for the Year 1918*.

formulation of the famous 'ten-year rule'¹ in 1919 gave the blessing of the Cabinet to the sense of relaxation which came with victory; financial restrictions were soon added to sap any excesses of reviving energy. Thus, although the supply problem did receive some study in the years immediately after the war, it was not until 1924 that the Committee of Imperial Defence, after considering the report of their Sub-Committee on the Production of Warlike Stores, decided to set up a standing committee consisting of the principal Supply Officers of the three fighting Services, together with a representative of the Board of Trade, as a means of creating, in the field of supply, 'a machinery and habit of constant and sympathetic consideration' of problems and methods of dealing with them by concerted departmental action. The responsibilities laid upon the Principal Supply Officers Committee, as it was called, clearly reflected the difficulties which had been experienced in the first World War. They were to ascertain and keep a watch on stocks of raw materials; prepare a list of essential items and make arrangements to forbid their export in time of war; prepare plans for increased output; maintain lists of contractors who could be called upon in war; and report periodically on all these matters to the main Committee.

The body which was to carry out these tasks was one of a type which has since become a very familiar part of the machinery of central government; the expert or official sub-committee of a committee operating at ministerial level. As it was reconstituted in 1927, when it took the form which it maintained during the period in which we are here interested, it had as its chairman the President of the Board of Trade. The Service departments were represented by Board or Council members, and representatives of the High Commissioners spoke for the Dominions. Including the chairman there were thirteen members. The Principal Supply Officers Committee followed the tradition of the Committee of Imperial Defence in inviting advisers to be present whenever it was felt that they could contribute; actual attendance at its meetings accordingly varied from about ten to twenty. We may anticipate events for a moment and note that in the spring of 1936 the Minister for the Co-ordination of Defence assumed the chairmanship.

Here, then, there was, operating in time of peace, with ample time for deliberation, a strong expert committee ready to apply itself to problems which provided the widest scope for bold and resolute action. The theory of procedure was somewhat as follows. First, the Cabinet would decide what kind of war ought to be planned for, and what role each Service might be expected to play in it. On this basis

¹ In August 1919 the Cabinet had laid it down that for ten years to come no war—or at least no 'great' war—need be expected and prepared for. See W. K. Hancock and M. M. Gowing: *British War Economy, op. cit.*, p. 45.

each Service would evolve a hypothesis of its requirements. These requirements would then be passed on to the Principal Supply Officers Committee which itself evolved an administrative machine for dealing with them. In considering how this theory worked out in practice we must consider first the factor which was within the control of the Principal Supply Officers themselves—their own organisation and procedure.

The Committee set out its ideas upon this, and indeed upon a considerable wider field, in an important report which they prepared in 1926 under the title of 'Supply Organisation in Peace and War'. In this they began by laying down two general principles, first that the organisation must be adaptable to any type or size of war, and secondly that the war organisation must evolve naturally, smoothly and rapidly from the organisation existing in peace. To these general principles they added the statement that the organisation which they were recommending was designed for a war of the first magnitude. They addressed themselves in the first place to arrangements for the control of raw materials, and they considered that, in peacetime, it should be the responsibility of the Board of Trade to watch the current position, weigh up the probable war situation and advise the Principal Supply Officers Committee accordingly about the need to conserve or develop supplies. In war, different methods and agencies would be required. Then the control and the supply of raw materials should be vested in a different authority, and control should not be in the hands of a fighting department. As a final stage of war development the Committee contemplated a Ministry of Material Resources. They then turned from materials to production and recommended an organisation for peacetime which, since it came into being forthwith, may be described as an actuality.

The organisation consisted of a pyramid of committees with the Principal Supply Officers Committee at its apex. The main Committee itself met once a year to consider the annual reports of its subordinate bodies, exercising general supervision at other times as required. The principal subordinate bodies were the Supply Board and the Board of Trade Supply Organisation, together with the Contracts Co-ordinating Committee, which had originally been set up in 1920, and was now taken under the wing of the Supply Board. This last body was composed of the directors of contracts of the three Services, and was perhaps, of this whole machine, the part most clearly designed to prevent a repetition of war-time abuses. Not only at home, but even in Paris under the critical eyes of our Allies, the two Service departments had, particularly in the early years of the first World War, openly and bitterly competed for supplies:¹

¹ For the history of this controversy see H. A. Jones: *The War in the Air* (Oxford, The Clarendon Press, Vol. III, 1922).

the object of the Contracts Co-ordinating Committee was to prevent a repetition of such scandals by ensuring that the supply departments acted as a single buyer. As to the Board of Trade supply organisation, it was concerned with raw materials, and the preparation of memoranda on the supplies of the more important commodities, together with plans for their conservation or increase in an emergency.

Of all the bodies which came into being during this period, there is none so important in regard to historical continuity, and perhaps even in regard to its functions, as the Supply Board. The Supply Board was set up as a co-ordinating and advisory body. Its functions were, briefly, to estimate in conjunction with the Board of Trade quantities and types of raw materials and manufactured articles which would be required in wartime, and to indicate in what direction supply was likely to fall short. In addition to this estimation of quantity the Supply Board was to determine those materials which ought to be brought under control at the outset of war; to consider questions in regard to which legislation might be necessary in wartime and to formulate appropriate proposals. The Board was also to consider the setting up of local organisations in wartime to exploit unknown local manufacturing resources. It provided itself with various subordinate committees, whose work, about which it was fully informed by annual reports, it was expected to co-ordinate. There were a number of such supply committees, some half-dozen or so, covering a very wide range; apart from oil, coal and the national food supply there was little in the whole field of civilian and of military supply with which they did not deal. As regards membership, the supply committees consisted of representatives of defence departments (including contracts representatives), and of the Board of Trade, and the Supply Board itself composed of the chairmen of the Supply Committees and other representatives of the same set of departments. The Board met irregularly but frequently and submitted six-monthly reports on its activities to the Principal Supply Officers Committee.

What has just been described were the actual functions, and the actual constitution, of the Supply Board in time of peace. We shall see that changed circumstances brought about some changes in these matters. It may be convenient, however, since what was planned as well as what in fact transpired is part of our subject, to glance aside for a moment and see what part the Principal Supply Officers Committee envisaged for the Supply Board in time of war. On this subject there were two main opinions. The first was that the Supply Board would continue to function in wartime as a judicial and advisory body, to settle any clash of interests either between the various Supply Committees or between the Services. It was to have no executive

authority and all purchases would continue to be carried out by the Service departments who would expand within themselves. The alternative was that if war broke out some central purchasing department might be essential and the Supply Board in that case would form the framework on which a Ministry of Supply could be built. We shall meet both these views again.

Meanwhile, although it is once again an anticipation of events, we may round off this account of the Supply Board by reference to an important step taken in 1935. The Supply Board itself considered, and proposed to the Principal Supply Officers Committee, that it should have a full-time president and secretary. The proposal, which was not a new one at the time, was accorded an unusually warm and unanimous welcome by the Supply Officers, and by the Committee of Imperial Defence to which it was referred. The Treasury remarked that 'this . . . was a step in the evolution of the Supply Board organisation—extending rather beyond the advisory capacity of the Committee of Imperial Defence into a more executive sphere, and it could be regarded in the same light as the arrangement the Home Office were now making for air raid precautions'. With the approval of the Committee of Imperial Defence the proposal was put into effect forthwith.

Important as this step was, it did not solve the problem which arose out of dealing with supply questions by a machinery of inter-departmental committees. The 1938 crisis revealed many defects in this machinery. Apart from the panic buying indulged in by civil departments for whom the Supply Board had not hitherto catered on a large scale, and the fact that departments went beyond their allocation of firms made by the Supply Board, there was the somewhat disconcerting revelation that, just when they became critically important, the personnel of the Supply Board vanished almost completely, since its members, all of whom, with the exceptions of the chairman and secretary, were departmental officials, were withdrawn by their own departments to attend to duties which those departments considered more urgent. This situation had important consequences, but these must await consideration when we deal more fully with the period in which they arose.

We have dealt at some length with the constitution and procedure of the Supply Board and of the Principal Supply Officers Committee to which the Supply Board reported. It is clear that nothing could be achieved by these bodies unless they were given a clear, reasonable, and durable hypothesis on which to act. Until 1932 such an hypothesis could be academic only. In 1928 for example, the Chiefs of Staff provided 'an artificial hypothesis' for an extra-European war and gave fairly detailed estimates of requirements. Thereafter however the position began, at first slowly, and then as the menace

in Nazi Germany became more obvious, with increasing rapidity, to change. In November 1934 the Committee of Imperial Defence gave a directive that those of its sub-committees which were concerned with the defence of the United Kingdom as distinct from planning for an extra-European conflict, should make preparations for a possible war with Germany with a view to completing them in five years from that date. British war planning, in fact, now officially recognised Germany and Japan in their role as prospective enemies. The 'artificial hypothesis' of 1928 had still however some official standing, and this overlapping into the rearmament period of the academic atmosphere of a period which was now rapidly disappearing caused some uneasiness. The outcome takes us out of the sphere of planning of war potential and into a new phase of this study.

Amongst these developments which have been described, however, there was one event, and one thread of activity, which have not so far been separately noticed. The event was the appointment of a co-ordinating minister. On 27th February 1936, the Prime Minister (Mr Baldwin), reviewing the defence situation in the House of Commons,¹ referred to the pressure of work under which he himself as Prime Minister was labouring, and spoke of the need for relief. He referred to the Committee of Imperial Defence as 'the essential link in all matters of Defence' and said that it must be in a continual state of development and adaptation. The latest development at this date was in fact the creation of the Defence Policy and Requirements Committee, to which we are about to turn, and while the Prime Minister considered the chairmanship of the Committee of Imperial Defence and of the Defence Policy and Requirements Committee must remain with himself, he announced that a minister would be appointed as deputy chairman of these committees, to whom he himself would delegate certain of the duties which he had hitherto carried out as Prime Minister. These duties would include the general supervision and control of the whole organisation and activity of the Committee of the Imperial Defence; and the co-ordination and speeding-up of executive action. When these proposals were framed in a White Paper² it was said that they were intended to serve two purposes, 'to provide an improved apparatus for the consideration of Defence problems as a whole, and to ensure the fullest and most effective use of the industrial factor, and the manpower available for production of material in the country'.

The post of Minister for the Co-ordination of Defence was duly created, and Sir Thomas Inskip appointed to it. When, some weeks later, Sir Thomas Inskip addressed the House of Commons³ about

¹ 309 H. of C. Deb., 5s., Col. 653 *et seq.*

² Cmd 5107.

³ 312 H. of C. Deb., 5s., Col. 1393 *et seq.*

the duties of his new office, he said that 'considerable strides had already been made in the preliminary stages of repairing the deficiencies that had been observed'. He had not, he said, 'pulled up anything by the roots'; he was in fact rather tending to the crops that had been sown. Welcoming his appointment in principle, Sir Archibald Sinclair, who followed him in the debate, said that the Ministry for the Co-ordination of Defence was in a special sense the creation of Parliament. Other ministries had been brought into being under the pressure of events and on the initiative of Governments, but this new ministry was the result of urgent demand from all quarters in both Houses of Parliament, that there should be a unity of doctrine in regard to all problems of defence, naval, military, air, transport and supply: unity of plan and unity of direction, in place of the old system of departmental autonomy and strife. Mr Attlee, however, said that the Minister had used a phrase in his speech which seemed to be exactly applicable to his own position—'Responsibility without authority is a sham'. It was responsibility without authority, Mr Attlee said, that had been given to the new Minister.

So much for the event. The thread of activity was the planning of priority. This question, from the time when it was raised in the Principal Supply Officers Committee in 1925 to the setting up of the Ministerial Priority Committee in April 1939, was treated as a matter of great importance, since the view was widely held that in the answer to this question lay the key to the whole supply problem. The outcome of the first discussion in the Principal Supply Officers Committee was a recommendation that upon the outbreak of a major war a Cabinet committee should be at once set up to deal with priority. The question was thus from the outset associated with war potential, as the purpose of the Cabinet committee would be to determine the priorities of the various items produced as the planned potential became an actuality. The original recommendation of the Principal Supply Officers Committee was supported by a similar recommendation from the Manpower Committee in 1925, and in March 1927 the Prime Minister appointed a committee to consider the proposal.

The proposed cabinet priority committee, as it emerged from the discussion, was modelled on the War Priorities Committee of the first World War. It was to consist of a minister without portfolio as chairman, the Service ministers and the President of the Board of Trade, together with the ministers of such new departments (National Service, Material Resources and Supply) as might be set up. Its functions would be to lay down principles by which conflicting demands for raw materials, manpower, manufacturing capacity and transport services might be settled, and also to determine particular questions referred to it. The proposal was that the

different fields, for example, manpower and materials, should be covered by sub-committees.

This plan remained unchanged until 1938. Up to that time such determination of priorities as was necessary was done by the Supply Board, but since labour, raw materials and capacity were all in excess of requirements, the work was negative rather than positive. The events of 1938—the lifting of financial limit upon some fields of armament production and the crisis over Czechoslovakia—brought the proposal that the Ministerial Priority Committee should be brought into being in anticipation of the actual outbreak of war. The Cabinet approved this proposal on 19th April 1939, and the Committee came into being on 1st September. Its chairman was the Minister for the Co-ordination of Defence and its composition was almost exactly as had been planned. Sub-committees on materials, production and labour were set up immediately. Thus the Ministerial Committee on Priorities, proposed as early as 1925, came into being on the eve of war just as had been planned in 1927. Very important developments lay ahead of it, but consideration of these must be delayed until a later stage in this volume.

Meanwhile there is, in all this planning that we have been describing, one element which may seem to the post-war reader to be laggard and little regarded—overseas supply. It is true that between the wars armament production in the Commonwealth countries other than the United Kingdom was negligible, and that the United Kingdom was accordingly a disposer rather than a receiver. Even in Canada the capacity of the single Government arsenal was very limited. Organisationally it is a striking fact that Canada was quite left outside the Principal Supply Officers Committee organisation, and did not develop any comparable organisation of its own. Canadian resources of war potential were thus almost unknown.

It was not until the Imperial Conference, in May 1937, that developments occurred. The question of establishing war potential in Canada now began to be discussed, and the Chiefs of Staff were strongly in favour of it. At the Conference, the United Kingdom encouraged the other Commonwealth countries to establish a potential for munitions production, but was somewhat vague on the vital question of the placing of orders. Yet it was of course upon orders from the United Kingdom the possibility of establishing potential in Canada almost exclusively rested, since Canada, as it then seemed, would not require a munitions industry for her own purposes. In the circumstances it is not surprising that progress was slow.

What of the United States? The immensity of the American industrial potential and the sympathetic American political attitude were alike full of encouraging possibility. It was unlikely, to say the

least of it, that Germany could obtain supplies from across the Atlantic. On the other hand Britain could not do so either until the repeal of the arms embargo by the revised Neutrality Act of 4th November 1939, which, in the words of Mr Cordell Hull,¹ 'opened the arsenal of the United States to Britain and France'. Discussions about the setting up of a purchasing agency in New York had begun in the spring, well in advance of this event, and the first decision to be taken was in favour of a direct agency, and against the use for this purpose of any intermediary, such as J. P. Morgan & Co. who had acted in this capacity in the first World War. On 7th November the British Purchasing Commission was formally set up, and the great business of procuring supplies from the United States passed out of that phase of pre-war planning to which this section of our story is still confined.

(ii)

Planning the Deficiency Programmes

In the middle of the nineteen-thirties—and if we are to be less imprecise we may say in 1934—the whole picture of the planning of supplies underwent a change which, at any rate in looking back upon it, we can see as dramatic, although dramatic in its suspense rather than its speed of action. The administrative machinery with which we have been dealing up to this point was, as we have said, concerned with war *potential*, that is to say with means of expanding production which could be put into effect after the outbreak of war. By 1934, two years after the repeal of the 'ten-year rule', it had become clear that planning of war potential, however carefully the planning might be done, and however impressive the potential itself might be, was not an adequate substitute for immediate action. It was necessary to bring into being not only plans for producing supplies in time of war, but plans for producing such supplies *before* war broke out—indeed as quickly as possible. The inauguration of the new era owed much to the Defence Requirements Committee, which consisted of the Chiefs of Staff together with one or two officers from equivalent civilian positions and which had been set up in 1933—the year in which Hitler became Chancellor of Germany—'to prepare a programme for meeting our worst deficiencies'. It is accordingly with the interdepartmental machinery for controlling what came to be known as 'deficiency' production that we must now deal.

¹ *The Memoirs of Cordell Hull*, Vol. I (Hodder & Stoughton, 1948).

In turning to this new branch of the subject we do not leave the Committee of Imperial Defence.¹ The bodies which co-ordinated deficiency production were part of the Committee's structure just as were the bodies which co-ordinated the preparation of war potential. The main body with which we are concerned is the Sub-Committee on Defence Policy and Requirements, which emerged in 1935 from a somewhat complex attempt to find a suitable instrument. With the Lord President of the Council in the Chair, the Chancellor of the Exchequer, Foreign Secretary and political chiefs of the Service departments as its backbone, and the Chiefs of Staff present as expert advisers, the Sub-Committee represented a powerful accession of authority for planning. From 1935 onwards the letters 'D.P.R.' were heard frequently in the departments. They represented an extension into current departmental activities of the Imperial Defence machinery with all its procedure for enquiring into facts and following up decisions. There was however a certain delay, since the new Committee came into being at a time of international crisis, and until the end of the year was immersed in the urgent problem of the dispute between Italy and Abyssinia and its possible consequences. It emerged from this crisis (which had been signalised on the German side by the repudiation of the military clauses of the Treaty of Versailles in March) as the guiding and the controlling influence in matters of current supply policy. A most important part of this mechanism of control was the progress reports which each of the Service departments submitted to the Committee each month. These reports covered not supply questions alone, but Service policy and progress in their widest capacity—recruitment, training, organisation and so forth. Yet they were addressed to supply questions with, perhaps, even from the beginning, peculiarly close attention. Thus Air Ministry reports gave not only details of orders and deliveries, but the reasons attributed to failures to meet orders. On at least one occasion the War Office report was entirely limited to supply questions, and although Admiralty reports displayed a special concern with naval recruitment they dwelt at length upon the same problems. Important as it was, however, the D.P.R. was not an organisational specific. It had no machinery of its own; in itself it was merely a cog in the machinery of the Committee of Imperial Defence. It derived its authority from the Cabinet status of its members rather than from anything in its own constitution, and if this authority was high, it was because the D.P.R. was essentially a piece of the Cabinet.

The D.P.R. did not operate alone. It collaborated very closely with the Defence Requirements Sub-Committee, to which reference has

¹ See Cmd 5107.

already been made, and whose function may be understood from the omission of the word 'policy' in its title. The senior and junior committees together constituted the machine which, in the second half of 1935, with a good deal of caution—caution both as to the date and the method of financing departmental programmes, and also as to avoiding pessimism about the international situation which made the programmes necessary—began to devote attention to departmental programmes on the basis that by 1938–39 each Service should have advanced its state of readiness to the necessary extent. It was the junior committee which was to conduct an investigation, and to offer guidance on two important questions; first as to the special measures which would be required for increasing factory output so as to provide the material within the set period; and secondly, the period required to achieve the same degree of preparedness if no special measures were taken. These activities on the part of the Defence Requirements Sub-Committee had administrative and organisational consequences which we shall consider as they arise.

In general the D.P.R. exercised its co-ordinating influence in broad terms, leaving the settlement of details to direct inter-departmental discussions. Even when dealing with departmental reports, which offered a wide field of comment and action, the Committee was generally content merely to 'take note'. Its members no doubt felt that if they were informed about the difficulties of each other's departments, then that in itself would tend to ease the difficulties which contained an element of departmental rivalry. Such a case arose in fact in 1936, when the Secretary of State for War remarked that Admiralty plans for the production of guns, gun mountings and fire control equipment might cause interference with the plans of his own department. He was however content to mention the matter without pressing it, and conceded the prior Admiralty need. He may have felt that enough could be achieved by a hint and a courteous withdrawal; it is at any rate clear that much was achieved in this Committee by such methods. There were, it is true, occasions upon which the D.P.R. approached more closely to the exercise of a direct authority. In the autumn of 1935, when the Italo-Abyssinian dispute was throwing up a series of greater and lesser crises, the Committee gave close attention to the shortage of anti-aircraft ammunition, approved the proposals for the continuity of orders, and in effect instructed departments to submit proposals for accelerated production through the Treasury Inter-Services Committee. Again, it was to the D.P.R. that the Secretary of State for Air, in the early summer of 1936, referred an important test case concerning financial terms for the operation of shadow factories. He had failed—by a wide margin—to reach agreement with the firm concerned and wanted full Government backing for adhering to what he

considered to be fair terms. This the Committee, after a full discussion, were very pleased to give; they were ready, if the firm still proved recalcitrant, to confront them with a body representing the full authority of the Government. Again, in the spring of 1937, after discussing a proposal for the purchase of anti-aircraft guns abroad which had been referred to it by the Treasury Inter-Services Committee, the Committee made detailed recommendations that the First Lord and the Secretary of State for War should jointly examine the possibility of adapting and manufacturing two different types of British naval guns. Recommendations or backing were in such circumstances tantamount to executive decisions; it is their rarity which makes them noteworthy.

Thus, by way of the series of negatives which becomes familiar in dealing with this interdepartmental machinery, we arrive at the question: what did this machinery in fact do? We have seen that the Defence Requirements Committee had been set up in 1933 in order 'to prepare a programme'. Did it do so? If by the term 'programme' we understand a classified list of matériel associated with a forecast of dates by which it will be available to the Services concerned (and that is the meaning that will normally be assigned to it in these pages), then the answer to this question is 'no'. The 'programme' which the Committee drew up and which was submitted through the Ministerial Committee on Defence Requirements to the Cabinet in March 1934 was a scheme, drawn up in the light of the prevailing strategical and financial situation, of financial allocation to the various elements of Service requirements. The allocations were made in considerable detail. The Naval Deficiency Programme for example, ran to some sixteen items, proceeding from major ones such as the Fleet Air Arm and the modernisation of capital ships down to such items as medical stores. When the Ministerial Committee considered this programme it cut by half the proposals for meeting the Army's deficiencies but greatly increased the programme of the Air Force; yet it was once again the Defence Requirements Committee which, in the following year, was asked to 're-examine the programmes'. This re-examination they undertook by a process similar to the one which they had employed in the preceding year. Their report, after a grave and searching discussion of the recent developments in the strategical situation, went on to propose a 'new standard' of strength for the armed forces. There followed an attempt, now made in greater detail than formerly, to translate this new standard into ships, guns and aeroplanes. The proposals themselves, however, appear to have originated in the departments; the Committee proposed mainly to 'adopt' programmes and 'concur in proposals'. This process, indeed, set as a pattern for the activity of the interdepartmental committees and the departments, continued

to be the pattern until the outbreak of war. Changes, however, were occurring elsewhere.

Reference has already been made to the enquiries which had been undertaken by the Defence Requirements Sub-Committee. One result of these was to bring into closer association the two parts of the interdepartmental supply machinery—that dealing with war potential and that dealing with deficiency programmes. A D.P.R. recommendation that questions of allocations and priority should be dealt with by the Supply Board shows this process of fusion beginning. The D.P.R. retained its right to hear appeals, but the effect of the acceptance of this recommendation was that the Supply Board, formally a planner of war potential, began to play a vital part in organising current production. The line between war potential and deficiency had however begun to blur and fade, and in spite of Treasury disapproval of arguments which treated the war hypothesis as a basis for actual programmes, this process continued. Thus in November 1936 the Supply Board recommended that orders for plant and machine tools should be placed upon the basis of the war potential hypothesis, when that basis was wider than what was called for under the deficiency programmes. By the end of 1936 the Supply Board felt obliged to draw the attention of the Principal Supply Officers to what they considered to be critical elements in the situation. In doing so they struck an almost apologetic note. A great deal had been achieved, and more was in hand; action taken under the deficiency programmes would, for the first time since 1918, place at the disposal of the Service departments a war potential transcending the limitations of the specialised armament industry; good relations had been established with large industrial firms; but the making good of deficiencies must be 'the first and most urgent requirement'. Nevertheless, in the opinion of the committee, the creation of a war potential of the size demanded by the War Office hypothesis could not be brought about by any other means than by placing orders in peace so that firms might equip and train themselves and their labour, and by the provision of additional plant.

The planning of war potential as such was in any case running into serious difficulties. These were of two kinds. First there were administrative difficulties, such as lack of finance and of staff, the second being exacerbated by preoccupation of departmental staff with their deficiency programmes. The second class of difficulty has already been referred to: it was chronic and serious; the difficulty of planning war potential without a firm and durable basis of requirements. As regards the administrative difficulties, the Principal Supply Officers Committee and the Supply Board in July 1938 declared that it was impossible to complete supply operations by the agreed date of November 1939, largely because of lack of staff and finance. For this

reason, they said, executive work on the problem had had to be 'largely crammed into the last two years'. They had already, however, in July 1937, said that 'the main difficulty had been the lack of firm Army requirements'. In 1938 there were still doubts about the War Office hypothesis, one having been received in July 1937 which envisaged the Territorial Army as part of the Field Force in war, the next having been based upon its omission. From difficulties of this sort the Principal Supply Officers Committee could indeed hardly escape. The doubling of the Territorial Army in March 1939, which, as the Committee pointed out, would have the effect of at least doubling the capacity required for certain Army needs in the early days of the war, was only by way of being the culmination of the process of inflating the hypotheses upon which war potential was supposed to be based.

That part of the interdepartmental co-ordinating machinery which was devoted to the planning of actual as opposed to potential supplies was from the organisational point of view in an altogether happier position. It had been possible to carry out a process of simplification. In November 1937 the Defence Policy and Requirements Sub-Committee came to an end as a separate body. The story of its demise requires a reference to a sister committee, that of Defence Plans (Policy) which had been created in 1937 to examine plans for a future war and also to provide a nucleus for a War Committee or War Cabinet. There had thus been in existence three committees, the Committee of Imperial Defence itself, the Sub-Committee on Defence Policy and Requirements, and the Defence Plans (Policy) Sub-Committee; and these three committees, in the words of the secretary, were 'all more or less independent of one another, [and] all dealing with defence questions without very definite lines of demarcation'. The position had a number of disadvantages; it was very awkward from the point of view of secretarial work, particularly indexing; Government departments were in doubt about the appropriate body to which to refer their problems; and urgent problems tended to be referred to whichever body was meeting first, regardless of its appropriateness. But, as the secretary pointed out, it was in a difficulty of this kind that the constitutional elasticity of the Committee of Imperial Defence was so great an asset. It could simply absorb the two sub-committees. The main Committee, as its chairman remarked in putting the proposals to it, would continue to hold fortnightly meetings on alternate Thursdays. On intermediate Thursdays the members of the existing Defence Policy and Requirements Sub-Committee would be invited to attend a meeting of the Committee of Imperial Defence which would deal with supply. From time to time there would be a meeting of the principal Committee in its 'Plans' uniform.

Thus, during the critical years 1938 and 1939, the co-ordination of departmental action in the field of rearmament was handled directly by the Committee of Imperial Defence. There was no great change in method, but as the international crisis developed there was a steady increase in the pervasiveness of the Committee's interest in the difficulties which departments were experiencing. The early months of 1938, for example, brought a series of discussions about the supply of armour plate for the Navy, and proposals were made for meeting labour shortage at Vickers; in the summer the chronic uneasiness about the obsolescence of naval aircraft broke out in discussions about the Skua. Supplies of aircraft from America was another subject that received careful consideration. More and more items were added to the lists which, in the departmental progress reports, came up each month for their consideration, and more and more details were required about each item. In the course of a single meeting in March 1939 the Committee decided 'to invite the War Office to amplify the information given in future Progress Reports' so as to give a more comprehensive time-table, and secondly to obtain a more detailed analysis of the aircraft programme from the Air Ministry.

As the outbreak of war drew nearer the Committee of Imperial Defence came to be more and more fully informed about the progress of munitions supply. In attempting to discern whether this increase in knowledge led to an increase in the authority which it wielded, we must remember that the Committee remained until its last meeting an advisory body only. And if we consider it *vis-à-vis* the Cabinet or the Prime Minister, and as concerned with great questions of national policy and strategy, it was advisory in fact as well as in name. If however we turn to some of the more detailed supply questions which it discussed during 1938 and 1939, and consider that it met under the chairmanship of a minister who was charged with co-ordinating the activities of the Service ministers who themselves with their expert advisers formed the backbone of the Committee, we shall appreciate that the Committee could have played an extremely authoritative part in the settlement of such questions. Yet during these two years there was perhaps only one departmental and one interdepartmental issue in which the Committee spoke or acted in a manner which suggested the degree and kind of authority which it might have wielded if it had wished to do so. In the spring of 1939 the production of tanks was discussed in considerable detail, and although the Committee did not discuss specific solutions to problems it took the unusual step of inviting the War Office representative 'to express to the Secretary of State for War the anxiety of the Committee over the tank production situation'. The other case was that of the interdepartmental friction which followed upon the Government's decision to introduce conscription. The reception of the militiamen

imposed a sudden and very heavy burden upon the War Office in the way of providing accommodation. The Treasury authorised a cost-plus form of contract for the carrying out of this work, and the result was a sudden drawing away of labour and resources from the work of other departments. This caused a very marked disturbance; for once an interdepartmental dispute was reflected in a note of acerbity within the Committee itself. The Committee discussed the matter fully, and was clearly prepared to take immediate action; it set up an *ad hoc* committee to investigate and make a quick report. But occasions of this kind were, it must be repeated, exceptional.

Nor, as may be inferred from what has already been said about progress reports, did the Committee of Imperial Defence itself play a very different role in regard to the drawing up of programmes from that which had been played by its predecessors. The programmes continued to be hammered out by a process which went on directly between the Cabinet and the departments, with the Minister for the Co-ordination of Defence playing a very limited part as an intermediary. It was to the Cabinet that the Minister, in December of 1937, put forward his views on the allocation of the finance which the Treasury calculated would be available for defence in the period 1937-41, and of the strategical policy which he considered should be based upon this expenditure. Thus for the Navy he proposed that the Admiralty should not incur expenditure which committed them beyond the D.R.C. standard; for the Army that its primary role should be that of Imperial commitments; while the Air Force was to concentrate on increases in the Metropolitan Air Force and not to make further increases in the overseas forces. It was upon a basis of strategical planning evolved in this way and approved by the Cabinet that the departments based their detailed programmes. We have already seen¹ the process by which, in the spring of the following year, the Air Ministry produced Scheme L, in response to an invitation by the Minister for the Co-ordination of Defence to draw up a programme on the basis of provisional allocations.

It might appear as a conclusion to this account of the work of this rather complicated network of interdepartmental committees that the important part is that which lay in its financial allocations. On the whole it would be true to say that the departments proposed, and the Cabinet decided. There is indeed a danger that a formalistic view of the position might result in an underestimation of the part which the committees played. It must never be forgotten that in all these events the number of ministers, high Service officers and officials concerned was very limited. The ministers who acquired

¹ See pp. 38 and 40, *et seq.*

information by their attendance at the D.P.R. were the same ministers who contributed to the vital decisions made in Cabinet; the Chiefs of Staff who acted in a consultative capacity in the Defence Requirements Committee and the senior officers and officials who deliberated in the Supply Board were the same men who gave to their ministers the expert advice on which the important submissions to the Cabinet were made. Everyone who acted at one time in an advisory capacity was simultaneously involved in another capacity in executive decisions. There are, indeed, two ways in which we may attempt to measure the effectiveness of the machinery. One is by considering contemporary criticism and proposals for alternatives. The second is against the history of subsequent events. It is to the first of these measures that we now turn, leaving the second to be applied as we reach a later period.

(iii)

Towards a Ministry of Supply

In conditions of peace, so long as the conditions remained stable, there were many people who held very strongly the view that the interdepartmental machinery of supply was adequate for its purpose. But there were others, even then, who were equally convinced that it was not, and as war became once again a serious possibility the question began to be repeated upon a note of anxiety. Both the satisfaction and the anxiety were in their turn easily enough explained in the light of history, since they reflected the circumstances by which Britain, in the first World War, had been forced to establish a strong central control of supply where previously such a control had been almost entirely lacking. In other words satisfaction in 1930 was a reflection of the great improvement upon the position as it had been in 1910; anxiety in 1938 was due in part at least to the fact that the organisation fell far short of what had been found necessary in 1917.

But satisfaction, as we have said, was at no time universal. The idea of co-ordinating supply, even in time of peace, not through a system of interdepartmental committees, but through a department of State set up for the purpose, had been present in some quarters ever since the war-time Ministry of Munitions had itself been dissolved. This course was advocated by the Haldane Committee on the machinery of government in 1918, and considered by the Cabinet in the spring of 1920; but it was thought that the advantages to be obtained from a Ministry of Supply was likely to be outweighed by the Parliamentary difficulties of creating a new department, and the proposal was turned down. This was but the beginning of a long

history. As early as 1922 the idea was canvassed again in the discussions of a committee which was set up to consider the amalgamation of services common to the Navy, Army and Air Force. This committee, however, thought that a common supply department for separate Services would be uneconomical and inefficient, although the members of that committee urged throughout their report—generally called the Mond and Weir Report—that its conclusions were applicable only to conditions of peace and retrenchment, a reservation not always borne in mind by those who were to quote from it later. Four years later, in 1926, the Principal Supply Officers Committee, in their paper on ‘Supply Organisation in Peace and War’, to which reference has already been made, provided some comments which were to echo for many years in Government discussions. After pointing out that since nothing in the nature of a Ministry of Munitions existed in time of peace its creation in time of war must mean a definite breach with the normal machinery for production, they proceeded to remark that not only had the function of purchase to be transferred to the new department; there was also the much more difficult question of the transfer of responsibility for design and inspection. ‘This’, the Committee remarked, ‘deprives the fighting Departments of their responsibility under these heads.’ This was, of course, a discussion about a Ministry of Supply proper, such as actually came into being in 1939. What the Principal Supply Officers actually proposed and what the Committee of Imperial Defence approved, was that in time of war each defence department should deal with its own supply, and that the machinery provided to assist them should consist, first of a Ministry of Material Resources, secondly of a supply organisation based on the continuance of the peace-time committees, and thirdly of a ministerial priority committee. These then, in 1927, became the official plans for supply in time of war, but little more was heard of them until the international situation of the mid-’thirties, and Britain’s rearmament response to it, brought them out of their pigeon-hole to be reconsidered with a new gravity and a new urgency.

It was in June 1936 that the Minister for the Co-ordination of Defence, Sir Thomas Inskip, sought the views of his colleagues on suggestions that had been made in the House of Commons concerning a Ministry of Supply. It is to be remembered that when different people from now on spoke about a ‘Ministry of Supply’ they often meant different things, but the ministers who gave their views to Sir Thomas appear to have shared a conception of an elementary department set up in time of peace, developing, in war, into a fairly thorough-going Ministry—a central executive department supplying finished weapons to all three Services. The most decided voices were those which spoke against the proposal. It would

slow up production; there was no advantage in abstracting men from departments to do the same work elsewhere; a Ministry of Supply with selected powers in time of peace was a very different thing from a Ministry of Supply with full powers in time of war. But if Government opinion was against the proposal it was also clearly against shutting the door on it altogether. Not for the last time the question of a Ministry of Supply was left for further consideration.

The next move was made, not on the ministerial, but on the official level, and it was a somewhat surprising one. At the end of 1936 the Chairman of the Supply Board expressed an uneasiness which, he said, the members of the Board had felt 'for several years' about the 1927 arrangements. What they now envisaged in time of war was a combined Ministry of Supply and Material Resources; in fact they thought it would be necessary to establish this as soon as war broke out. Reporting these views of the Supply Board to the Committee of Imperial Defence Sir Arthur Robinson said that they accepted the Admiralty view that it should not enter into such a department; about the position of the Air Ministry there was disagreement. These proposals constituted a break with—they proved in the event only to be an interruption of—Government thinking on the subject of supply organisation in war, and a break that might have very important consequences, both administrative and political. For the Ministry of Supply was now assuming a symbolic quality—to its advocates a symbol of Britain's readiness to meet the strident challenge of Hitler's Germany, to its opponents a symbol of what has since become known as 'warmongering'. It was not likely that a quick decision would be reached on the Supply Board's proposals, since to some ministers and others a decision to set up a Ministry of Supply would have seemed alarmist and alarming, and in fact the Committee of Imperial Defence, when it considered Sir Arthur Robinson's report, decided to obtain first of all an authoritative opinion on whether the proposed 'central executive Ministry' should in fact cover all three departments, or whether the Admiralty, and if so the Air Ministry, 'should remain outside'. To obtain this they appointed a sub-committee.

The sub-committee, however, reporting a year later, in December 1937, disagreed with the conclusions reached by the Principal Supply Officers Committee, that a Ministry of Supply should be set up at all either in wartime or peace. Basing their conclusions on the concept of limited liability, reaffirmed and reinforced during their deliberations by the Government's decision that the preparation of the Army in advance of war should be limited to the Regular Army, Air Defence of Great Britain, and four Territorial Divisions, and on the inseparability of design, inspection, and supply, they had in fact thrown their terms of reference overboard, and urged that it should

not be necessary to transfer responsibility for the supply of finished stores to a central supply organisation at the outbreak of war, provided that the Deficiency Programmes of the departments were completed and if the Air Ministry and the War Office also completed their arrangements for supply to the extent estimated in the first twelve months of war. The sub-committee's proposals were in fact a reversion to the 1927 proposals, and this was emphasised by their recommendation that steps should be taken to lay out the organisation and prepare for the establishment of what was in effect the Ministry of Material Resources, now described as a ministry for the control (and supply, as necessary) of materials and labour. It was also assumed that a Ministry of National Service would be set up on the outbreak of war.

The sub-committee's report was accepted subject to a review of the completion of their programme of the interested departments in twelve months time. The problem of a single central supply organisation in wartime for munitions and warlike stores was to be considered in the light of that review, to the results of which we shall return.

Meanwhile, in authoritative quarters outside the Government the project of a Ministry of Supply was finding important advocates. Among them were the members of the Royal Commission on the Private Manufacture of Arms,¹ who in their Report published in 1936 gave their views as follows:

In principle, however, we think there should be established by the Government a body for the purpose of controlling supply and deciding advisory powers over supply, manufacture, costing and the authorisation of orders from abroad. It should be presided over by a Minister responsible to Parliament. Its main duties would be the consideration and the decision of all questions of supply and manufacture in peacetime, the preparation in full detail of the regulations and plans for emergency expansion by co-operation between the Government establishments, and private industry, the encouragement and development of scientific research, costing and the control of prices and the inspection and the authorisation of all orders received from abroad by armament firms.

The report went on to urge that the Government's own manufacturing establishments should be fully equipped for the production in some measure of naval, military, and air armaments, and that most of the functions of private firms engaged in the manufacture of armaments, and several others besides, should be added to them.

In the House of Commons the question had a continuous history from 1934 onwards. In that year, in the course of the debate on the Report on the Private Manufacture of Armaments, Dr Christopher

¹ Cmd 5292. (Report of Royal Commission on the Private Manufacture of and Trading in Arms (1935-36), para. 130.)

Addison (later Lord Addison), a former Minister of Munitions, asked, in effect, for some national agency with functions akin to the Ministry of which he had formerly been the chief, not as a war-time emergency but as a measure of reasonable efficiency and co-ordination even in time of peace.¹ Mr Churchill pressed for such a Ministry continually and in 1936 published a memorandum on the matter to which reference will be made later. In May 1938 in the Lords,² Lord Mottistone, who had himself been at one time the second-in-command of the Ministry of Munitions, moved to resolve that in the interests of national security a Ministry of Supply for the three defence Services should be set up. His arguments, in which he was seconded by Lord Addison, were that the international situation had deteriorated rapidly since the matter was last discussed, that the situation closely resembled that of 1915, and the lesson to be derived from the resemblance was that the supply departments of the three different Services, together with the supply advisers to the Minister for the Co-ordination of Defence, Sir Thomas Inskip, were, and must be, totally incapable of performing the function which a Ministry of Munitions Supply could perform and did perform with extraordinary success in the first World War. In Lord Mottistone's opinion supply, invention, design, and above all production of all kinds should be entrusted to captains of industry rather than serving officers. Lord Samuel remarked later in the same debate that 'A Service Department, or a group of Service Departments, is not fitted to mobilise industry, allocate priority and carry out all the other measures which are needed'. All these arguments, of course, were addressed towards the creation of a thorough-going Ministry of Supply; that a Ministry of Material Resources would be set up was known or assumed.

The opponents of the motion did not advance general principles as a ground for their objections. Their arguments were that the existence of a Ministry of Supply might be more appropriate to a state of war, that it might interfere with normal trade, and that in peacetime its proposed functions were adequately carried out by the supply department of the three Services and the various sub-committees of the Committee of Imperial Defence (though not all the Government supporters were equally impressed with the adequacy of these committees). It was the wording of the motion that the Ministry should be set up 'forthwith', and this of course was going far beyond the most radical proposals made *inside* Government circles at any date before the spring of 1939.

The arguments employed by the advocates of a Ministry of Supply

¹ H. of C. Deb., Vol. 293, Col. 1394-1404, 8th November 1934.

² H. of L. Deb., Vol. 109, Col. 287, 23rd May 1938.

were heard again in an atmosphere of greater urgency in the Commons,¹ the November of the same year, when Sir Hugh Seeley moved an amendment to the Address:

But we regret that although deficiencies both in military and civil defences are admitted by your Majesty's Ministers as well as serious delay in the execution of the programme of rearmament stated to be necessary by the Service Departments for national safety, no mention is made of the creation of a Ministry of Supply both to secure efficiency and prevent waste and profiteering.

The gravamen of that long debate was the condition of the armed forces, particularly the Air Force, and the formidable figures of German aircraft production obviously lay heavily on the minds of the House. The fierce attack launched on the Government's preparations for defence chiefly by Mr Churchill and Colonel Moore-Brabazon had as its grounds that the Government had clung too rigidly to its defence programme originated three years earlier, despite vastly changing conditions, and that in aircraft particularly a needless multiplication of types was hindering production. The question was whether the faults, if faults they were, in the existing system of supply would not have occurred if there had been a Ministry of Supply. Sir Thomas Inskip maintained that they would still have occurred since 'the Minister of Munitions would be directed to carry out still the policy of the Secretary of State for Air and his advisers in the Department'.² The conclusiveness of this retort rested on the crucial decision of what the powers of the proposed Ministry should be *vis-à-vis* the Service departments, and the argument was in fact produced by a Government supporter that the Ministry was impracticable since strategy could not be separated from supply. Mr Churchill had his reply ready: 'In war why should you divorce strategy from supply? Supply will dictate the strategy of most of the wars that are to be fought in the future.'³

Other arguments produced by the Government supporters were those being used inside Government circles, that the creation of such a department would interfere with normal trade and that to be effective it would need to be vested with compulsory powers. The latter charge was vigorously denied by many Members and Sir Arthur Salter referred to Mr Churchill's memorandum mentioned above in which he proposed a Bill in two parts—one giving extreme powers applicable only in time of war and another part in which the Ministry would have powers that were still considerable but more limited in time of peace. Sir Arthur Salter also repeated the point

¹ H. of C. Deb., Col. 1087, Vol. 341, 17th November 1938.

² *Ibid.*, Col. 1103.

³ *Ibid.*, Col. 1142.

fundamental to the supporters of the amendment and which had been emphasised so strongly in the Lords' debate:

A fighting Service as such is a very good judge as to whether an aeroplane or ship is good, but it is not conversant normally with the methods of production and the conditions in which it is possible to get a great increase in supplies. . . . The Air Ministry in particular has not any experience comparable with that which the Admiralty has acquired through the great dockyards.¹

The Prime Minister's reply concentrated chiefly on the proposed powers of the Ministry. 'The only person who can satisfactorily decide on what is the proper relation between the number of aircraft and their efficiency is the Air Minister, as advised by his technical advisers. Does anybody really suppose that a Ministry of Supply can be the authority for the standardisation of destroyers, tanks and aircraft?'² The Prime Minister spoke of the Mond and Weir Report of 1922 to which we have already referred:

In the case of all highly technical requirements and even in regard to requirements of a more common nature, the user and the technical authority must be most intimately associated; so closely in fact that no definite line can be drawn between them. For example, almost all the members of the Board of Admiralty are immediately concerned with the technical details of a warship. The Chief of the Air Staff must retain the right to alter or modify the material involved in a contract for aeroplanes and, similarly, the Master General of Ordnance, while responsible for the design and supply of a fighting tank, must necessarily conform in his everyday work to the policy of the General Staff. . . . A single Supply Department under any one authority, having on its council as members the Third and Fourth Sea Lords, the Quartermaster-General and Master General of Ordnance, the Director General of Aircraft Supply and Research, representing the users, together with the heads of branches of the supply departments, would suffer severely on account of the dual responsibility of the Service members. We are of the opinion that an amalgamation and co-ordination of supply could only be a practical proposition as a concomitant part of a Ministry which controlled a defence force in which the identity of the naval, military and air services had been merged.³

The Prime Minister reminded the House that some of the supporters of the amendment had been of the opinion that design, inspection and supply must all go together and that if these functions were transferred to a Ministry of Supply 'then you were going to separate design from the user of that design and thereby create very

¹ *Ibid.*, Col. 1165.

² *Ibid.*, Col. 1202.

³ *Ibid.*, Col. 1203.

grave difficulties'.¹ Indeed there was by no means universal agreement among the supporters of a Ministry of Supply as to what should be the exact extent of its authority. Public opinion was being increasingly focused upon this issue. In November, on the same day as the debate, Sir Arthur Salter in *The Times* made proposals which suggested that some control of design should be vested in the Ministry of Supply, and this letter attracted a considerable amount of attention. The point has been made earlier that the supporters of a Ministry of Supply were by no means agreed on what the apportionment of the functions of strategy, design, research and experiment, supply and production should be as between the Service departments and a Ministry of Supply. It can at least be said however that all this discussion tended to cast doubt on the existing apportionment of functions.

How was official thinking moving while advocacy was being lavished for and against the project in public? The review of the production situation which, as we have seen, the Committee of Imperial Defence had asked for in a year's time, was duly undertaken by the Minister for the Co-ordination of Defence in January 1939. It revealed that both the War Office and the Air Ministry, although not the Admiralty, fell short of war potential. 'It seems clear', the Minister wrote, 'that further large measures of industrial mobilisation will or may have to be taken in an emergency, and this was the supply position out of which the Ministry of Munitions originated in the last war.' He now felt that public opinion would force the Government to set up a Ministry of Supply 'in the full sense' on the outbreak of war, and recommended that an immediate decision should be taken about this. The question of whether the Ministry of Supply should cover all three departments or should omit the Admiralty could, Sir Thomas thought, be left until war broke out. Detailed plans, he added, were already in hand for the Ministry of Materials, and: 'If responsibility for the supply of finished war stores . . . is to be centralised in one Ministry in war, then that supply (and also corresponding design and inspection) must be centralised in the Ministry already approved by the Committee of Imperial Defence', said the Minister for the Co-ordination of Defence, 'namely a Ministry for the control of materials and common services which would then become a Ministry of Supply in the full sense of the word'.

The Committee of Imperial Defence now accordingly informed the Cabinet that in their view it would be necessary to set up a Ministry of Supply in time of war; that current planning should cover either a three- or two-Service department; but that a decision

¹ *Ibid.*, Col. 1205.

should be made on the subject. It was already the end of January 1939—seven months and one week before Britain was destined to go to war—but before the final decision of April several moves were still to be made in the debate. After considering the report of the Committee of Imperial Defence the Cabinet called for further advice, which was supplied by the Minister for the Co-ordination of Defence and the Chancellor of the Duchy of Lancaster in a joint memorandum which bore the familiar title of ‘Supply Organisation in Peace and War’. This memorandum recommended, and the Cabinet adopted, four important but, as it proved, short-lived proposals. The first was that a Ministry of Supply should not be set up in time of peace; the second that all preparations should be made for setting up a Ministry of Supply in time of war; the third that a decision that whether, and if so, when, a Ministry of Supply should be set up in war should be deferred until ‘the onset of an emergency’; and the fourth was to compromise on the Admiralty issue—‘the Ministry of Supply should be responsible for the supply of the War Office and the Air Ministry and for some part, but not the whole, of the Admiralty requirements, unless and until the stresses of war compel the inclusion of the whole’.

A Ministry of Supply seemed farther away than ever. In fact, it was drawing very near. The Cabinet decision that the existing thirteen divisions of the Territorial Army should first be brought up to war establishment and then doubled in numbers was a big step away from the situation in which the creation of a Ministry of Supply might have seemed provocative, and when in April the Minister for the Co-ordination of Defence and the Chancellor of the Duchy of Lancaster drew up another memorandum its conclusions were radically different. It was in fact a *volte face*; it recommended the foundation of a Ministry of Supply ‘forthwith’ with the object of ‘taking over such stores of general user as may be convenient . . . and all Army supply’. Its powers were also to include the ability to take over supply functions from the other Services if this was later thought to be necessary. The Cabinet having approved these conclusions, legislation was put in hand. The long debate was over.

It is not difficult to see behind the cautious and hesitant approach of the Government to the creation of a Ministry of Supply, two great issues which cannot be discussed fully within the limitations of a history of administration. The reluctance of the Government of the day to provoke, and the willingness of a powerful section of public opinion to defy, the power of Nazi Germany and Fascist Italy, is a subject of larger and broader history than that with which we are here concerned. Yet, as we have seen, it profoundly affected, and indeed largely determined, the course of that history. There was also involved a clash of Service interests, and the question of the new department’s taking over functions from the Services was the ground

on which the clash took place. The observer can hardly help noting that the nearer any discussions about a supply ministry approached to practical effect, the further they fell below the imposing theoretical concept of comprehensiveness and authority. The three Service departments were not at all in harmony about the functions of a Ministry of Supply, and in some quarters at any rate it was felt that it had better never come into existence at all than come into existence as a dangerous intruder. Support for the idea of a Ministry of Supply came mainly from the War Office, where the view prevailed that a new department would free the existing one to get on with its own job. The Air Ministry was much less sanguine. By the spring of 1939 they felt their production machinery to be running on top gear, and they feared that an outside agency was at least as likely to damage as to improve it. They were enlarging their field of supply by sub-contracting, and they were very jealous of any attempt to limit this enlargement. The position of the Admiralty was different. They did not, they considered, compete for capacity with either of the other departments, since they relied on shipbuilding firms which could not be of use to the other Services, and on a small number of firms which were specialists in the production of naval equipment. Moreover the Admiralty considered that in the field of naval supply the continuity of the process which involved user, designer and producer was of special importance. They accordingly stood, so they contended, outside the sphere of competition and mass production which would be the province of a Minister of Supply; naval production should remain with the Admiralty as it had done in the time of the Ministry of Munitions. But above all the Admiralty was implacably determined not to relinquish responsibility for design, and it was regarded as a cardinal principle that responsibility for supply and design must be in the same hands. These views of the Admiralty were not of course new in 1938 or 1939; on the contrary, they had been heard in every discussion which had ever taken place upon the subject of a Ministry of Supply. But as events brought major decisions nearer, the Admiralty repeated their arguments with even greater firmness. The line which the Admiralty took in turn affected the Air Ministry. Design, they affirmed, was as important to them as it was to the Admiralty. If a supply department were to be formed, it should cover all three Services; if the Admiralty stood out, so must they.

In April the decisions were taken and the Ministry of Supply Bill was accordingly prepared; it passed the Commons in June. Government critics who throughout the 'thirties had been urging in the Commons the creation of a Ministry of Supply were, however, by no means satisfied with the Bill. The clause which gave powers to the Ministry 'to buy or otherwise acquire, manufacture or otherwise produce store or transport any articles required for the public service'

was considerably tempered by the limitation admitted by Mr Burgin, the Minister designate, whereby the consent of other Government departments had to be obtained before any transfer of powers could be made to the Ministry of Supply.¹ This limitation lent force to the criticism that the Bill gave wide and extensive powers which in the hands of an inefficient minister might be of no value.² Other critics of the Sir Arthur Salter school fastened on the exclusion of aircraft production.

The organisation of the Ministry of Supply was being prepared at the same time as the Bill which was to bring it into being. It was, of course, largely dictated by the nature of the existing organisations which it was to incorporate. Thus on the Army side the existing organisation was to be transferred *en bloc*, so that the contracts branches, for example, simply continued in the same building, and with the same files. On the raw materials side, the organisation had been worked out in the Board of Trade, and the staff of the Import Duties Advisory Committee was earmarked for the new department. So, on 1st August 1939, with its two wings linked by a body of secretariat and finance branches, with its new Permanent Secretary and Minister, the Ministry of Supply was launched. How it fared upon the stormy sea of 1940 and the ensuing years of war we shall see later in this volume.

¹ H. of C. Deb., Vol. 348, Col. 667, 8th June 1939.

² *Ibid.*, Col. 678 and elsewhere.

PART II

The Admiralty

CHAPTER V

THE DEPARTMENTS:

(1) NAVAL NEW CONSTRUCTION AND REPAIR

(i)

Preamble

IN THE OPENING pages of this volume a brief account was given, bird's-eye, of the Board of Admiralty—its origin, and its modern state of being as a composite 'person'. The reader may find it desirable to refresh his memory of those pages before going on. Particularly he should remind himself how within the collective authority of that 'person' there was diversity of function, but that the doctrine was of a superintending lord superintending particular *work*, whoever it might be done by, rather than commanding particular *stuffs*, whatever they might be doing. Again, that broadly speaking it was for the First Sea Lord as final authority of the naval staff to say what the Navy needed, and for the Third and Fourth Sea Lords as Controller of the Navy and as Chief of Supplies to see that these needs were met.

Decisions on matters of policy, we saw, were the prerogative and responsibility of the Board (exercised in day-to-day matters by the assent of two or more of its members): but technical and executive responsibility, for tendering specialist advice and for putting the Board's supply policy into effect, rested on an array of departmental directors. The natural history of these has already been touched on, in the opening chapter; but the departments have not yet been described separately. It will be the principal business of this chapter and the next to do so, picturing the departments as they were at the outbreak of war and then trying to show their development to meet the special needs of wartime.

The latter part of the present chapter will concern itself chiefly with hulls and engines: with the Naval Construction Department, that is to say, the Engineer-in-Chief's Department and the Dockyard Department, both at headquarters and in the field. There will be a section on 'Warship design and construction' showing, first, the close relations between the designers and the naval staff as well as their technical colleagues in other Admiralty departments: second, the

development over several decades of Admiralty machinery for superintending warship construction in the private yards: third, the difficulties faced by the naval construction and engineering departments in expanding and adapting their organisations to novel war-time needs. This leads to a section on 'progressing and planning' in war-time naval building. A further section deals summarily with the war-time organisation for repair and maintenance. The chapter concludes with a résumé from other sources contrasting the state of the shipbuilding and ship-repair industries at the material time with their state at the outbreak of the earlier war. The sequel—a description of the departments concerned with armament and equipment (either technically, or as the authorities for provisioning and distribution) will form Chapter VI. But before embarking on any of these separate accounts there is an important event to recite in some detail, for it profoundly affected all these departments and indeed had its repercussions in every corner of Admiralty administration. Within a few days of the outbreak of war there was a sudden removal to Bath—more than a hundred miles from the offices of the Board of Admiralty—of practically the whole of the production and supply side, so far as any precise line could be drawn, at departmental level, while the Controller and the Fourth Sea Lord and the naval staff and the rest of the Admiralty remained in London.

(ii)

The Move to Bath

The reader will surmise that this Bath exodus, this geographical division of the indivisible Admiralty, was not initiated voluntarily by the Admiralty itself. On the contrary, it was dictated by policies developed at a higher level—in Mr Baldwin's and Mr Chamberlain's Cabinets. There is irony in the story, for this Admiralty severance proved to be the only lasting result of policies which, at the time they were formulated, had neither the Admiralty nor severance particularly in mind.

The story is this. As early as the beginning of 1936 the Government began to be perturbed at a novelty in the problems of defence planning. This had been introduced by the increased striking-power of aircraft. It might now have become possible, they were advised, for an enemy to destroy the seat of government and with it the machinery of government in the first few days of a war, without having first won any general victory. There was at that time little experience available, by which to judge whether it was in fact possible (or probable): public speculation ran riot, and even

informed opinion found it difficult to arrive at very definite conclusions: but the problem could not be ignored. Committees instituted to study it¹ reported that to be on the safe side it would be necessary in the event of war at once to evacuate the whole business of government from London, and ultimately to spread it as thinly as possible over the northern, midland and western counties.

Detailed plans were prepared. Strictly speaking, these committee plans were still hypothetical; but there is a natural tendency for hypothetical plans of this nature, if they are vast and once they have been worked out in sufficient detail, to become accepted policy almost imperceptibly: and then for the accepted policy—it only needs a touch on the trigger—to become action. There was however a prime difficulty about ever implementing any such wholesale scheme of war-time evacuation as this one—the question of timing. From start to finish such a move, however carefully prepared, must take at least ten days: when was it to be carried out? Clearly it must take place before the capital and the railways serving it were destroyed, and that destruction might come very early in an aggressor's war if not instantly—this was the assumption on which necessity for the whole plan rested. But such a vast operation of removal in the first few weeks of *war* would interfere with the mobilisation and deployment of the armed forces: militarily it was quite unacceptable. Equally it could not be carried out in the last few weeks of *peace*: to embark on it in a merely critical situation might precipitate the international catastrophe. It might in any case alarm the citizenry (once they fully understood what was happening and why) to the verge, at least, of panic.

One is reminded of the dilemma of the Hibernian authority that had resolved to build a new gaol, resolved to build it from the materials of the old gaol, and resolved not to pull down the old gaol till the new gaol was built. The horns of this dilemma seem to have begun to make themselves felt by the Government at the time of the Munich crisis, for soon after it was decided that these plans must be reconsidered.

As for the Board of Admiralty, they had pretended no marked enthusiasm at any time for these plans to abandon ship forthwith in case the enemy might sink her. But now the plans were to be revised they took the opportunity of putting forward proposals of their own. These proposals conformed in appearance to previous Cabinet policy, but in essence savoured much more of clearing the decks for

¹ A committee to consider the advisability of evacuating the whole machinery of government from central London in the event of war was set up under the chairmanship of Sir Warren Fisher in March 1936. The Cabinet approved its report in February 1937 and set up a further interdepartmental committee under Sir James Rae to work out evacuation plans in detail. The Rae Committee reported in November 1937.

action. Let them (they now asked) be allowed to buttress the stronger parts of their Whitehall building, and let them at least try to hold these as headquarters for the Board and for those officers, naval and civilian, whose business was with mobilising and operating the fleet. The remainder of the Admiralty consisted chiefly of departments whose most essential contacts in wartime were with the shipyards and the engineering midlands rather than with the fleet or the War Cabinet. These could be sent somewhere not too out-of-the-way (such as Bath). If this were decided, the sensible thing would be to move them early, as a peace-time operation, and to let them establish themselves well in advance of hostilities. Then, should war experience show that the Whitehall building, in spite of dug-outs and shoring-up and the rest, was in fact untenable for long in the face of air attack, the mere one-fifth of the full Admiralty staff left behind could be conveyed comparatively easily to some other town in the west-country; there the two parts of the Admiralty would be once again in reasonably close touch.

Most other departments of State were thinking on similar lines, and in February 1939 the Cabinet drastically revised their intentions. These they now divided into a short-term and a long-term plan. But the gist of it was now that there should be no general helter-skelter: that Whitehall should after all be fortified and held for as long as possible as the seat of the supreme direction of the war.

It was also agreed that certain diminished precautionary evacuations of non-operational departments should be carried out at once in peacetime—as the scheme proposed by the Admiralty had suggested. But now a further difficulty arose: it was already too late. During the ensuing months the mass evacuation of children and women necessarily had priority, and proved to be about all that the administrative machine could handle of this kind of thing at one time, or that the social system could absorb. Thus 3rd September came: war was declared: *still* no move had been made—and it was not till five days later that the Cabinet on the advice of the Chiefs of Staff actually ordered that the preliminary moves of the great peregrination should begin. In the event, these ‘preliminary’ moves were the only moves of the whole vast evacuation-of-government scheme ever put into effect, so far as the service and supply departments were concerned—the movement of certain Air Ministry staffs to Harrogate, and the 4,000 Admiralty staffs aforesaid to Bath.

The requisitioning of buildings for office accommodation was in the hands of the Ministry of Works, and for them the compulsory taking-over on Admiralty behalf of almost all the principal hotels and schools in Bath was comparatively easy: the owners had already been warned, it was only a push-button matter of putting prepared plans into effect. But the Ministry of Health, who had undertaken the

billeting of the Admiralty staffs, faced a more intractable problem. The war had already begun, and by this time Bath was rapidly filling up with private citizens from the metropolis and elsewhere, themselves fleeing from the aerial wrath to come of their own proper motion and at their own proper (fairly lavish) costs. Bath was a city accustomed to live off visitors. If the Admiralty moved in, these private ones would have to go: and by contrast a bare guinea-a-week per head was all the Government proffered for board and lodging. Moreover the Government insisted on specified comforts: this horde of official lodgers might not be treated entirely as steerage passengers, even if they were only paying steerage fares (for example, Admiralty officers should *not*, it was laid down, be compelled to sleep two or more to a bed). When the appointed day approached, it was found at the last moment that in the face of these difficulties the Ministry of Health's local billeting officer had made almost no progress at all, and the Admiralty then took over billeting themselves. Beds were bought in quantity, a persuasive house-to-house visitation was made, and with the help of the municipal authorities the most urgent problems were solved. On the appointed day only an advance-guard travelled, it is true: but the rest of the 4,000 were able to move in only a day later.

Once installed, they soon settled down. A number of them after all were used to postings to dockyards and other outpost establishments. They did not demand the impossible of their hosts, and the citizens of Bath responded. In many cases comforts in excess of the official minima were hospitably provided: as for the Government's guinea-a-week, usually private arrangements were concluded which at least reduced the financial burden on the hosts. Thus tension was gradually eased. Moreover it is related that the Admiralty's chief billeting officer developed his own rule-of-thumb for handling complaints. Guests who complained of their hosts were moved to the homes of hosts who had complained of their guests, to the better discipline of both. The departments also settled down in their new improvised offices. Within three days of arrival, directors were reporting that work was back at 80 per cent. of normal.

This was a hopeful beginning: but whether that remaining 20 per cent. of efficiency was ever fully recaptured—that is another question, and remains an open one. In particular, the move appreciably weakened that complete cohesion and contact within the Admiralty on which Admiralty authorities particularly laid such stress. In a number of cases liaison staffs were maintained by Bath departments in London, and by London organisations in Bath; but this was only a makeshift remedy, it tended to encourage duplication of work and yet could not prevent the congenital tendency of departments to flourish with a life of their own—as organisms linked by the natural

ecology of their environment rather than as mechanical organisations dependent on impetus from above—from being enhanced. In short, it could not prevent the appearance of that peculiar administrative bogey which later came to be widely recognised as ‘Bathmanship’. Moreover, as we shall presently see,¹ whenever during the course of the war some new Admiralty organisation was called into being, the question whether its true spiritual home was London or Bath had always to be canvassed, and to be decided even if it could not be solved.

Not only were the Bath departments now geographically separated from their London colleagues: in most cases they were appreciably separated, in their scattered buildings, from one another.² In London, a walk down a corridor had usually sufficed for consulting another department, in familiarly official surroundings. But now the Director of Naval Construction, for example, if he would visit his colleague the Director of Navy Contracts, had a long and uphill and uninviting mile to go from the central comforts—indeed, splendours—of his Grand Pump Hotel, to the windy suburbs on the heights above the city and the powerfully haunted walls of a headmistress’s study. Such factors in the administrative scene should not be disregarded merely because they are picturesque. In sum: coupled as it was with novel problems of the delegation of Board authority, the move to Bath laid a permanent strain on the working of the Admiralty machine almost comparable with the strain of the war itself—with which it coincided.

Seven months later the Air Ministry staffs were back from Harrogate—a Ministry now in their own right.³ But most of the Bath Admiralty departments remained at Bath throughout the war, and after it: indeed at the time of writing they were still at Bath, so considerably expanded after more than twelve years (like a hermit-crab in a new shell) that it would seem to an observer unlikely they ever could return to Whitehall. In a sense the Admiralty had been tricked into the geographical severance: but once the move was made, although there were occasional proposals to bring the departments back no decision to do so was ever taken. Was there then something to put on the credit side of the account after all?

In an old plan of the eighteenth-century Admiralty building the rooms round the Whitehall courtyard are shown not as offices but as residences of the Lords Commissioners. Indeed on that plan only two rooms in the whole building are shown as occupied by ‘The Established Clerks’.⁴ That was the Admiralty proper, of course: the Navy

¹ Chapter VIII *passim*.

² Later, when hutments were built for them as offices, this position was improved.

³ See Part IV, Chapter XIV (i).

⁴ Even this was an innovation. Previously the Board had functioned without any subordinate headquarters staff at all!

Board, the Victualling Board and the rest were at that time housed elsewhere and the consolidation of 1832 must have substantially altered the picture. So again did the creation of a naval war staff in 1911. But even within living memory the Admiralty had been a comparatively small and compact organisation. For example, before 1914 a normal secretariat branch could be housed in two or three rooms—one for its head, two at most for the branch itself; and in those days, there were only half a dozen secretariat branches in all. There were as yet no special finance branches, and (in 1911) even the single 'Civil Establishment' branch had only six members, one of them part-time. By the nineteen-thirties, however, it would seem that the simple administrative conditions which had made a small compact Admiralty once possible were somehow altogether departed from the British scene. Even leaving out of account the further expansion that the coming war would render inevitable, the Whitehall shell was already almost outgrown.

Then the war came, and with it the exodus. At one stroke the move made room in London for expansion of the staffs left there, and opened before the evacuated departments themselves fields for expansion altogether new—free from the intense rivalry for staff and accommodation that presently developed between the ministries left in war-time London.

However, this is perhaps to anticipate unduly. This easement for expansion was only an eventual bye-product; what was then in the mind of Authority was as we have seen rather a measure of insurance against the menace of devastating air attack: against an 'emergency'. In such an emergency, communication with the Board in London might be impossible. It was therefore necessary to prepare a shadow Board in Bath. Only two quasi-commissioners were needed to exercise in an emergency Board powers¹: a quasi-controller (since the bulk of the departments were Controller's departments) and a quasi-secretary.

In peacetime, when the Controller had had no official deputy at all, it had been customary that the Director of Naval Equipment signed for him in his absences. This department was not a large one nor—the layman might have thought—an obviously important one. It had no direct production responsibilities of its own. But its director was an executive naval officer of flag rank. Moreover, the department had this particular importance in naval eyes, that it existed entirely to represent the 'user'. Its business was to keep a co-ordinating and restrictive watch on the technicians to ensure that ships remained *ships*: that they never degenerated into boxes of tricks altogether, but remained fit to live in and fight in. This department, then, was the

¹ See p. 4.

principal guardian on the Controller's side of the house of the Navy's supreme doctrine—that in war the warrior matters more than the weapon, the seaman more than the vessel: a doctrine which also of course lay at the root of something cognate—the Navy's repeated insistence on a Controller familiar with life at sea rather than with shipyard and factory, a Controller who was the Third Sea Lord—a fighting Admiral, not a technician or industrialist.

It was the Director of Naval Equipment who now, still retaining his directorate, was appointed formally the Controller's vicar-in-Bath: and an Under Secretary (Bath) was appointed as well. These two, then, were to constitute the 'shadow' Board. If communications with London should be broken, they were authorised to act together in Bath with the full powers of Admiralty. What their powers and duties were to be in the meantime, however, was left a little vague.¹ In the event, it soon appeared that for the Deputy Controller at least there might be a considerable role to fill—focus to Bath departments of the Controller's will, focus to the Controller of Bath departments' views and difficulties. To some extent and from time to time, although not fully and not always, he acted in both capacities. The direct access of directors to the Controller himself seems to have been a jealously valued privilege. But possible roles of major importance for the Under Secretary were less obvious. Unlike the Controller's organisation, secretariat branches already had intermediate authorities between themselves and the Secretary, the principal assistant secretaries (as they were still styled at that time). So far as their work was concerned, then, most secretariat branches stationed in Bath continued to report—except in the case of local establishment work of course—through their normal channels in London. On one occasion in 1940 the Under Secretary experimented in a variation of this procedure: he caused a memorandum on certain priority matters to be prepared by a Bath branch in consultation with Bath departments, and himself submitted it as a matter of urgency direct to the First Lord. But the First Lord referred it back to the Controller, the Secretary, and the Principal Priority Officer for comment. This was, in reverse, the chain of authorities through whom it would normally have been submitted. The experiment was never repeated: instead, the Under Secretary found an important if less conspicuous role in the general lubrication of the Bath machine, in the control of common services and relations with the civic authorities.

¹ See also pp. 192, 193.

(iii)

The Design and Construction of Hulls and Engines

But let us now turn to the departments themselves that were thus stationed in Bath. Among these, unquestionably the most important was the Department of Naval Construction. This was made quite clear by the Director's official description: he was '*principal* technical adviser to the Board'. He drew a considerably higher salary than any other director. Other civilian directors might or might not be rewarded with marks of royal favour, culminating in the honour of knighthood: for him, a knighthood of the Bath was traditional. Traditional also was his election to membership of the Athenæum, as acknowledged head of his profession.

The Director of Naval Construction was architect to the Royal Navy. It was his business to help the naval staff with technical advice in formulating their 'requirements': to turn those requirements into a practicable design (or designs): to submit his designs, with models if necessary, to the Board: and then to see to it that a private shipyard or a Royal Dockyard in a reasonable time and at a proper cost and with all due skill turned the approved drawings into a satisfactory warship.

Very occasionally, it is true, shipyards built warships to their own design (usually prepared under Admiralty guidance, however) right up to the second World War. Whites designed certain destroyers, and Vickers designed as well as built submarines. Sometimes this was even done speculatively, for sale to any friendly power if the British Admiralty was not interested. But latterly this had become rare. More and more, warships were built to Admiralty design only.

The naval constructors, the caste of highly qualified technicians by whom the department was manned, had the organisation and status of a Royal Corps, of which the director was titular commander. In theory there were two channels of recruitment to this corps: university graduates with first-class engineering degrees could be entered direct as assistant constructors, and cadetships for training were awarded by public examination. But in practice entry by the former channel was rare: graduates with such valuable qualifications did not perhaps find the pay and prospects of the corps exceptionally attractive: and though the examination for cadetships was an open one, apprentices at the Royal Dockyards gained from their practical experience such a flying start over other lads that it amounted virtually to a monopoly. Thus it came about that in practice there

were few members of the Royal Corps who had not begun their careers as boys at Portsmouth, Chatham, Sheerness, Devonport, or Rosyth. Lifelong specialised expertise of a high order, then, was more characteristic of the corps than a general, theoretical scientific education at university level.

The department at headquarters was divided into a number of sections each of which specialised in the design and construction of a particular class of ship, from battleships and giant aircraft-carriers down to mosquito-craft. One designer gave exclusive attention to the design of destroyers, another to cruisers, and so on.

The drawings for a new battleship took two or three years to prepare (she would then be another five to seven years building). Indeed the designing of any new class of warship was a long and intricate business. First, the approved staff requirements would be stated in language. They asked for a ship defensively armoured against enemy weapons of a specified power; carrying such-and-such weapons herself: capable of a given speed and endurance: endowed with prescribed qualities of strength and stability: with accommodation for so many officers and men. The initial step, then, knowing the size and shape and weight of everything to go in her, was for the constructors to calculate roughly the hull-form and horse-power needed to attain the speed that the staff had asked for. In these calculations an important role was played by tank-tests with models at Haslar—the ‘Admiralty Experiment Works’ there¹ was an integral part of the department’s organisation. Then, once the ‘effective horse-power’ was thus determined, the next step was to consult the Engineer-in-Chief’s Department as to the design of main engines required to develop that necessary power—more particularly their weight and size; also the bulk of fuel that must be carried to ensure the required endurance: for this information might reveal the need for substantial modification of the design originally sketched.

The design of ships, as we have just seen, was regarded as an expertise quite distinct from sailing them: the constructor and the sailor were separate castes.² But this distinction was not made in the case of engines. It was the same guild—the engineer officers of the Navy—who controlled the engines at sea, who repaired them in the dockyards and who, in the Engineer-in-Chief’s Department,³ were responsible for their design and supervision of their production. Main propulsive machinery included turbines for the larger classes, reciprocating engines for the smaller and slower vessels (minesweepers

¹ See p. 128.

² This had not always been the case. As recently as 1890 it was possible to regard it as axiomatic that the sailor must design a better ship than the scientist.

³ The Engineer-in-Chief was the only engineer officer in the Navy of vice-admiral’s rank.

and so forth), and a special kind of lightweight diesel for submarines. As well as main propulsive machinery, however, the Department was responsible for all kinds of auxiliary machinery: engines for generating electricity, for operating guns, for refrigeration—pumping—ventilation: in a major vessel there might be as many as a hundred distinct purposes for such machinery to serve. All this auxiliary plant had to be provided for, of course, in the design of the ship, as well as the main propulsive machinery itself.

But consultation with the Engineer-in-Chief's Department was only the first of a series of interdepartmental discussions which had to be undertaken by the constructors before any design was completed. For example, there were the experts in naval ordnance, to whom a ship was primarily a floating gun-platform (awkwardly given to pitching and rolling)—for work on the main mountings would have to begin before the keel was laid, if they were to be ready in time. There were the electrical engineers, in whose eyes a ship was a large-scale piece of electrical hardware: the armament supply officers, for whom she was arsenal and ammunition store: and the Second Sea Lord's people, who must have seemed to the constructors almost to regard her as a kind of floating welfare state¹—and the rest. All these conflicting interests had to be not merely reconciled but integrated: spaces calculated—sometimes to a fraction of an inch, weights counterbalanced, structural strengths adjusted. Scantlings had to be worked out and materials specified—where mild steel was to be used, where high tensile steel, and cast steel: where light alloys: where phosphor bronze. And the Board had to approve, whereon the drawings were sealed with the Board seal.

This organisation for warship design had remained unchanged in principle for some time. But the organisation for warship production was far less static: in the first half of the twentieth century it went through a series of considerable changes.

If the ship was to be built at a Royal Dockyard, she was in the hands of the dockyard staff—a technical team, consisting of a constructive manager drawn from the Royal Corps, an engineer manager, an electrical engineer, a naval store officer, accountants and certain other officers—all seconded, for a term of duty, from their parent departments at headquarters, and all under the command of the Admiral-Superintendent (or Captain-Superintendent) of the yard, upon whom ultimate responsibility rested. In recent times, however, the bulk of new construction work had passed into the hands of private shipbuilders. Here final responsibility for carrying out the Admiralty's orders rested on the contractor himself; but the Admiralty still needed an organisation for inspection and oversight

¹ The Second Sea Lord was 'chief of naval personnel'.

at least: an organisation, moreover, capable of giving technical advice and supervising costs and reporting to the Admiralty on the capabilities of the various yards for particular classes of work.

Before 1914 a Superintendent of Contract Work, responsible for overseeing the quality of the work done in the yards and questions of cost, headed a department independent of the Naval Construction Department, which was then a design department only. But this complete division of responsibility was not altogether happy in its results. If a ship proved unsatisfactory in any particular not demonstrably the builder's fault, it was natural for the Superintendent to blame her design and for the Director of Naval Construction to blame her workmanship. Moreover, the Contract Work Department was only responsible for the bare ship: the powers and interests of its 'principal ship overseer' on the spot were limited to the maintenance of proper standards in the hull-work alone. The Engineer-in-Chief, the Director of Electrical Engineering and other authorities concerned had their own quite separate inspection organisations, operating in the shipyards but not under the principal ship overseer's control. As for *progress* of the work—the overseer would of course report if called on, but real responsibility rested on the contractor alone (and indeed it was even more to his interest than it was at that time to Admiralty interest to see that no wasteful delays should occur on his building slips or in his fitting-out berths).

When the first World War broke out, however, the war-time importance to the Navy of speedy completions and the novel war-time value to the shipbuilders of official help combined to make a more high-powered administrative organisation necessary. The Superintendent of Contract Work was superseded by a 'Director of Warship Production'; engineer officers and electrical engineers were seconded to him, so that in theory at any rate the new Director headed a department responsible for the production of the complete ship (with the exception of her offensive armament and stores).

Under the new department a new field organisation was set up. It was in addition to the existing principal ship overseers, who were accredited on a ship-by-ship basis, and it was organised on a territorial basis. A 'warship production superintendent' was appointed to each of the principal shipbuilding districts. At first there was some feeling among the ship overseers that this new official was a fifth wheel, but it soon became clear to them that his functions differed from theirs. He was not concerned with quality or workmanship, his duty was to oversee and assist the *progress* of all warship production in his district: and in order that delays in the delivery of materials might not interfere with shipyard programmes, materials overseers under him were stationed in the steel works and ship's machinery shops where progress had, of course, to be dovetailed with progress in the

shipyards themselves. Responsibility for standards of work done remained entirely with the overseers.

In peacetime, of course, the need for the new department decreased. In 1919 the liaison officers from the departments of engineering and of electrical engineering returned quietly to their folds. In the 1931 economy drive the independent department itself was abolished: the more modest title of 'Superintendent of Contract Work' was revived, but with the status this time only of Assistant Director of Naval Construction. Thus what was left of the organisation, both at headquarters and in the field, became a sub-department of the Naval Construction Department, which now embraced production as well as design. Nevertheless, one essential feature of the war-time directorate was preserved—the warship production superintendents, responsible for the progress of all shipyard work in their several districts. This organisation continued right through the inter-war period and right through the second World War. It is of particular interest because it would seem to have been the only exclusively 'production and progress' outport organisation possessed by any Admiralty department at the beginning of rearmament.

From this it might be supposed that the department would have been able to meet the onset of a war economy with a flying start. Unfortunately that was far from the truth. Before this chapter is ended we shall have occasion to outline the magnitude of their industrial task, the inadequacy of their industrial potential. But the particular difficulty under which they laboured—perhaps more seriously than most other departments in the field of war production—from the very first days of rearmament, was a shortage of qualified staff to meet such suddenly increased commitments. In the economy period intake at the bottom had been restricted: now, there were not enough experienced constructors to go round and emergency recruitment of new staff with the necessary technical qualifications was virtually impossible—because almost no one outside the Royal Corps and the special warship firms, who were themselves short of staff, was trained and expert in the design and construction of warships. Thus it became no longer practicable to provide overseers on the basis of one to a ship: the most that could be managed was one to a shipyard, and this was found inadequate at the larger yards either for strict supervision of quality or for briefing the superintendents on progress. A further call was made on constructors, as we shall see presently, by the emergency repair organisation¹ all round the coast. Moreover, since there were not enough effective building slips in Britain to undertake the full programme of work in hand, additional orders had to be placed in the United States, Canada and India, and these too needed supervision: thus the

¹ See p. 102.

Director found himself called upon to supply staff not only for headquarters and for yards at home, but to be sent on technical missions this way and that all over the world.

When war actually broke out he was, it is true, able to recruit a few Lloyd's surveyors whom the war threw out of their normal occupation. But this small accretion of staff was at once more than counterbalanced by the sudden further large increase in work. The corps now found itself fathering new classes of warship, responsible for a share in measures to deal with the magnetic mine (such as degaussing and fitting LL sweeps), saddled after the Continental collapse with the complications of a varied collection of ships of foreign design and construction—a collection to which fifty veteran American destroyers were shortly to be added. Moreover, the Director, Sir Stanley Goodall, had even found himself made responsible for projects that were not ships at all—such as 'Cultivator', the gigantic plough which was to have torn its way through the Siegfried line: just as his predecessor in office, Sir Tennyson Deyncourt, had been asked in 1915 by the same First Lord to design and produce the world's first tank.¹

In the material field, the first fear of an acute shortage—it emerged almost as soon as rearmament began—proved to be over armour plate. In the earlier war the Navy had been able to rely for its defensive armour on five great firms—Vickers-Armstrongs, John Brown, Cammell Laird, Beardmore and Hadfield. The making of armour is highly specialised work and there is no civilian use for naval armour; if no naval orders were to be forthcoming in a period of 'naval holiday', idle capacity could only be kept in being by subsidies. To reduce the cost of these it had been decided, when the war ended, that capacity for naval armour should be maintained only by Vickers at Sheffield, by John Brown (using part of Cammell Laird's works), and by Beardmore at Glasgow. Everything possible seems to have been done, after rearmament began, to try to reconstitute the traditional capacity which had been lost, and with some measure of success; but much of it had long been turned over irrevocably to heavy steel work for industry, and by 1938 it was apparent that British-made armour alone could never meet what were then current British naval aspirations² in time. A considerable part of a ship's armour is built in at an early stage in construction, so that delays in its supply will seriously hold up progress. The only possible answer, the Controller (Sir Reginald Henderson) decided, was purchase abroad. Thus it was that British naval rearmament actually became

¹ See W. S. Churchill, *The Gathering Storm* (Cassell, 1948), pp. 566–68.

² By 1940 there was to be armour capacity to spare. Partly this was because some of the heavy armoured ships of the 'rearmament' programme had then given place to lighter 'emergency' construction.

dependent for a brief period on purchases of naval armour from Czechoslovakia: that there were even attempts to buy it in *Germany* almost up to the actual outbreak of war.¹

'The rearmament programme contained a large number of armoured ships. We ought to have shouted at once that our armour-producing capacity was inadequate. Probably this would have been done if we had been adequately staffed. But we were all "bows under".' So wrote the Director of Naval Construction of the period. The lesson, of course, subsequently reinforced by similar incidents, was that under modern war-time conditions the load on a single sub-department of contract work, required to supervise both the work in the shipyards and also material supplies to shipyards, was excessive. In October 1942, therefore, the responsibility was divided and half of it assigned to a new sub-department: henceforth there was to be a Director of Contract Work (Ships) and a Director of Contract Work (Supplies). It would be the particular duty of the latter to see and to foresee that materials and equipment were forthcoming when required. The officer appointed to the new post had been the designer of 'Cultivator', and on this project had been closely associated with the Ministry of Supply and with the iron and steel control. This association would now stand him in good stead: so also would the fact that the nature of the work made the full qualifications of the Royal Corps unnecessary except at the top—he was able to employ a whole army of 'chasers' recruited from outside.

At the same time the title of Director of Warship Production was revived. The *title* was revived: but it was impossible with inadequate qualified staff to revive a *department* which should again function effectively over the whole field of warship production as its predecessor in the earlier war had done. Indeed it is not quite clear whether in 1942 it was ever even intended to be a completely independent department at all. The doubt is in a sense academic. Sir Stanley Goodall, while retaining his title of Director of Naval Construction, was now given the additional quasi-Board title of Assistant Controller of Warship Production.² He remained, moreover, titular head of the Royal Corps of which the new Director was a member. Thus the new Director continued to owe him allegiance in two capacities at least, if not in all three. The officer appointed to the post had previously, in the early days of the war, as superintendent of conversion, been responsible for the large and urgent programme of converting requisitioned merchant ships to naval purposes—to armed merchant cruisers, minesweepers and the like:³ in 1942 he found

¹ A surprising part in the degaussing programme was played by orders of electrical cable from Italy right up to that country's entry into the war. See p. 113.

² See p. 197.

³ See also p. 144.

sufficient on his plate with detailed supervision of the new programme of corvettes and frigates, then at its height:¹ for this conveyor-belt programme in its urgency and complexity certainly required the full attention of one man—and it was shortly to be followed by the demands of Mulberry, of combined-operations craft for the Far East and of other special programmes of the kind.

It may perhaps appear from this account that the organisation of the naval construction agglomerate at a high level did not, towards the end of the war, present an entirely tidy picture. But this might surely be regarded as inevitable, where there was inadequate qualified staff to give effect to all the implications of the new posts created. It was a situation, perhaps, which demanded that the actual duties performed should be attuned rather to the man and to the occasion than strictly to the Treasury terms of reference of the post.

To sum up. The difficulties which the Naval Construction Department had to face when passing on to a war footing were threefold. First, a lack of adequate industrial capacity (this will be discussed a little more fully at the end of the chapter). Shipbuilding capacity is *sui generis*: surely there could be little hope of increase by turnover from quite different peace-time purposes, as a corset factory, for example, could be set to make coding machines: and merchant ship construction was almost as vital a war-time need as naval construction—a little but not much poaching in that field could be allowed. Second, a lack of adequate qualified staff. Naval constructors again were *sui generis*: apart from those few Lloyd's surveyors, there was no outside pool of comparable technicians which could be drawn on for temporary recruits—the private shipyards, working to capacity, were themselves short of trained staff. Third, too much to do. In addition to the vastly increased load of its familiarly technical work the department found itself forced, as the conditions of a war economy took shape, to undertake an increasing amount of administrative and organisational 'production' work which in peacetime, when it was almost purely a technical department, had never come its way in comparable volume. It was only gradually and partially, as we shall see,² that relief in this field came to be afforded by the secretariat and others.

At least during rearmament and the first phases of the war these same difficulties do not seem to have hit the Engineer-in-Chief's Department quite so hard as the constructors. In the matter of main engines they also had a highly specialised industry, *sui generis*, to deal with: most of the major shipyards incorporated their own marine engineering works, and a total of only fourteen firms supplied

¹ See pp. 104, 187.

² Chapter VIII.

all turbines, large and small, for naval purposes: but the industry seems to have proved adequate to meet the early calls upon it—calls which rose from a little under a million horse-power in 1935 to nearly two million in 1939. Their various auxiliary machinery, on the other hand, came from that general engineering industry which is the backbone of all munitions production. Here, it is true, they found themselves in direct competition with the needs of the other Services: but in the inter-war period the department had co-operated closely in Supply Board planning, and they entered the war with an allocation of elbow-room in the industry reasonably proportioned to their needs. As for staff, the qualifications for an engineer are strict, but they are not so rare as the qualifications for a naval constructor: qualified recruits could be found, and given temporary commissions or employed as civilians: moreover there were a number of senior engineer officers in retirement who might be too old to go to sea but whose knowledge and experience might still have a most important part to play in the industrial field, or in administrative posts of a semi-technical nature. One such retired engineer officer of flag rank returned to handle machine-tool questions for the Admiralty: another—an ex-Deputy-Engineer-in-Chief—acted as Admiralty liaison officer with a variety of controls and technical or semi-technical interdepartmental committees, and helped the newly created Principal Priority Officer¹ with valued technical advice. The Admiralty Regional Officers² also were drawn from this class.

(iv)

Progressing and Planning

We have seen that in the early days of the war the only department with an exclusively 'progress' organisation out in the field was the Department of Naval Construction itself. At that time the general system of watching the progress of Admiralty programmes centrally was simple in the extreme. It was based on a document called 'Controller's List' and a monthly function called 'Controller's Meeting'. The former showed all ships under construction with their past or prospective dates of laying-down, launching and completion. Once a month, the warship production superintendents sent in their reports: these were circulated and digested and then, once a month, the Controller visited Bath. With all his heads of department round a table, the listed dates were passed under review. Where

¹ See p. 165 *et seq.*

² See p. 181.

delays were reported (and they were many: there was an overall tendency for dates to have slipped back an average 30 per cent. by the time a ship was commissioned), they were usually attributed in the report received to some 'laggard item' of armament or equipment: whereon the director concerned had to have his answer ready, why his contribution was late, what steps he was taking.

Up to a point the method was effective: but it had two weaknesses. The first was that the dates originally listed were based on the shipbuilders' initial promises, which were inclined to be optimistic, while the causes of delay reported derived from the shipbuilders' allegations, which were not wholly disinterested. Naturally a shipbuilder, finding himself forced to admit that he could not honour his promise anyhow, was tempted to postpone the admission until some outside supply providentially late offered him a scapegoat. Secondly, it was administration by inquest rather than by prevention. The departmental director concerned could explain, and could usually master, the delay which had occurred: but he had little or no means of foretelling, still less of forestalling, the delay which would occur next. He might, and usually did, keep a close watch through his inspectors on the progress of work on the premises of his main contractors. But usually these difficulties originated elsewhere, among sub-contracts. It had always been—and so far as possible, remained—the policy of Admiralty departments to leave main contractors entirely free in their relations with sub-contractors: with the natural result that this was a somewhat mysterious region of which the departments had, at least initially, very little knowledge.

With wisdom after the event, the reader may perhaps be surprised that departments did not all of them at once when war broke out hasten to set up 'progress' sections, with all the appropriate paraphernalia. Indeed the Engineer-in-Chief's Department were actually thinking of doing so at the time of the outbreak of war: yet even that department postponed the actual deed until early in 1945. But the truth surely is that a premature paper organisation would have been of little value. Knowledge of the structure of industry, and particularly of the psychology of private enterprise and the way of a big firm with a little one, could only be acquired the hard way—by dealing for a while empirically with difficulties as they cropped up. For example, in 1941 a 'shortage' of steel castings brought about a serious hitch in the completion of destroyers' main turbines. Some firms, it seemed, got them on time, others did not—and the latter were often the very firms where they were immediately needed. Enquiry proved that this was not so much a case of absolute shortage as of ordinary schoolyard bullying; castings were scarce, and the more powerful firms were insisting on having theirs first whether they were really ready for them or not. On making this discovery the

department took these castings out of the region of sub-contracting altogether: placed their own orders with the steelfounders, and allocated the output at their own pleasure—to the benefit of the destroyer programme as a whole.

It was only in that sort of way, bit by bit apparently, that most departments were able to build up progress organisations of practical value, and then to take the further step from progressing to planning. As knowledge was gained it became possible, for example, for the Engineer-in-Chief's progress section to estimate the capacity of each marine engineering firm in terms of lines of machinery—or sets of machinery units—per year, and so, in consultation with the constructors, to match up the load on this kind of capacity with the corresponding load on the building slips. Again, much was learned about the real (as opposed to the apparent) time that it takes to build a particular engine. Before work could *begin* in the engine shops, certain castings and forgings had, as we have seen, to be delivered there: it was ultimately the date of the order to the founders and forgemasters, not to the main machinery contractors, which mattered. Thus for any new programme it became the practice to secure the allocation of castings first—the order with the engine shop could then be placed at leisure. Presently it proved necessary to go even further than that, at least in one particular case. Under the emergency escort vessel programme of 1943, reciprocating main engines, cylindrical or water-tube boilers, and simple reciprocating auxiliaries had to be provided for no less than 200 corvettes and frigates, with precise adherence to programme. Since the ship-building industry was already saturated with orders, it had been devised that the hulls should be prefabricated by civil engineering firms and the like, then sent to the shipyards for assembly. Likewise, in order to provide the machinery, firms had to be employed which had never done Admiralty work before. The Engineer-in-Chief, therefore, decided to assume full production responsibility: not merely the castings this time but the complete articles were designated 'Admiralty supply items'. A central cardex system focused the whole field of output, and interchangeable machinery, as it came ready, was switched to the construction job ready for it.

The Director of Naval Construction, moreover, had for his part his own ways of watching and planning the load on his, the ship-building industry. The 'Controller's List' was arranged to show the warships under construction according to classes: that was what interested the Navy—to know what warships would be available when, and it was what interested most of his departments—to know what items of equipment designed for a particular class would be needed when. For the Naval Construction Department however the same information was wanted in a different form. This was provided

initially by 'slip charts', constantly revised, which showed on a yard-by-yard basis and month-by-month for several years ahead, the present and projected occupation of every building slip and every fitting-out berth at every centre of shipbuilding in the country.

It was these slip charts too which provided the circumstantial basis for most of the statistical work in the shipbuilding field which was to be developed later.¹ Every class of warship has its own characteristic curve of the labour force needed ideally at each stage from keel-laying to launching, from launching to completion. Thus it should be possible, after perusing the slip chart, to forecast the approximate labour force needed by any given yard on any given future date, if work was to go forward without a hitch, and thence to proceed to over-all manpower budgeting with a fair degree of confidence. Alternatively, since labour shortages meant that in practice the coat had to be cut to suit the cloth, comparison with forecasts of the actual labour forces realistically expected to be available to each yard, 'weighted' severally by constants deduced from the known plant facilities and past record of each yard, enabled the statisticians to compute in advance with a fair degree of probability the delays that had inevitably to be expected—perhaps some time before the shipbuilder himself might be ready to admit to them. Thus too the degree of relief to other ships in hand which was likely to be derived from the authorisation of any particular postponement could usually be estimated. Like all statistical forecasting, the accuracy of the results of these methods was proportionate to the size of the 'populations' involved—the over-all picture was more likely to be true than any of the separate details of which it was composed. Thus calculation could supplement but was never intended to supplant the experience, the on-the-spot technical knowledge of the superintendents and overseers—and of the shipbuilders themselves, of course. The way in which this statistical work came to be undertaken, however, and its place in Admiralty organisation, belongs more properly to Chapter VIII.²

(v)

Repair and Maintenance

So much, then, for 'new construction'. But if we were at this point to ignore the question of repair and maintenance we should be left with a very unbalanced picture indeed, both of the war-time load on the country's shipyard and world-wide dockyard resources, and of the

¹ See p. 175.

² P. 172 *et seq.*

calls made on the categories of professionally qualified Admiralty officers we have been already considering.

The authority responsible for all repair, maintenance, and modernisation of the ships of the Royal Navy was, under the Controller's superintendence, the Director of Dockyards. This was normally a vice-admiral's appointment. At each Royal Dockyard, at home and abroad—from Rosyth to Singapore—there was as we have seen¹ a composite professional team, headed by a constructive manager, an engineer manager, an Admiralty electrical engineer and other officers seconded from their parent professional departments. The same organisation was reflected at headquarters; the Dockyard Department was a composite department, consisting of branches managed severally by naval constructors (under a chief constructor), by engineer officers (under a Captain (E)), and by electrical engineers (under a superintending electrical engineer)—all these officers likewise being seconded from their own professional departments. There was also an accountancy branch.

The origins of the surviving Royal Dockyards themselves, and the period when their primary purpose was the *building* of warships, belong to 'heart-of-oak' days—the pre-history of the subject-matter of this volume. Ever since the middle of the nineteenth century, when several of the home yards were finally closed, the remainder had been increasingly concerned with repair and maintenance and the miscellaneous work of supplies to the several fleets. The last dockyard-built battleships were completed in 1916. In the inter-war period the dockyard programmes were formed (with an occasional new construction job or the final touches to a privately built warship prior to commissioning) chiefly out of the comparatively frequent minor refits and few major modernisations which punctuated the active life of the average naval ship or vessel. On the outbreak of war, the home dockyards employed in their professional departments a little less than 40,000 men, of which rather more than half were directly employed on work of this nature.² The available labour and the work to be undertaken were reasonably balanced, though a little work of this kind was even in those days done by private repair firms. With the approach of war, however, it was clearly apparent that Royal Dockyard repair resources alone could never be adequate for the needs of a major conflict. In any case, the urgent thing with the innumerable minor casualties of war would be to get the work taken in hand wherever facilities were nearest, so as to restore the vessel to her operational base in the shortest possible time. For this purpose there

¹ P. 91.

² See *The Repair and Upkeep of H.M. Ships and Vessels in War* by G. A. Bassett, C.B., R.C.N.C. (Deputy Director of Dockyards) in *Transactions of the Institution of Naval Architects*, 1946.

was no question but that reliance of a major kind would have to be placed on the various ship repair firms scattered round the coast at most of the commercial ports, and the necessary organisation was prepared accordingly.

The requirement, we have seen, was partly industrial, partly operational. In general supervision of the local organisations, therefore, there were to be appointed in wartime a number of flag officers-in-charge and naval officers-in-charge, representing a nexus of sub-commands under the several territorial naval commanders-in-chief.¹ A major part of their duties would consist in the general local control of warship repairs.² In their offices at the major repair centres, 'emergency repair' teams were posted, consisting of senior officers of the Dockyard Department—a constructor, an engineer and an electrical engineer. It was the business of these 'principal repair overseers', when a ship came in hand, to decide as quickly as possible what repairs were needed and to fit her into the programme of one of the local firms.

The success of this scheme can perhaps best be measured in terms of volume of work carried out. In 1938 the bill for naval repairs in private hands was merely some £340,000. By 1943 and 1944 the annual bill had risen to £44 million. The emergency repair staffs at ports had increased to nearly 600 officers—and there were proportionate increases in headquarters staffs as well, of course. It will clearly be seen, moreover, that the calls this work made on shipyard labour—repair work calls for much the same trades as new building, though it uses them in different proportions—were formidable.

There is only space here to touch lightly on some of the other steps taken by the Director of Dockyards to meet the needs of war—though all of them made calls on skilled staff, and most of them calls on British labour. New repair bases were set up at home and abroad—new capacity jointly almost equivalent to one of the major home dockyards. After 1941, a mission organised the repair of British warships in the United States. Dry-docking facilities both at home and abroad were improved. Repair ships for the Far Eastern theatre were equipped and manned. A force of 9,000 'special repair ratings' of military age under naval discipline was recruited for service abroad. Special arrangements at the southern ports were made to meet the special operational repair requirements of the Normandy landings.

¹ C.-in-C.s Rosyth, Nore, Portsmouth and Western Approaches, with the Admirals Commanding Dover, and Orkneys and Shetland, divided the coast of Great Britain between them.

² For their subsequent appointment as District Shipyard Controllers under the Essential Works (Shipbuilding and Ship-repairing) Order, see pp. 148-149 and 182.

(vi)

The State of the Industry

Before this chapter closes, however, we ought to take a look at the state of the industrial base of these organisations, the shipyard resources which the shipbuilding and ship-repairing departments of the Admiralty existed to canalise and exploit. The subject is primarily one for other volumes in this series¹: here a summary must suffice.

In 1913 (and still in 1920) British shipyards were capable of producing some two million tons of new merchant shipping annually, as well as of building up the strength of the greatest Navy the world had ever known. At the end of the 'twenties, naval building was in the doldrums and merchant output had dropped consistently to less than one million annual tons output—to less than one-half. During the 'thirties, as orders dwindled, the number of available building berths was also reduced by about one-half—a process which was presently systematised in a deliberate plan of 'rationalisation'. Likewise the labour force dropped in numbers in the inter-war period—again, by roughly one-half. In short, it is a fair approximation to say that the industry faced the second war with far greater leeway of naval strength to make good than before, and half the resources with which to do it—or, rather, less than half: for there were other than numerical factors. Depressions, after all, hit capital as well as labour—funds for the modernisation and replacement of plant, a constant necessity, had been lacking, and equipment which had been up-to-date in 1914 was now some of it ancient to the point of decrepitude, at least in the smaller yards. The workers who had left the industry for other employment might be expected to include many of those with the greater energy and initiative. Moreover, a declining labour force had meant that over a crucial period the intake of apprentices had dwindled to a trickle, and the total included a disproportionate number of very recent entries: thus it was an industry disproportionately manned by the elderly and the very young—and these last had just reached the age which the armed forces were most eager to swallow up.

In 1937 the Chancellor criticised Admiralty proposals for a last-minute attempt to shore up the strength of the Navy on the grounds that these proposals were beyond the present capacity of the industry to carry out. It is interesting that as late as the winter of 1937 no one seems to have regarded this as an argument for fostering, and if

¹ e.g. Hancock and Gowing, *British War Economy*, *op. cit.*, and Postan, *British War Production*, *op. cit.*

possible expanding, the shipbuilding industry—only as an argument for turning the Admiralty programme down.¹ The industry was regarded as a static quantity, a pint pot—no, a half-pint pot now, from which the Navy was demanding a quart.

On one occasion at least the Admiralty did succeed, later on, in belying that old adage when, with every warship yard fully occupied, the need for a large programme of anti-submarine vessels was suddenly superimposed and the answer was found in prefabrication. In the mushroom American war-time shipyards, with their unlimited elbow-room, prefabrication could be practised—as well as inland—in the yard itself, an invisible conveyor-belt stretching a mile or so from the yard gate to the slipway turned steel into ships in one continuous process. In Britain, even if labour had been available locally, this deployment of space was impossible, since most of the yards had been closely hemmed in by workers' dwellings for generations. What was to be devised, then, had to be something different: an analysis of the ship-design into a number of parts, each of them not too large for conveyance by rail: the fabrication of these parts at structural steel firms up and down the country, each firm becoming expert in a single part, which it prepared in quantity: the assignment and transport of the completed parts for rapid assembly at slipways right round the coast.

But this sort of production of frigates and corvettes was hardly a genuine expansion of the shipbuilding industry—it was more a sort of conjuring, so many rabbits out of a hat. Something of the same technique was applied later even more widely to landing-craft. But ultimately there are dour limits to the possibilities in the economic and industrial field of conjuring of this sort—rabbits out of a hat, rather than out of a hutch—however ably and successfully performed. In the last resort, the hutch (i.e. the shipyard) remained the limiting factor, the final measure of the potentialities of all Admiralty output.

¹ Postan, *British War Production*, *op. cit.*, p. 26.

CHAPTER VI
THE DEPARTMENTS:
(2) EQUIPMENT AND ARMAMENT

(i)

Preamble

IN THE PREVIOUS chapter we considered the three great departments most directly concerned in the building and maintaining of warships—the Director of Naval Construction, the Engineer-in-Chief, and the Director of Dockyards. We now turn to departments concerned in the production of equipment and armament—‘inland’ industry, that two-thirds of Admiralty supply where the Admiralty worked in direct competition or collaboration (or both) with the supply services of the Army and Air Force, and yet very much on its own.

In this particular study we must bear carefully in mind—if we are not to lose ourselves altogether—what has already been briefly cited, that the Admiralty system for the production of arms and especially of equipment involved a considerable degree of divorce between technical responsibility and responsibility for provisioning and supply.¹ There were various technical or specialist departments responsible for development, design and inspection in particular fields; but only two main provisioning and storage departments. The first of these latter covered what may be loosely described as ‘in-offensive’ equipment of all kinds and the second was concerned with armament stores, each having its own relations with a nexus of technical authorities. That at least is the broad picture (though subject, as we shall see, to much qualification in detail). There was no near equivalent to either of these ‘store’ departments in the organisations for the other two Services.

In the former of these two fields the design, inspection and production of technical equipment came under the superintendence of the Controller; but provisioning, storage and supply of this same equipment, as well as of non-technical stores, was overseen by the Fourth Sea Lord. The Fourth Sea Lord was ‘Superintending Lord’ of the Naval Store Department. In the armament field, however, the

¹ See p. 9.

Controller was responsible throughout; for provisioning and storage, as well as for design and production. Thus in the next section of this chapter we shall consider first the production of technical equipment—electrics, electronics and the like—from the point of view of the technical authorities—the Controller's side; the following section will deal, second, with the organisation of provisioning and supply of this same equipment as well as of non-technical stores—the Fourth Sea Lord's side; but the fourth section will treat the whole field of weapons together, because this whole field came at that time under the superintendence of the Controller.

This system of divided responsibility—technical, and provisioning—had grown up long before the war, and the reader will no doubt wonder how the Admiralty managed to graft on to it war-time 'production' responsibilities and on which side of the divide these responsibilities fell. Whose business was it, for example, to develop new capacity? The non-technical store officer, since his was the responsibility of supplying material in the quantities called for? Or the technical officer, whose business originally was supposed to be only design and inspection? Or even the contracts officer, whose business the placing of orders was supposed to be? In practice, of course, even in full peacetime and particularly during rearmament, such problems were specifically allotted to the technical rather than the provisioning or contracts authorities. Nevertheless, the prevailing system prevented the former from ever being complete masters in their own house. For example, they could not place educational orders without the approval of the appropriate store department as well as of the Contracts Department; and no doubt they often thought these supply and contracts officers slow in realising the necessity for placing such orders sufficiently in advance of supply needs. Again, no doubt they often felt that their own technical knowledge and links with the Navy equipped them better than the non-technical civilian store officer for long-term provisioning, for forecasting the trends of the Navy's demands and the probable volume of these demands in the future. On the other hand, they themselves knew less than the store officer about the problems of distribution among depots and stores all over the world—a highly important factor in all provisioning calculations.

On the outbreak of war it was officially recognised, not only that many orders were of such great urgency that some of the niceties of peace-time procedure would have to be sacrificed, but also that responsibility for the development of new capacity *must* lie with the departments with the technical knowledge and the industrial contacts. Accordingly the technical authorities then took over all but nominally the actual placing of orders on behalf of the stores and the contracts departments. But the former remained officially the

provisioning authority, and all were still placed 'subject to contract' to be negotiated by the latter.¹

So much, then, for production. The fifth section in this chapter will go on to discuss research and development, with a brief survey of some of the various Admiralty research establishments; the growing importance and status of scientists in the Admiralty machine, and the relations between scientists (in the generalised sense) and the Admiralty's specialist technicians, naval and civilian.²

In the concluding paragraphs of the chapter a brief attempt will be made to dissipate the kaleidoscopic variety of these Admiralty departments—a variety which by that time will be only too apparent—and to evolve some kind of basic formula for the system as a whole.

But before we take a look at the principal departments *seriatim* in this way there is one more point of a general nature which must be made. Broadly speaking, each technical department in the Admiralty was responsible for industrial inspection in its own field and maintained its own outpost organisation for the purpose. Most of these inspecting organisations were long-established and in close touch with their principal contractors for many years before the war. Since each such organisation looked exclusively to its own parent department, each was free to follow—and very properly did follow—the geographical lay-out of the industry with which it was chiefly concerned, ignoring altogether the lay-out of all other Admiralty inspectorates. Thus they differed widely among themselves, and of course bore no relationship to the 'divisions' of the Ministry of Labour on which the 'regional' boundaries were in due course founded. This did not matter, so long as they remained inspection rather than production or progress organisations: no need existed for co-ordination at what later came to be called 'regional' level. This was the principal reason, of course, why the Admiralty offered so gloomy a welcome to the regional board system when it was introduced³ and felt bound to hedge about the powers and responsibilities of their own 'regional officers' with so many checks and

¹ Some further reference to the activities of the Director of Contracts will be found in Chapter VIII, but the general question of contracts procedure is the subject of a separate volume in this series.

² Perhaps this is a convenient point at which to explain what is meant by a 'specialist' officer of the Navy. First, the 'temporary specialists'. On reaching the rank of lieutenant the majority of executive officers specialise for a time in one particular branch of the naval art—in gunnery, for example, or torpedoes, or signals, or navigation. On reaching the rank of full commander these cease to specialise (though naturally each is likely to retain a particular interest in his special subject). Engineer officers, on the other hand, and officers of the electrical branch (set up in 1939) were among the 'permanent specialists', remaining in their particular branch of the Service throughout their careers and wearing distinguishing marks on their uniforms. In the Engineering Branch itself there were 'sub-specialities', such as gun mounting engineers and air engineers.

³ See p. 179 *et seq.*

safeguards—a desire to avoid at all costs damage to the existing and well-tried but somewhat complex outport organisations which had already been built up department by department. But now let us turn to the departments themselves.

(ii)

Electrics, Electronics (and Acoustics)

The reader will have noticed in the previous chapter a number of references to a department which was not there further described—the Department of Electrical Engineering. This director, we saw, had to be consulted at the design stage of every new class of warship. Further, his inspectors appeared in the shipyards, responsible for vetting the contractor's electrical work on the hull. His electrical engineers filled an important place in the technical team controlling the work in each of the Royal Dockyards, and in the Dockyard Department at headquarters. Thus there is clearly a case for regarding the department as primarily a shipbuilding department: indeed, it was sometimes so regarded¹ and that was actually its history—it began in 1901 with a special allowance of £100 to a constructor in the Naval Construction Department 'for electrical duties', and the budding organisation remained at least nominally a subordinate part of that great department until the first World War. On the other hand, as a production department its principal calls were made on an industry in no way specially connected with the shipyards, and even for that reason alone it would be preferable to reserve an account of it for the present chapter; but further, the Electrical Department was inextricably connected with several of the other departments which fall for review here. In the field of fire control, for example, it undertook certain design work for the Director of Naval Ordnance, and acted as his agent in the manufacture and installation of the electrical equipment of gun mountings, directors and fire control systems. Thirdly, most of the Electrical Department's products ranked as 'stores', which means (as we have seen) that while the department was responsible for design, for specification, and for inspection, it was the Director of Naval Stores who was the provisioning authority determining quantities to be ordered, placing the orders through the Contracts Department, and taking delivery.² As has been foreshadowed, the Naval Store Department will loom large in the present chapter in more than one context.

¹ See p. 92 ('department of warship production') and p. 194 (suggestions for 'grouping' departments).

² See p. 15.

The technical responsibilities of the Director of Electrical Engineering, then, can be defined as covering almost the whole field of the electrical equipment of ships and shore installations, but with the exception of radio (a term which includes radar). This exception may seem curious; and indeed in 1941 there was a tentative but abortive move to abolish it. By 1941, however, such enormous developments in the field of radar were already under way that no doubt by that time it was a foregone conclusion to retain the subject in the hands of specialists.

Originally, however, the reasons for the exception were historical. We have seen that the work of the Electrical Engineering Department was from the beginning a civilian, 'shore' activity, long carried in the womb (or at least, in the marsupial pouch) of the Naval Construction Department. At sea, in early days, it was the torpedo officer of a ship who was considered her electrical expert—signalling, then, was a comparatively simple matter of semaphore, flags and lamps. Thus, when preliminary sea experiments were first made in the use of wireless telegraphy in the Navy, they were entrusted to the torpedo officers—who alone had the necessary knowledge; and when it became necessary to organise further experimental work, and more ships came to be fitted with the new equipment, and the initiative for research and development still came from the torpedo officers, it was naturally to H.M.S. *Vernon*¹—the naval torpedo school—that this experimental work was at first entrusted.

In the course of time, however, it came to be recognised that wireless after all was essentially a kind of signalling (which was already becoming more technical in other fields as well), and consequently in 1917 the Wireless Department of H.M.S. *Vernon* was transferred to the Signal School and renamed the 'Experimental Department' of that school. This school had hitherto been a very small unit, chiefly occupied in training signalmen and situated in Portsmouth Barracks: the new department was considerably larger than the old school itself, and effectively swallowed it, even though at the time of the transfer the staff, naval and civilian, numbered only about 75. By 1944, however, the Admiralty Signal Establishment was the largest of all Admiralty establishments of the kind—its staff, including workers of every description, had reached the 7,000 mark!

Thus it was in the early years of the war that the technical activities of the 'school' were controlled (through its Captain) by the Director of Signals at the Admiralty and that radio had its own Admiralty authority entirely independent of 'electrics' of other kinds. This directorate of signals, moreover, was in the unusual position of combining the duties of a staff division for communications, responsible to the Vice Chief of Naval Staff, and of a technical department

¹ See later in this chapter, 'Research and Development', p. 127.

responsible to the Controller—a nice example of the doctrine of Board superintendence so frequently quoted in these pages. Thus the 'requirements' of radio equipment for communications were formulated by D.S.D. himself as a Staff authority, while the 'requirements' for other purposes were formulated by the Gunnery Division and other staff divisions concerned and passed to D.S.D. as technical authority. He, in his turn, would then pass them with his own to the Captain of the Signal School for development or production.

However, whatever might be the history of the development and management of naval radio, practical contacts between the Signal and the Electrical Engineering Departments were naturally close. The Director of Electrical Engineering relied on the Signal School for certain standard components used in his own electronic work and in turn supplied the latter with cables and rotating machinery. At times, indeed, these contacts proved to be so close as even to give rise to a certain amount of friction over borderline activities: for example, the development and production of new types of signalling lamp was for some years a debated territory between them: at another time, similar difficulties arose over special electric fans intended for radio purposes; but happily this friction never reached danger-point. Perhaps the real root of it is to be found in a clearly discernible difference of outlook between the two authorities, which made each of them a little distrustful of the other's judgment where the interests of both were involved. Both departments, admittedly, were concerned in development and production; but the electrical engineer perhaps tended to look at things preponderantly from the production point of view; his main concern was to supply the Navy with adequate equipment in the necessary quantities (which might be vast): the signals specialist, on the other hand, was chiefly determined that what the Navy was given should always and at all costs be the latest and best. Thus quantity production typified the first—sudden huge expansions of output to meet unprecedented demands for electrical material constituted the most spectacular of his war-time achievements, while 'crash programmes' typified the latter—and certainly constituted his.

Indeed this difference of viewpoint divided radio production from almost every other kind of war production. *Apparently* nothing could be more wasteful of labour than the 'crash programme', the few hand-made outfits of the latest type rushed into operations instead of on to the factory floor; yet in practice these outfits might actually save munitions labour, because they might reduce the calls for material of other kinds. The latest radar set might mean to the Army, fewer rounds fired per 'bird'; to the Air Force, fewer bombers per target; to the Navy, fewer hunters per submarine 'kill' and fewer ships sunk. Against this, of course, had to be set the reductions in

output of conventional material which the huge amount of labour absorbed by the new industry involved . . . it is difficult to conceive a worse headache for the statistical planner than calculations of this kind entail.

With these prefatory remarks, then, let us turn to the war-time organisation of these two Admiralty departments, beginning with the Department of Electrical Engineering. Since this was a professional as well as a production department, in certain respects the functions of the director paralleled those of the head of the Royal Corps and those of the Engineer-in-Chief. He was a professional head; like them, in addition to staffing his own department and his inspectorate in the field, he was responsible, as we have already seen, for 'bedding out' qualified officers in the dockyards at home and abroad, in the Dockyard Department and elsewhere—an 'electrical corps' in everything but name. Necessarily this professional organisation, like the other two, was staffed by officers with high technical qualifications. But in practice they were recruited from outside the Admiralty service considerably more freely than were (for example) the corps of constructors and the engineer officers of the Navy. For the most part they had received their practical training in industry.¹ The British electrical industry was flourishing, efficient and highly organised. Close contact with such an industry and the recruitment of qualified staff from it might then be expected to be a valuable asset of the department; for most Admiralty specialists are only able to acquire their knowledge of the intimate workings of great manufacturing concerns in the course of official visits or official postings—that is to say, from outside.

In 1939 the department consisted, at headquarters, of four branches. The first handled fleet shore establishments and also finance generally. The second was concerned with development and design—the Electrical Department of the Admiralty Engineering Laboratory was an integral part of it.² The third branch designed the main electrical installations in ships. The fourth designed special installations; they prepared, that is, the diagrams used by dockyards and shipyards when installing particular apparatus and instruments—fire control, communications, compasses and so on.

¹ The career of the director in office at the time of writing is fairly typical. After serving in the first World War he took a B.Sc. at Edinburgh University in 1921, then joined the British Thomson-Houston Co. as a student apprentice. Except for a year spent studying American methods with the General Electricity Co. at Schenectady, he remained with the B.T.H. Co. at Rugby until 1926, when he joined the Admiralty as Assistant Electrical Engineer. After serving in the Home dockyards and in Ceylon and in the Director of Dockyards' Department at headquarters, he was appointed in 1937 Superintendent Electrical Engineer at Singapore. In 1940 he returned to the Admiralty to take charge as Assistant Director of D.E.E.'s new Production Branch; and in 1945 succeeded Sir James Pringle as Director.

² See this chapter, section (v), pp. 128-29.

It is perhaps symptomatic of the department's familiarity with industry that as early as February 1940 the Director felt ready to add a fifth branch, a production branch, to the already existing four. It is also, however, symptomatic of the anxieties he had been for some time feeling about the future of the supplies with which he was concerned—anxieties fully shared, in the field of fire control gear, by the Director of Naval Ordnance.

The reasons for the Director's anxieties were these. The electrical equipment needed in war for the Navy differs less *in kind* from the normal production of the industry than does much of the equipment required by the Army or Air Force; but the *quantities* required (as the Director realised) were likely to be out of all proportion to peacetime demands. For the need for electrical equipment could not be expected to remain merely proportional to an increased rate of ship-building—when probably no very serious production difficulties would arise. No reliance could be placed on calculations based on past user: the danger lay in wholly exceptional demands. Now, as we have already seen, it was not the Director of Electrical Engineering, it was the Director of Stores who carried provisioning responsibility. The electrical engineers, as technical authority, might be *au fait* with probable developments of the use of electrical equipment by the Navy long before the stage of official approval was reached: they might be expected to have rather more than a hunch, if some particular equipment was likely to be needed in vastly increased quantities; but quantities to be ordered were decided by store officers, and these could only estimate at any distance ahead quantities required for future uses by basing their calculations on past user—or at best, on officially approved developments. One would look, no doubt, for the closest possible consultation between the two departments in the preparation of programmes: nevertheless, the inherent bias of such a set-up towards under-ordering seemed obvious, and under-ordering (the Director felt) carried manifest dangers. At the very least it would tend to produce a situation where electrical equipment generally, instead of passing as it should from the various manufacturers into a stockpile held by the Naval Store Department (from which it could be allocated as required), had to be despatched direct from the manufacturer to some user anxiously awaiting its arrival.

Hence, then, arose the Director's anxieties: whether the need for an adequate expansion of resources would be realised in time. With his industrial experience he understood only too well the importance of placing educational orders and expanding capacity well in advance of the actual need for increased output. But again—in peacetime, the placing of orders was not his business: it devolved on the Director of Contracts, who customarily farmed them out, within the charmed circle of 'Admiralty firms', on the basis of competitive tender. Under

peace-time conditions and the rule of finance this was no doubt inevitable. But the electrical engineers had long felt that it tended to concentrate electrical work for the Admiralty in the hands of certain smallish firms which specialised in cutting costs to the bone but usually were not the firms best capable of war-time expansion.

As a matter of fact, on the outbreak of war the Director's forebodings about new and unprecedented demands were speedily justified. Measures to defeat the magnetic mine, for example, called suddenly for electrical material in vast quantities—the Director of Torpedoes and Mining and other associated authorities were crying out for L.L. sweeps and degaussing cable in particular—quite outside the scope of normal shipbuilding electricians. In the winter of 1939 orders for £2 million worth of degaussing cable alone had to be placed quite unexpectedly, as a matter of immediacy, and for the time being all available capacity for cable production in the United Kingdom and in Canada as well was turned over to the work—orders were even placed in Italy right up to the moment when Italy declared war.

These, then, were the circumstances in February 1940, when the Director set up his new 'production' branch. He now had a freer hand than formerly to expand capacity (though perhaps rather late in the day). From then on the new branch became responsible for finding new capacity, for allocating orders, and for seeing that quantities and delivery dates were satisfactory.

From his first conception of a production branch it had been the Director's intention to decentralise its work to the greatest possible extent. With this object he began by strengthening his existing outport organisation; but later he decided that something more drastic than a mere strengthening of it was called for. As we have already seen in the preamble to this chapter, each department maintained an outport organisation of its own. The position of the Electrical Engineering Department, however, differed somewhat from most of its fellows in this respect, because of the location pattern of the electrical industry. As we have seen, the department was both a shipbuilding and a manufacturing department; its 'district electrical engineers' therefore had the dual functions of inspecting installations in ships and inspecting equipment under manufacture. The latter was their major function—particularly since the new responsibilities which the advent of a production branch created. But the industry with which they had to deal was fairly evenly spread about the country, instead of being concentrated in particular centres like such industries as shipbuilding, for example, or the construction of gun mountings, and the district electrical engineers were spaced out accordingly. For most departments it seemed impossible to re-align their inspectorates to tally with the Regional Board boundaries; but

it was not so downright impossible for the Director of Electrical Engineering as it appeared to most of his colleagues to consider such a reorganisation on 'regional' lines.

This indeed was the key to the steps he now contemplated. By 1942 at least it was clear that the Regional Boards had come to stay. Even if their control over the allocation of industrial capacity was not so complete in practice as on paper, they certainly by that date held the key to labour supply in all fields except shipbuilding and ship-repairing (where it was controlled on Admiralty behalf by their District Shipyard Controllers). Accordingly the Director did two things. First, he revised the boundaries of his district engineers' parishes to march with the boundaries of the Regional Boards, called them in future 'Admiralty Regional Electrical Engineers' and confined their activities exclusively to manufacture. Secondly, he appointed to each shipyard district a separate officer, called 'Warship Electrical Superintendent', to take over the installation of electrical equipment in ships. In this way the Director hoped for the best of both worlds. No great dislocation of his old organisation or its established contacts with industry was involved; and now his local officers were well placed (at the elbows of the Admiralty regional officers) for playing the new game of interdepartmental priorities in the regions as well.

This was the only Admiralty department to take such a step during the war; but, as has been remarked, the geographical lay-out of the electrical industry made it easier for the electrical engineers than for any other department—nor is there, it must be confessed, any evidence that the others suffered noticeably from their failure to follow suit.

That was in 1942. Thereafter no major change took place in the Electrical Department's organisation during the rest of the war. In the field of radio, however, the major change was still to come.

Responsibility in the field of naval radio rested initially, as we have seen, with the Signal Department, working through the Signal School. The latter became ultimately a very large establishment indeed: but the headquarters staff of the *department* remained comparatively small. In 1935 it had consisted of no more than the Director himself, five naval officers, and the necessary clerical assistance. This staff gradually increased during the expansion period, of course, but not disproportionately—so much of the department's work was actually handled at the establishment. With the Bath exodus, however, a certain division of responsibilities within the department became necessary: the Director himself remained in London to handle policy and the 'staff' end, and a deputy director (also a captain, R.N.) was stationed in Bath to handle production questions, as a conformable part of the general Bath organisation.

This is not the place in which to attempt any account of the almost incredible development of radio in wartime for all three Services, nor to describe the various interdepartmental organisations—the Radio Board, the Radio Production Executive, the numerous sub-committees and the agency purchase arrangements—that were set up. But it would be futile to describe the development of the Admiralty organisation without any reference to the technical development which it fostered and reflected. Radar indeed was more than a new device—it was a new science, with almost limitless applications. From the earliest stages the Admiralty had played an important, and for a considerable period a leading, part in it. Ever since the days immediately following the first World War the Admiralty had been engaged in valve research: it was under Admiralty auspices that silica valves came to be developed: by 1930 the Admiralty had become the recognised leader of the three Services in the development of valves for special purposes. In January 1938 the first two experimental ‘R.D.F.’ sets for ship use were under construction in Signal School workshops. At the time of the Munich crisis the Signal School research laboratory even turned itself temporarily into a valve-factory, as the only possible means of keeping the R.D.F. ‘Home Chain’ on the air! By the time of the outbreak of the war the Navy was completely re-equipped with communications equipment, yet in 1939 the Admiralty was still spending more money on radio communications and radar even than the Air Ministry was.

As might be expected, then, by the beginning of the war radio had become by far the largest part of the Signal Department’s interests. But it was not by any means its sole interest, and these other interests produced developments of their own. For example, a visual signalling section had been set up under the direction of a physicist who was an expert in optical matters, primarily for the development of ultra-violet and infra-red signalling methods. Moreover the department was naturally interested in sound-waves as well as electro-magnetic waves. The Fessenden system of submarine communication by sound was an obvious ‘signals’ preoccupation. Thus it was natural that the development of a similar technique for exploding enemy acoustic mines should have been entrusted to them, together with navigational echo-sounding equipment and a variety of acoustically operated anti-submarine devices (such as the asdic)—wholly, or in collaboration with other authorities such as the anti-submarine warfare division of the staff, unless and until a new specialist department was set up to take them over. In the course of the war, however, development of the new science of radar was *so* colossal, that it presently became evident that some measure of reorganisation of Admiralty arrangements was necessary so that radio might have undivided attention. Thus in 1943 it was decided to divide and

reshuffle the previous responsibilities of the old Signal Department. First, the department's 'staff' and 'production' duties were divided. In future the title of 'D.S.D.' was to be exclusively that of the head of a naval staff division—the division concerned with communications—no longer of a production department. Second, radio material was to have the exclusive attention of a department of its own. As a matter of fact, production of the various anti-submarine acoustic devices such as the asdic had already by this time been hived off, and entrusted to a material section of the Anti-Submarine Warfare division of the staff which presently became a production department in its own right—the Department of Anti-Submarine Material, set up in April 1944.¹ Thus the major part of the old Signal Department—the part exclusively concerned with radio—was now free to become a new production department, the Department of Radio Equipment. Henceforward it was the Director of Radio Equipment who became responsible to the Controller for equipping the Navy with efficient radio of all kinds except airborne equipment.² As for the work of the new department, it continued to be carried on—programming and planning, production control, inspection, testing and fitting supervision, as well as research and development—chiefly at the Signal School, which had already been re-christened 'Admiralty Signal Establishment' and now passed under the new director's control.

It is difficult to think of another case where industrial production was directly controlled in this way by an establishment, instead of a headquarters department—but then, from the earliest days the normal 'parent-child' relationship of department and establishment had been virtually reversed in the relations between the Department of Signals and the Signal School.

At headquarters the new department was divided into six sections: two policy sections (one for radar, one for communications), providing the necessary link between the naval staff and the scientists and engineers as well as keeping in touch with developments in the other Services: an installation section, handling particularly the allocation to stated ships and services of equipment in short supply; a provision, production and finance section; and two sections dealing with clerical work and maintenance.

In his report on radio production to the Prime Minister in August 1942, Lord Justice du Parcq remarked that the Admiralty, by remaining an undivided department of State, enjoyed a particular

¹ This work had originally been carried out entirely in the Royal Dockyards, for security reasons: in the course of the war an increasing use came to be made of contractors for the production of components, but assembly—even sub-assembly of the most secret parts of the equipment—was carried out in Admiralty establishments right to the end.

² This, of course, with the aircraft themselves, was the responsibility of M.A.P. See Chapter VII.

advantage over its fellows in such an esoteric field as radar—it need persuade no one of the need for a particular kind of equipment except itself. The Admiralty organisation for radio, moreover, seems to have been more complete in itself, to have brought under the cloak of a single department a wider stretch of responsibility—particularly at that time when D.S.D. was a staff division and a technical department as well—than the similar organisations in the sister supply ministries which tended to place development and production in separate hands. Nevertheless, even the Admiralty departmental independence was not entire; for once more the question of ‘provisioning’ rears its head. The procedure was something as follows. First, the Director of Radio Equipment—in consultation, of course, with the naval staff—would formulate demands in terms of fittings for particular classes of ship. All destroyers, for example, were to be fitted with one particular type of equipment, all escort vessels with another. It was then for the Signal establishment to analyse the demand—ultimately, in terms of numbers of ‘boxes’, valves and components. Many of these bits and pieces the establishment would have to procure from its contractors, or through the appropriate inter-Service authorities. But at this point the Director of Naval Stores appeared in the picture, for to him was entrusted the ‘provision’ as well as the custody of these stores: it was for him to take over now and to calculate how many items needed to be purchased new, how many he could provide from stock—or in the case of new equipment, what extra numbers he needed to order to build up his usual reserve and meet the needs of maintenance. So let us at last take up this clue of provisioning and storage which we have already met so often in our wanderings, and follow it to its bitted end in the vast and ramified organisation of the Naval Store Department itself.

(iii)

Provisioning, Supply and Storage

Historically, the Director of Stores is *the* supplier of the Navy. There was a ‘Keeper of the Stores’ in 1514. In an earlier epoch of simply-armed sailing vessels he had supplied practically everything that went into the ship except her guns and ammunition; his responsibility for ‘timber, cordage and canvas’, still extant in the twentieth century, indicates his great place in naval history. Yet if the twentieth-century Director of Stores saw himself now surrounded by more recent creations and bedevilled by technical experts who wanted to take provisioning out of his hands, he remained nevertheless one of the most formidable authorities in the Admiralty.

Let us consider, then, the wide range of his activities. During the period with which we are concerned the Director of Stores was responsible to the Fourth Sea Lord for the provision, storage and supply of all metal and metal articles used in building and repairing ships in dockyards and also in other dockyard work and for equipping and maintaining ships and naval establishments; this included (as we have seen) the provisioning, storage and supply of electrical stores of all kinds, of radio equipment, of fire and torpedo control gear. We have seen repeatedly how closely this provisioning phase of his responsibilities brought him in touch with technical departments under the Controller's superintendence, how closely indeed the two organisations were interlocked. But there was also a wide non-technical field of supply in which he reigned alone: timber, cordage and canvas and a vast assemblage of miscellaneous items ranging from office equipment to 'pots, chamber, rubber, lunatics for the use of'—everything, in short, which might conceivably be required by ships and naval establishments throughout the world. Airframe and aero engine spares, and operational and ground equipment for naval aircraft, concluded this, the first part of his responsibility. The second part of it comprised fuels for the fleet and dockyard services. Thus the great task of providing and transporting and storing oil fuel for ships, aviation fuel, petrol, kerosene, lubricating oils, coal and fuelling appliances for the world-wide use of H.M. ships and naval establishments rested in his hands. Thirdly, he was responsible for the transport of goods and men. As well as many and vast storage establishments all over the world, he maintained his own fleets of supply ships at sea and transport vehicles on land. The Admiralty's principal railway transport officer worked under his aegis.

Much of his production work, as we have seen, was handled technically and industrially by specialist departments; but it should not be assumed that the remainder of the field was merely a matter of routine purchase over the counter. Planning might most certainly be involved, and questions of building new capacity. For example, it was the Director of Stores who, in the 'thirties, with an eye to the war-time supply of textiles for canvas, set on foot the national policy for encouraging the home production of flax—a project in which King George VI, both as a sailor and as squire of Sandringham, took a personal interest. A progress section in the department was one of the war-time developments.

Since, however, the bulk of the work of the department was of a specialist, perhaps, but not of a technical character, the department was one of those,¹ recruited from the executive grades of the Civil Service, in which service was lifelong. The organisation, during the

¹ See p. 14.

rearmament period, provided for three deputy and six assistant directors, in charge of some eighteen sections. On the outbreak of war the Fourth Sea Lord made proposals for reorganising and strengthening the department, which, as the Admiralty informed the Treasury, was already so overdriven that there was real danger of a breakdown. The proposals, compared with others which the Admiralty and the other supply departments were soon to put forward, were fairly modest—the main points were the creation of two new deputy and two assistant directors—but the opposition which they met from the Treasury, the protracted and detailed argument between high officials, and the personal intervention of the Fourth Sea Lord in the discussions, are somewhat surprising as a war-time phenomenon, and illustrate the manner in which the Treasury was apt occasionally to round upon ‘expansionist’ tendencies among the supply departments. There could in fact be no doubt of the burden the department had to bear, even if measured in terms of storage space alone: this increased at home and abroad from 5½ million square feet in 1939 to over 22 million by the end of the war. A huge department: the non-industrial staff rose from 1,050 in 1939 to 9,807 in 1945 and over the same period the industrial staff rose from 5,600 to 38,369—all over the world, of course.

All-pervading as the interests of the Naval Stores Department might appear, one important exception will already have been noticed: it was not (and never had been, for reasons which will shortly be made clear) responsible for the provision or storage of guns and ammunition. So far as it was concerned with ‘weapons’, they were for the most part weapons of defence and detection, or equipment ancillary to weapons. For armament stores were the concern of a separate but somewhat similar organisation, the Department of Armament Supply. This department came at that time under the superintendence of the Controller—by fiat, for on theoretical grounds it might well be argued that its functions were more appropriate to the Fourth Sea Lord as ‘Chief of Supplies’. But this brings us to the third great group in the Admiralty production field, the nexus of departments and sub-departments responsible under the Controller for weapons of offence, the nexus to which the Department of Armament Supply belonged. It will be better to break off, then, and treat this nexus as a new subject on its own.

(iv)

Weapons of Offence

The last Tudor Master of the Ordnance of the Navy died in 1589, and his office was absorbed in the Master General of the Ordnance, who thus became responsible for the development and supply of ordnance for both Services. Thereafter in the supply of guns the Army voice was usually preponderant; and the history of this period has already been briefly sketched elsewhere in the volume,¹ as being predominantly an Army matter. It was not till the middle of the nineteenth century—shortly after the Ordnance Board itself was finally swallowed up in the War Office—that the Admiralty came back into the picture.

H.M.S. Warrior, launched on the last day of 1860, was the first Ironclad, but she was still armed with smooth-bore muzzle-loading cannon on truck carriages. It would not have taken one of Drake's gunners ten minutes to learn to handle her artillery; there had been practically no change since Armada days. There seemed a *prima facie* charge, then, that in the cause of Army improvements the special needs of the Navy had been neglected. For these needs were in fact already very different—not so much as regards the guns themselves as their mountings. What was needed at that time for artillery on terra firma was usually a comparatively light mounting, something transportable. The ground underneath it was solid. The gun itself was stationary when firing, and even the target was relatively stationary. For naval use, weight was a much less important consideration—naval guns to-day are no longer trundled about the gun deck, the main mountings are built into the structure of the ship like a tooth into a jawbone. On the other hand the ship herself is in constant movement. She pitches and she rolls; she is probably travelling at a high speed in one direction at the moment of firing while the target itself travels in another; for all this complicated movement fire control gear has to compensate. The Navy and the Army problems were—at that time, at least—poles apart; for the days of the tank gun and its like were yet to come.

In 1866, therefore, the first Director of Naval Ordnance at the Admiralty was appointed. Thus began a long battle to secure control for the Navy over its own ordnance, a history of tenacity on both sides curiously foreshadowing the similar battle which opened in the twentieth century for control of a newer weapon than the gun—the controversy over naval aircraft. At first the new Director took over

¹ See Chapter II.

only the *arrangements* for procurement of ordnance; procurement itself remained a War Office responsibility until 1888. But even after 1888, when the Admiralty took over entirely all procurement of naval ordnance, custody and supply (curiously) remained in Army hands. The transfer of this responsibility began in 1891, but it was a very gradual process; there were still Army officers officiating at naval ordnance depots abroad in 1916—fifty years after the ordnance battle had opened, and when the battle over aircraft was just about to begin. Again, a Chief Inspector of Naval Ordnance had been appointed at the Admiralty in 1908; but, for years after, much of the inspection of naval guns made at Woolwich remained in Army hands or those of the Ministry of Munitions. At first it was only in the field of private industry that the Admiralty chief inspector officiated.

All this is ancient history, so far as the present volume is concerned; but it will perhaps help to understand the somewhat complicated arrangements in force at the beginning of the second war. For instance, at that time the Admiralty had still never taken over exclusively in a creative (as distinguished from a critical) sense the design of naval mountings—not as the naval constructor designed warships. The official source of designs of guns and mountings for the Navy and Army alike was still the Design Department at Woolwich Arsenal¹ which was responsible for ‘the preparation of original designs for the Army, Navy and Air Force, of guns, gun carriages and mountings, ammunition and allied stores, bombs, pyrotechnics and certain torpedo stores, small arms and their mountings’. This was not, however, the whole picture. The same tendencies had long been afoot in the armament world which had led to the increase in contract-built ships: many guns and almost all mountings for the Navy were in fact not products of Woolwich at all, but were invented, designed and constructed by private firms to Admiralty requirements. In 1923 the Chief Inspector of Naval Ordnance remarked that the Navy could get from private firms designs of guns and projectiles ‘at least equal to’ those prepared at Woolwich, ‘if not superior to them’. In this work, of course, the firm of Vickers was pre-eminent—and by 1939 alone in the field.

This, then, is the background against which the group of Admiralty organisations responsible for weapons of offence has to be viewed in a survey of the war period.

The Directorate of Naval Ordnance was the parent department of the whole group; the Departments of Torpedoes and Mining, and of Armament Supply, both derived from it and achieved full independence, while two important sub-departments which we shall presently

¹ See Part III, Chapter XIII (ii). The research and design departments were inter-service establishments, but their strongest link was with the Army.

have to consider—the ‘chief inspectorates’ of Naval Ordnance and of Gun mountings—remained attached to it. It was a ‘naval’ department: the Director and his deputies, that is to say, were executive naval officers, serving for short-term appointments, and his assistants engineer officers; but the staff was a trinity in which executive naval officers, engineer officers, and finally civilian scientists had each their own part to play, where such a part was appropriate. In the field of gun mountings, of course, the engineer officer would approach the problem from a technical and production, and the executive officer from a ‘user’ point of view (with particular emphasis on the safe handling of ammunition); here there was little room for the scientist since the contractor prepared his own designs. But in the development of fire control work, on the other hand, and particularly in the Admiralty Gunnery Establishment (an offshoot in the middle of the war of the Admiralty Research Laboratory, which was put under direct Naval Ordnance Department control), the scientist came in as well. As for the electrical side of the work—a considerable item, particularly in the fire control and director tower fields—instead of incorporating electrical engineers as a fourth element in the Ordnance Department’s staff, the burden both of design and production was carried (as we have seen) by the Electrical Engineering Department itself.

Oversight of the actual production of gun mountings and much other gear was delegated to an officer with the perhaps misleading title of chief ‘inspector’ of gun mountings. Inspection was only part of his job; his sub-department was responsible in addition for the organisation of production generally, for production forecasts, for supervising the fitting of gun mountings in ships, and for finding new capacity. In 1937 he had a single civilian ‘production officer’; late in the war he had four or five, but no one could regard the size of such a team as excessive, if indeed it was adequate. They had a difficult task in expanding production—which meant calling in firms completely strange to the work, even peace-time manufacturers of carpets and linoleum; and particular manufacturing difficulties to contend with—for one example, owing to the bulky nature of a gun mounting it is seldom possible to build a prototype; for another, the galloping progress of radar apparatus presented an ever-changing problem. It is little surprise, then, that mysterious delays occurred in early days in production of the Mark VI director tower, for instance; or that a mounting (the STAAG) originally expected to weigh some eleven tons finally tipped the scales at seventeen. We have already seen how serious such delays could be in the progress of a ship’s construction,¹

¹ It is questionable, however, whether the frequency with which late deliveries of gun mountings were alleged as the cause of shipyard delays was fully justified. In the context of this doubt, see p. 98.

and the effect of such changes in weight on ship's design. It may rather be regarded as a matter of surprise that adequate modern mountings, director and fire control gear were ever produced on time at all, bedevilled as the officers of the Ordnance Department were by production difficulties and an exceptionally long planning period on the one hand, and a protean procession of new requirements and improved up-to-the-minute designs on the other.

This 'chief inspector' of gun mountings, as we have seen, was in fact, if not in name, a production deputy to the Director, under whose suzerainty his sub-department came. The reader will recall that there was another 'chief inspector'—of Naval Ordnance—also in the field. The latter, however, hovered on the verge of independence, seeing that he enjoyed the privilege of his own Board instructions, although, with characteristic nicety, they were appended to those of the Director instead of being handed to him personally. This was a sub-department of some seniority, founded, it will be recalled, in 1908 to be responsible for the whole inspection of guns and shells *not* made at Woolwich and, after 1920, for the inspection of torpedoes and mines as well. The field was in wartime, as may be imagined, very wide indeed, covering inspection of the whole output of the Department of Armament Supply (which we shall presently discuss); indeed they found it necessary to set up more than one gauge-factory even to supply the necessary gauges. The functions of this organisation, moreover, differed considerably from those of the gun mounting inspectorate, as the material differed. They were far more strictly concerned with inspection only, the securing of the necessary high standards in an enormous output of stores. The administrative headquarters of the sub-department were in Bath, but the inspectorate itself was divided over no less than thirteen inspection areas, its principal technical headquarters being in the Midlands. The sub-department was enabled by the nature of its work to enjoy this advantage among the naval departments, that its head was normally a captain retired from active service and thus available for a rather longer term of office than other naval departmental heads, whose usefulness was considered to depend more on their fresh knowledge of conditions at sea—which in this case at least were hardly relevant—than on conditions in the department, and whose careers in any case called them back to a command at the earliest possible moment.

The Director of Naval Ordnance himself came into being, as we have seen, in the middle of the nineteenth century, during the latter half of which the production of naval armaments came increasingly under Admiralty control. Curiously, however, torpedoes and underwater weapons generally continued much longer to be borne on the Army Vote; they were not taken over by the Admiralty Naval Ordnance Department until as late as 1910. Thereafter underwater

weapons underwent a vast extension of use, and by the close of the first World War an independent department had been formed. By the onset of rearmament in 1934 the Director of Torpedoes and Mining was responsible to the Controller for all design, research, experiment and inspection connected—whether offensively or defensively—with torpedoes, mining, anti-mining and chemical defence; and was responsible for mining vessels, paravanes, sweeps, torpedo tubes, air compressors, and so forth.

However laggard the war might be in the other elements, the under-sea war at least started effectively as well as nominally in September 1939; and among the equipment and weapons which the Director of Torpedoes and Mining was at once put under heavy pressure to provide were Acteon net defences, degaussing equipment, and controlled minefields, guard loops and indicator loops. Again, the decision to lay the Northern Barrage involved a large increase in independent mine production, while ‘anti-non-contact’ devices (as they were dubbed) were required to combat the ‘non-contact’ torpedo pistol. In short, the Director of Torpedoes and Mining had to adapt his department to the exigencies of total war somewhat earlier than many of his fellow-directors inside and outside the Admiralty. The department consisted then (as regards naval staff) of the Director, his deputy, one engineer captain as head of the tube section, and some fourteen commanders plus a handful of junior officers spread over some eight sections. Most of this staff joined the exodus to Bath. Now the department was not quite so complete a hermaphrodite as D.S.D.; nevertheless, its work called for exceptionally close liaison with the naval staff. Thus it was necessary for the Director, while himself in Bath, to maintain a particularly strong liaison party in London. This meant additional hands: an immediate step was an expansion involving three additional captains and other officers as well. But additions to staff were not alone sufficient to deal with all the rapidly expanding aspects of underwater warfare, and the department almost at once began to give birth to new bodies either partly or wholly independent. One of the earliest of these was the Department of Boom Defence, which was created out of the Boom Defence section and was responsible for boom defence material. As the battle against the magnetic mine developed into the far-reaching, long-term process of degaussing, the process of ‘hiving-off’ was carried further by the emergence of a Superintendent of Demagnetisation (but he was not a ‘supplying’ agency).

The creation of these and other special posts, however, led to anomalies. For example, the offspring had to continue to make use of the parent organisation for production, experiment and development; and when an opportunity arose in the spring of 1940 to make changes, the Admiralty remarked in a letter to the Treasury that ‘it was only

by the loyalty and good sense of those concerned that so illogical a system could be worked at all'. The department was accordingly now reorganised on a comprehensive and logical basis. Briefly, production and material were to be the study of the department in Bath, while the London sections were to be expanded to almost similar dimensions to carry on the department's former 'staff' activities. There was no formal split (such as took place later, as we have seen, in the reorganisation of the Signals Department); but even so mild a measure of independence for the production side roused certain fears among the naval staff of the old bogey—production 'waging its own war'.

The reader will perhaps have noticed that while the Director of Torpedoes and Mining was responsible for torpedo tubes and for the design and inspection of torpedoes, he was not responsible for the *manufacture* of torpedoes themselves. Nor was he responsible for the manufacture of mines either. This brings us back at last to the third and youngest, but ultimately the largest, of the organisations in the nexus for the supply of weapons of offence, the Department of Armament Supply; the department responsible for the 'production . . . provision, receipt, custody, maintenance, issue, conveyance and proper distribution' of all Vote 9 stores—all guns and ordnance, that is, all small arms equipment, all ammunition, bombs, explosives, torpedoes, mines, depth charges and so forth. In other words, the Armament Supply Department stood in somewhat the same relation to the Naval Ordnance and the Torpedo and Mining Departments that the Naval Store Department stood to such authorities as the Department of Electrical Engineering. There was, however, an important historical difference. The Director of Stores, as we have seen, was one of the oldest Admiralty authorities, and had never known an outside departmental master; the Director of Armament Supply was a comparative parvenu. After a brief taste of independence following the end of the first World War, in 1923 he was once again reduced to the status of a 'chief superintendent', formally subordinate to the Director of Ordnance (and responsible also to the Director of Torpedoes and Mining), and he only recovered his full independence, after a considerable tussle, a few days before the outbreak of the second war.

Like the Director of Stores, the Director of Armament Supply relied in technical matters on the appropriate technical authorities. Quantities required, moreover, were laid down by the naval staff. He was not concerned in questions of design, except that designs before going into production needed his concurrence from the manufacturing, storage, transport, and repair points of view. Inspection, as we have already seen, was the province of the chief inspector of ordnance. Like the Naval Store Department, again, his staff was a civilian one recruited from the executive grades of the Civil Service.

His responsibilities nevertheless were very considerable. He was in charge of manufacturing establishments and depots employing a labour force over 15,000 strong with an output, in the first year of the war alone, worth £40 million. He controlled entirely the Royal Naval Torpedo Factory, and the Royal Naval Cordite Factories for the production of propellant, and he arranged with the Royal Ordnance Factories at Woolwich and elsewhere for the filling of naval shell. On him rested the primary responsibility for allocating all orders for armament stores, in particular their allocation between Government factories and private industry, and his responsibility for progressing manufacture was particularly emphasised. Finally, he was responsible for the distribution of ammunition and cognate stores so that it should be available in the required quantities in the armament supply depots which he maintained at home and abroad.

The department was originally divided into three main branches: one for guns, one for ammunition, and one for 'underwater stores' (mines, etc). But with rearmament under way in 1936 production problems began to become important, and it became necessary to set up a production branch as well. This branch (as elsewhere) was principally recruited from outside, the officers appointed having at least a nodding acquaintance with industry even if they had no previous experience of armament material. The country was combed for suitable capacity to meet a vastly expanded programme, and shadow capacity was laid down. Small educational orders were placed. By this means adequate potential was found to meet the requirements of the naval staff as previously determined. But, not unnaturally, these underwent great modifications with war experience—in this field as in others. For example, the scale of provisions of ammunition for A.A. guns had to be doubled: new types of fuse (such as the radio proximity fuse) were introduced, and other queer devices, particularly in the anti-aircraft field, such as the 'unrotating projectile'—a sort of comet with a tail of piano wire. Most of these needs could only be met by building and equipping new factories, or developing and expanding existing ones, and this was, of course, subject as the war progressed to the usual inter-departmental routines. The initiation of action on these routines, through the appropriate Admiralty channels, was part of the functions of the new production branch on behalf of all three of the supply branches listed above. Once the orders were placed, they were also responsible for progress, for the supply of materials, and for assistance in the sub-contract field.

Broadly speaking, the work of the Armament Supply Department, much of which was concerned with mass production, was more closely akin to typical work of the Ministry of Supply than was the work of any other Admiralty production department (except certain

facets of the work of the Director of Stores, and the clothing requirements of the Director of Victualling); and it is natural that they worked in rather closer touch with the Ministry of Supply than did most of the others.

(v)

Research and Development

This brings to a close the list of the major departments responsible to varying extents for production, provision and supply for the Navy; for such war-time organisations as the departments of 'Combined Operations Material' and 'Coastal Forces Material' were responsible only for the co-ordination of supplies for particular purposes—they did not carry direct supply responsibilities themselves as e.g. the department of 'Anti-Submarine Material' did. Most of these departments—again, to varying extents—carried also responsibilities for research and development; but there were special authorities for scientific research as well. Once more we have an intricate nexus: so perhaps the convenience of treating the subject of research and development here as a separate one, instead of piecemeal as each department was mentioned, will be conceded.

Traditionally, each directorate was responsible for such scientific research in its own field as the director considered desirable, and subject to the Controller's approval he made the necessary arrangements for carrying it out. These arrangements commonly took the form of setting up a research establishment, and by the end of the first World War the Admiralty possessed a considerable number of such establishments devoted to research and development. All these, however, were not necessarily subordinate to a production department; they might rather represent the 'user' point of view. Indeed the oldest of them was the naval gunnery establishment—the 'stone frigate' H.M.S. *Excellent*, which had a very long history of scientific method brought to bear on naval warfare, dating in fact from the experiments begun in the sea-going vessel *Excellent* in 1832. These experiments had been 'trials', that is to say tests of the operational efficiency of existing weapons (presumably new types); but they were also experimental and could directly affect future development. Such trials remained the essential function of *Excellent* throughout the period with which we are concerned.

Another important 'user' establishment was H.M.S. *Vernon*¹ which in the course of a long history was itself the parent of three other

¹ See p. 109.

establishments: the Admiralty Signal School, or Signal Establishment, which broke away in 1918—and was to become the fountain-head of radio research in particular; the Admiralty Mining Establishment, born during our particular war; and the Torpedo Experimental Establishment in 1943. *Vernon's* function was to represent the interests of the users at all stages in the development, production and use of underwater weapons in particular, with emphasis on safety and handling from the earliest stage. *Vernon* influenced design, of course, and for part of the war still retained vestigial elements of its earlier design functions, but these were removed from its charge in 1943 largely because it was felt to be improper that the designer of equipment and its lay-out should also be the critic of its suitability for use at sea: one function or the other ought to be dropped.

But let us return to establishments under direct production department control. The establishment which exerted the greatest influence on the design of hulls was the Admiralty Experiment Works.¹ This establishment was directly responsible to the Director of Naval Construction. It was set up in 1885 to carry out model tests of hull forms according to an ingenious technique which had been invented by William Froude (and which was quickly adopted throughout the world). A large covered tank was employed. Above the tank was suspended a railway on which ran a truck drawn at any given speed, and beneath this truck the model was drawn through the water, and its resistance measured by a self-acting dynamometer on the truck. Before long it became standard practice to subject all new naval ship designs to model tests, and such tests, considerably amplified and extended, were always the main function of 'A.E.W.'

Another 'design' establishment was the Admiralty Compass Observatory, responsible for the design and testing of all naval compasses. In 1820 Peter Barlow (author of a scheme of compass correction) had reported to the Admiralty that 'half the compasses in the British Navy were mere lumber and ought to be destroyed'; and in 1837 a committee was appointed to investigate the subject. Five years later the Compass Department was formed, initially to test commercially-produced compasses, but later as itself a design agency. The Director of the Compass Department had, as it were, two faces: one as a director at headquarters and the other as head of the Observatory. The functions of the Observatory comprised ultimately the design of compasses for all three Services and the inspection and the testing of the compasses which were manufactured by firms to their designs. The staff was originally composed of naval officers but was considerably reinforced by civilian scientists during the war.

The Admiralty Engineering Laboratory was constituted in 1917 to consist of two separate sections, one dealing with mechanical and the

¹ See: p. 90.

other with electrical engineering—each responsible to the appropriate headquarters department. Both were design institutions, dealing as their titles suggest with the mechanical and electrical equipment of ships. The former was set up largely to supplement the work of private firms in the design of the submarine engine. Both were mainly staffed by civilians. There were similar establishments devoted to chemistry and metallurgy, and historically the youngest such establishment of all was the Naval Construction Research Establishment which was set up as late as 1943. This was not concerned (like A.E.W.) with superficial design but with the structure of ships, and particularly the effect on them of underwater explosions.

But it would be unnecessarily tedious to catalogue here *all* the research and development establishments maintained by the Admiralty (some of them have already been mentioned at other points in the narrative). It will be enough if the examples given indicate their wide diversity of conception and function. Their organisational structure likewise was by no means a stereotype. As in the departments themselves, it reflected the diversity of their historical origins. Thus most establishments were decidedly naval in character, but some were exclusively civilian; some contained a mere handful of scientists and technicians, others were themselves complex administrative machines. But whatever their nature and whatever their origin, they were alike in being specialist organisations 'belonging' more or less—however happily they might arrange to co-operate with others on particular problems—to a particular headquarters authority.

That at least was the general picture at the close of the first World War. In the inter-war period, however, an important development occurred. Scientists of note began to be introduced in considerable numbers into responsible positions in the supply organisations of all three Services; civilians, of general (rather than specialised) attainments.

The Admiralty appointed a scientist of high standing in the outside world to be its first 'Director of Scientific Research' in 1920. There was already at that time a post of 'scientific adviser'; but all scientific activities were in practice controlled by a body called the Board of Scientific Research, specific enquiries being under the control of its various committees; and even now the new Director's post was to be a co-ordinating one only. His instructions entrusted to him responsibility for generally directing, organising and advising on all research work for naval purposes, allocating the funds provided, maintaining the efficiency of the Naval Research Institute, and recommending the appointments of civilian scientific staff at all Admiralty establishments where research work was undertaken. His powers, however, were strictly limited. Each Admiralty department was to retain full responsibility for research in its own particular field. The Director of

Scientific Research might examine outside inventions for them, but in an advisory capacity only: each technical department remained solely responsible for the efficiency of all methods and material brought into use by it in the naval service. He might recommend scientists for appointment to the various research establishments; but once appointed, they were responsible for the actual work they did not to him but to the commanding officer of the establishment to which they had been posted, and came under the administration of the latter officer from then on.

The intrusion of a new authority with such limited powers was neither warmly welcomed nor widely objected to; but the general attitude was that there was little he could do which was not being done already, little he could do that would tread on any other people's corns. He was, however, given a research establishment of his own. The Admiralty Research Laboratory was set up to carry on 'scientific research of a fundamental and pioneer character which might bear on naval interests and for the prosecution of which no appropriate outside agency exists'. On the practical side, any Admiralty department might bring him its problems if these seemed to require a 'research' approach, and it was his business to arrange these problems—or the more urgent and important of them—into a programme of work for the new laboratory. But he was particularly encouraged also to keep in touch with the wide world of science beyond the threshold of naval affairs. This, of course, was difficult for the technical directors to do—their eyes being glued to their own particular problems; on their behalf, then, a part at least of his alertness was to be directed towards the more distant general future, the rosy dawn of science that was presently to flood the military world with so much light.

His laboratory was staffed with civilians—mainly physicists, with a few mathematicians—as a matter of principle, because, it was stated, 'the training of Service officers disposes them to be users and designers rather than researchers'. These came, of course, under his direct administration from the first. But a revolution—albeit a rather slow-moving revolution—in the status of the other scientists and kindred staffs in the Admiralty was now in preparation. It began in 1925, when it was decided that the civilian technical staffs in the Signal School and in the Mine Design Department of *Vernon* should be pooled, and the pool administered by the Director of Scientific Research. For this was the harbinger of a general and important—indeed, an electrifying change: the grouping of all the scientific and technical staffs of the Admiralty and its outport establishments into three pools, one scientific, one technical, and one analytical, under a common professional head. For all three pools were to be administered by D.S.R.; and although this administration was intended not

to interfere with the executive functions of the various inspectorates or heads of establishments, he could at least now make recommendations to the authorities concerned, and even to the Controller himself, about any readjustment of pool staffs as between the various establishments which he felt to be necessary.

The pool system at once enhanced the status both of the director and of his staff also. Before this, scientists in the various establishments had felt themselves somewhat isolated from their professional head and his small headquarters party. Their appointments and all prospects of promotion had been settled by the heads of their establishments—in most cases, naval officers—and their chances of gaining wider experience by transfer were slight; they had tended, like civilian staffs elsewhere, to be kept where they were first appointed. From now on, with their newly accorded unity, we find the scientists passing over to the offensive. They were, after all, a naturally homogeneous body of men, only artificially kept apart hitherto; of keen intelligence and singleness of outlook, well aware of their own value. They came from the outside world, and they did not take kindly to the disabilities endemic in government employment. Secrecy ran contrary to their whole training and outlook. The difficulty of gaining promotion on scientific ability alone not joined to any natural knack of administration (inevitably the higher posts carried administrative responsibilities) outraged them. The low rates of pay, the minutely graded hierarchies, the overruling of scientists by non-scientists, all those things were perpetual thorns. It was natural that their discontents should seize the first opportunity of an outlet.

Shortly this opportunity was to be even further extended. As a feature of administration, the new pool system was presently adopted by the Air Ministry too—and elsewhere. Henceforward, then, in all these matters scientists not only in the Admiralty but throughout the government service were able to make common and thus formidable cause. Without question, moreover, the general trend of the times was now on their side. One of the features of the rearmament effort of the years immediately before the war was a lively interest everywhere in out-of-the-way weapons. Thus were born in wartime such Admiralty bodies as the 'Miscellaneous Weapons Development Department': true, most of the work of this department was only 'scientific' in the popular sense, and its approach and general tone were much influenced by a number of enthusiastic and ingenious young naval officers who worked side by side with the orthodox scientists; but its very existence showed which way the wind was blowing. In a different way, the war-time creation under scientists of wide reputation and powerful personality of a 'Department of Operational Research' in the Admiralty brought to the existing scientific department allies of high standing. Thus the attack, in alliance with scientific

colleagues throughout Whitehall, became a series of weighty, widespread, determined and prolonged assaults. In due course the Treasury showed themselves prepared to correct proved anomalies, and to concede what they could in an attempt to reconcile what were in fact two fundamentally incompatible sets of values; nevertheless in the long run they seem to have surrendered very little which they felt could not fairly be granted without injustice to other government servants—for that, generally, was the inescapable rub.

These negotiations with the Treasury concerned the status of the profession as a whole. Within the Admiralty, the problem was rather one of organisation and precedence. In some ways the position of Admiralty scientists compared favourably with that of scientists in other departments: in particular, the antagonism between Service officer and civilian, which was (as we shall presently see) an unhappy feature of many Army establishments, was absent. All the same, beyond fairly narrow limits the Admiralty scientist could only do what he was asked to do, could only advise when his advice was called for. Perhaps it was natural for him, then, to feel that his advice was not so freely called for as it might have been, and to resent it when departments such as the ordnance authorities preferred to take their troubles to Vickers, rather than to increase the use of civilian scientists in their own departments. At any rate, in the summer of 1941 the Director was still inclined to speak of a 'failure to appreciate the place which scientists and engineers hold in matters of defence' and of the way in which it was possible for 'quite unqualified officers' to act contrary to the advice he gave them. Yet how was this to be remedied? After all, he was only a director among other directors: quite clearly he could not exercise *authority* over his colleagues; only some supra-departmental power could do that.

Accordingly in October 1942 a new post was created, an 'Assistant Controller (Research and Development)'; and Dr C. F. Goodeve, F.R.S., was appointed to fill it. The nature of this post should be carefully appreciated (we shall revert to it at length in Chapter IX). Dr Goodeve was not a director general set over a director; direction of the D.S.R. Department was not his concern. His authority was delegated authority from the Controller to 'control'—not the scientists, but the rest of the Controller's organisation on behalf of science: to 'co-ordinate research and development in the Controller's departments, etc., to ensure that scientific opinion is adequately represented in those departments and that all due weight is given to it'.

The success of the new post is perhaps indicated by the disappearance thereafter of the whole question of the authority of science from the rather unhappy eminence it had obtained among the anxieties of senior officials. One constitutional amendment, however, to the terms of reference of the post was found necessary—deriving from the

nature of the doctrine of Board superintendence.¹ It was perfectly proper for D.S.R. to have responsibilities extending beyond the Controller's sphere of interest, since heads of departments hold their 'instructions' from the Board as a whole; but for an assistant to a particular member of the Board to go beyond the field of his principal would be another matter. Yet clearly it was desirable that the A.C. (R. & D.) should be free on occasion to exercise just such a wider responsibility. So he was given the additional post of 'adviser to the Board', and in a stroke the constitutional difficulty was solved.

But before leaving the subject of research and development, we should perhaps stress the marked difference of function which distinguished the Admiralty D.S.R. from his opposite number in the aircraft field. The activity of scientific research in the Air departments was conceived, as we shall presently see, as an integral part of the main function of the development of aircraft. The Directors of Scientific Research and of Technical Development were there the closest of partners—they were indeed literally interchangeable, since a Deputy Director of Scientific Research in aircraft production could (and did) become a Director of Technical Development. In the Admiralty it was of course inconceivable that a Director of Scientific Research for the Navy should become Director of Naval Construction. The difference lay, not in the degree of importance attached by the two departments to scientific research but rather in the essentially different functions carried out by the Director of Naval Construction (Admiralty), who was himself the designer of ships, and the Director of Technical Development (Air), who was *not* the designer of aircraft but merely advised firms about their own designs. In the design and development of ships, indeed, the members of the Royal Corps of Naval Constructors were regarded as qualified by their own specialised training to see where basic research was desirable and themselves to carry it out. In this research members of the scientific research pool might assist, but they could hardly replace the naval constructors as actual designers; and it is important to bear in mind that primary responsibility for scientific research in ship design thus rested with the head of the Royal Corps, not with the Director of Scientific Research.

If, however, we turn from the construction to the arming and to the defence of warships we find a somewhat different picture. As we have seen, the naval ordnance officers (for example) were not normally the actual designers of the equipment they developed. Thus, in the evolution of gunlaying equipment and of mines and torpedoes, in the study of underwater explosions and the defence of ships against them, in all the developments of amphibious warfare, in local defence and camouflage—while one or more other authorities might be involved, it was with D.S.R. in practice that the initiative usually lay.

¹ See pp. 4, 5.

For this pre-eminence there was abounding reason. His pre-war practice of long-term investigation had been aimed at providing the Director of Scientific Research with an accumulation of pigeon-holed knowledge which could be fetched out and rapidly applied as the basis of technical development, whenever the urgencies of wartime called for it. Thus there were not many 'new weapons' produced by the enemy at sea—bar the outstanding exception of the Schnorkel—with which he had not himself experimented at one time or another, and so had already considered possible antidotes. For example, Admiralty scientists were considering noise-making decoys as antidotes to any prospective acoustic torpedo as early as 1940—though it was not till 1942 that the torpedo itself made its appearance as an enemy weapon. As for the magnetic mine, the Admiralty Research Laboratory was successfully experimenting with antidotes as early as 1926, although no magnetic mine was yet known to exist—and indeed thirteen years had yet to elapse before they were to be sprung upon the world by the Germans as a 'surprise'. Similarly, it was long-sightedness in beginning to experiment with infra-red a year or two before the war that enabled the Admiralty (when called on) to develop a variety of infra-red homing and signalling devices not only for naval but for Army use as well.

(vi)

Principles of the System

Likely the reader may now feel wearied and bewildered, after conning this chapter and the chapter before it, by an appearance of such kaleidoscopic diversity, by so total a lack of 'system' (in the Gallic sense) in the series of Admiralty institutions which these little sketches have tried to arrange and portray. Quite bluntly—to suggest that any such conscious 'system' existed would be to falsify the picture and that is an excessive price to pay for lucidity. Nevertheless, certain common features are discernible which are not entirely fortuitous, and the student in need of guiding threads through the maze may be glad of these at least to lay hold of.

We have seen that certain departments (without exception, civilian departments) were 'monolithic' in their structure: their senior staff, that is to say, was drawn from a single type of candidate who was, or who became, by professional training or at least by life-long practice, expert in the department's particular business. Other departments were composite. The usual thesis would seem to be this: the greater the relative importance of design and development in the work of a production department, the more likely we are to find a composite

staff with the higher direction in naval hands and other important and subordinate posts in civilian hands.¹ The doctrine underlying this teamwork in development, design and production and this traditional all-pervading predominance of the naval officer was clearly summed up by the Controller of the day in a memorandum issued in 1943. In this he laid down three principles for the design of equipment for naval use. It must be suitable to the conditions in which it would be used and the men who would use it; it must be the best equipment that science and technique could evolve; and it must be quick and easy to produce. The order of importance in which these principles are listed, and the inherent possibility of conflict between them, should be carefully noted. It followed from these principles (he said) that design should be undertaken by a team representing the three interests involved: the naval user, the scientist or technician, and the production expert. And although each of these would play a dominant part at succeeding stages, it was important that each should play some part in every stage. . . . On the other hand, it was necessary with the team system that one interest should have a kind of supervisory responsibility over the field as a whole, and the best people to hold that responsibility, he felt, were the naval users. Not only were they concerned at all stages, but they had the object most clearly in front of them, and were better able than anyone else to settle arguments.

Although the Controller did not himself make the point on this occasion, the doctrine is in fact an example of the British naval axiom that men in the long run matter more than material—an axiom which had earlier been stated in a characteristically extreme form by Lord Fisher—himself an ex-D.N.O. and ex-Controller, when he declared in a letter to Lord Esher that ‘men are everything, material nothing’.² Hence the pre-eminence of the Controller’s first principle, then, that ‘equipment must be suitable to the men who were to use it’—no Procrustean bed which sea-legs must be cut, or stretched, to fit!

It will no doubt strike the reader that such a system of composite departments under inevitable naval direction, however admirable in theory, would be difficult to work from a human and administrative point of view. It calls, from civilians, for particular professional skills of a high order, yet condemns the members of these various civilian

¹ Two obvious exceptions to this ‘thesis’ will probably occur to the reader. The Dockyard Department was not interested in design and development, but it was composite and under naval direction. Technical diversity accounted for the first, operational considerations for the second point. The Naval Construction Department was a design department, but its structure was civilian and monolithic. Here the exception is only apparent: naval control was none the less real for being extra-departmental, exercised by the Naval Staff (with their strictly formulated requirements), the Director of Naval Equipment, the Admiral Superintendent of Contract-Built Ships, and the Controller himself. See also Chapter V (ii).

² See Marder (ed.), *‘Fear God and Dread Nought’: The Letters of Lord Fisher of Kilverstone* (Cape, 1952), Vol. I.

'guilds'—and even the engineer officers of the Navy—to permanently subordinate positions, as if by a kind of colour bar. It requires first-class men; but how could first-class, ambitious men be reconciled to this kind of blind-alley service? By way of an answer, let us propound our second thesis. With each of the major professional guilds from which the composite departments were recruited there was normally associated a particular parent department, an executive and professional focus where its own appropriate parcel of executive authority at 'director' level resided in its own professional head. From these parent departments professional officers were 'farmed out' on a temporary basis. Thus every professional officer's work could be controlled by the immediate executive authority over him at the time, but his *career* could remain throughout in the control of his own professional chief—and *this* directorship, at least, was open to the talents of every member of the guild. The scientist employed on fire control gear could never become Director of Naval Ordnance; but he might become Director of Scientific Research. The constructor or the electrical engineer could never become Director of Dockyards; but his service in the Dockyards Department might well prove a step towards the ultimate headship of his own.

For the reader, then, who wishes to carry away any clear picture in his mind of this Admiralty organisation at departmental level, it might perhaps be a useful exercise of memory at this stage to think back and re-assess each department mentally in these terms. Each focus of executive authority, whether complex or simple—the Department of Dockyards, the Department of Naval Ordnance, or again, the Naval Store Department, etc.: which guild or guilds does it draw into its service, in what proportions and with what relative seniority? Further, each pervasive guild—the constructors, the electrical engineers, the naval engineer officers, etc.: who is its professional head and which other focal authorities does it also serve?

We have already watched in some detail, in this account, the emergence of one particular guild—the scientists—to full departmental stature (and more) on its own account: an emergence by which the value of the guild as a component in other departments was undoubtedly enhanced. We have also, perhaps, seen the tentative beginnings of the emergence of a new guild—the experienced 'production' officers drawn from industry itself. In wartime at least this guild was recruited in considerable numbers, and widely scattered throughout the machine as a whole. With the engineer officers of the Navy it formed the third part in the Controller's tri-partite design 'team', as well as having an important part to play in practical production and progress work. Yet the authorities never accorded it, during the period we have under review, either its own professional head or its own focus of executive authority—any 'parent department'

whatever. Perhaps it was not then easy to see the room, or the need, for such an addition to the existing organisation. Yet the authorities must sometimes have wondered whether either the best men could be recruited for such a service or the best use be made of them without.

This, however, is a subject to which we must revert in our concluding chapter: for the present, our factual picture of existing Admiralty departments is still not complete.

CHAPTER VII

MERCHANT SHIPS AND NAVAL AIRCRAFT

(i)

Preamble

PRESENTLY we must turn to aspects of the Admiralty machine other than the 'departments'; but before we leave the departments altogether there are two special cases to consider, illustrating a special kind of situation.

Preponderantly each of the three major supply organisations—the Admiralty, the Ministry of Supply and the Ministry of Aircraft Production—was concerned with supplies for one only of the three armed services. But exceptionally one of these supply departments would assume responsibility for the production of particular kinds of material which were used by two or perhaps all three Services—even by civilians as well. The Ministry of Supply had many responsibilities of this nature, and the special responsibilities of the Ministry of Aircraft Production in the production of radio are a particular case in point which will be dealt with in due course.¹

Such assumptions of responsibility naturally resulted in excrescences and gaps in the organisational pattern; excrescences on the administration of the department which accepted catholic responsibility, and gaps in the organisation of departments which among all their tasks were frequently very conscious of one or two tasks which were done for them and not by them. The Admiralty undertook the building and repair of merchant ships to meet the needs of the Ministry of War Transport: the supply of aircraft was undertaken for the Navy as well as for the Air Force by the Ministry of Aircraft Production. Studied together, this excrescence and this deeply-felt gap in the Admiralty war-time pattern may help to throw a little light on the kinds of problems which arise in organising 'horizontal' supplies of this nature. That is the reason for treating here in a chapter together two such apparently disparate subjects as merchant ships and naval aircraft; organisationally, from the Admiralty point of view they are the obverse and the reverse of a single coin.

¹ See pp. 304-305.

Direct control of production at all stages by the user was (as we have seen) a fundamental of Admiralty doctrine. Indeed it is clear from the record that divided control of the product—the separation of user and producer—tended to lead to trouble, at least in any sphere where supplies for the Navy were concerned. But it is also clear from the record that divided control of a specialised industry also led to trouble. This chapter, then, poses (among other things) the question: when they conflict, which of these two doctrines is the stronger medicine? There could scarcely be a more difficult question, in any given set of circumstances, to decide.

The period we have under review was not the first occasion on which either of these two particular ‘headaches’ afflicted Whitehall. Both had appeared first in the earlier conflict, and in both cases we shall have to take a brief look at their origin and earlier history if we are to see in perspective the measures which came to be adopted in the war of 1939–45.

Let us begin with the construction and repair of merchant ships.

(ii)

The Construction and Repair of Merchant Ships

In time of war there *has* to be control of merchant shipbuilding. Shipping companies are unlikely at their own expense to order new tonnage on the necessary scale (unless promised rates of hire so extravagant as to indemnify them against the risk of being saddled with redundant tonnage when the war is over); moreover the kind of ship best suited to the immediate special needs of war will in any case differ from the kinds commercially most profitable in peacetime. In short, the overriding interest of a state at war—production of the greatest possible cargo-carrying capacity of the necessary categories in the shortest possible time—is almost certain to be at variance with the interests of the private parties concerned. Further: in the conditions of acute shortage inseparable from war, shipbuilders executing private orders will not get labour and materials unless these orders are rated as part of the war production plan. For, as Sir Arthur Salter wrote, ‘in a general system of official control what is left to private enterprise fares badly’.¹

Sir Arthur Salter was writing about the first World War. During the first two years of that war neither the supreme importance of merchant shipping nor the extent of the novel dangers confronting it

¹ Salter: *Allied Shipping Control* (Oxford, Clarendon Press, 1921), p. 81.

were appreciated. Initially, the Merchant Navy was not accepted as an integral part of the nation's fighting strength; even the Government regarded the building of cargo vessels as a mere commercial activity which could with impunity be pushed into the background. As a result, merchant shipbuilding languished between 1914 and 1916 and almost expired. Skilled labour was drawn away from such 'civilian' employment to warship building both by better pay and by prestige. The output of merchant ships from British yards, which had approached two million tons a year in the years before 1914, fell to a mere 660,000 tons in 1916.

In 1916, however, the dangers of such an attitude at a time of intensified submarine warfare began to be recognised, and the Government attempted to reinvigorate private shipbuilding—for example, by the recall of skilled marine engineers from the Services. But although the rate of output rose in the last quarter of that year to the equivalent of an annual $\frac{3}{4}$ million tons, clearly more positive action by the State was needed. In December the Government accepted direct responsibility for the construction of merchant ships. But even then they still hoped to interfere as little as possible with normal business methods—and the practical problems of securing adequate labour and materials, it was soon found, were not to be solved by the mere assumption of 'responsibility' by a government department. As long as the all-powerful Royal Navy was a free competitor, so long would its pull prove too strong and merchant work continue to obtain a mere residue of berths, manpower and materials. In May 1917 the Government decided that this unequal competition must be brought to an end: responsibility for both branches of shipyard work must be vested in a single authority—which meant the Admiralty. Within the Admiralty, it must be grasped by a single pair of hands.

The Cabinet's intention was that an organisation should be built up within the Admiralty comparable with that which provided the Army with munitions, to develop and use to the best advantage of *both* sides the whole shipbuilding resources of the country. The office of Controller, it was decided, was to be the keystone of the arch, in charge of both kinds of building. For a Controller in such a position, however, impartiality would not be enough—he must be prepared time and again to throw his whole weight on to the lighter side of the scales. Moreover, it will be recalled that this was the 'business' Government. Accordingly the revolutionary experiment was tried of appointing an outside civilian Controller. Sir Eric Geddes was chosen—the railway magnate who had just made a name for himself as Director General of Transportation with the armies in France—and a staff appointed under him of no less than 600 souls on the merchant side alone.

A few months later, however, Geddes himself was promoted to be First Lord. This touched off a further series of reorganisations. In the course of them the Controliership of the Navy ultimately reverted to naval hands, and in March 1918 Lord Pirrie—the septuagenarian chairman of Harland and Wolff—became ‘Controller General of Merchant Shipbuilding’. He was not himself made a member of the Board, but he was not made subordinate to the Controller of the Navy; in so far as he had a ‘superintending lord’, this was expressly the First Lord himself. In practice, he was a semi-autonomous potentate, neither of the Board nor under it, and had his own right of direct access to the War Cabinet.

In this way at last, when the war was nearly over, a real place in the production scheme was carved out for merchant shipping; certain yards were definitely set aside for merchant work alone, and from two-thirds of them at least naval work was in fact successfully excluded.

These then were the lessons and precedents of the first World War. The whole military and civil effort of the Commonwealth and a great part of the effort of her allies (including much of the military assistance supplied by the United States) had been found to depend on British shipping; and this effort, it was realised, had been needlessly jeopardised by failure to solve early enough the problems of replacing tonnage lost. In any future war, with a diminished merchant fleet to start with and diminished shipbuilding capacity, Government responsibility for merchant building would be necessary from the first. The only way which had been found to render that responsibility effective was to lay it on the same shoulders as warship building—the broad shoulders of the Admiralty, reinforced by powerful figures from the shipbuilding world itself.

The control of merchant building in time of war was one of the problems tackled during the inter-war period by the Principal Supply Officers Committee, which set up a sub-committee for the purpose. From the first, official control in wartime was taken for granted; the only question at issue was whether the Admiralty should once more take charge. This, it seemed, was not acceptable to the Board of Trade. From a situation of some obscurity it was the latter department, not the Admiralty, which eventually emerged for merchant building as the planning and producing authority-to-be.

The necessary co-ordination with naval building, it was supposed, could be sufficiently secured by a previously negotiated division of the building capacity of the country into naval and mercantile slips and berths. A good deal of planning along these lines was done during the 'twenties and after. But this initial division of capacity on paper was made in the absence of any severe pressure of rearmament; when that pressure began to be felt in 1934 these paper allocations

crumbled, for the Admiralty quickly found themselves forced to table demands which would have reduced capacity for building merchant ships to what the Board of Trade considered a dangerously low level. History was beginning to repeat itself, in short. Clearly, at least some sort of umpire was needed; and early in 1937 discussions between the two departments led to the setting up of a 'Shipbuilding Consultative Committee', under the chairmanship of Sir Amos Ayre¹ with four other leading shipbuilders as members, and with Admiralty and Board of Trade delegates in attendance. Set up 'largely as a support of the Board of Trade against the Admiralty' and 'to avoid the confusion, delay and waste which arose at the beginning of the last war, when Admiralty action practically stopped merchant shipbuilding and did not make the best use of the facilities the industry could provide' the committee in fact proved, for the time being at least, an acceptable instrument of co-ordination between the two departments, as well as providing the essential data for a practical approach to the merchant building programme. Indeed the final allocation arrived at by Supply Committee III in the light of the advice proffered by this consultative committee consisted of an approximately equal distribution of shipbuilding berths between naval and mercantile construction; and this, though not completely satisfactory to either party, was accepted by both at the time as the best obtainable compromise.

Although by September 1938 the planning of the practical aspects of a merchant shipbuilding programme for application in time of war—allocation of capacity, consideration of the types of vessel to be built and of the degree of standardisation to be imposed—had thus reached a fairly advanced stage, very little attention had up to that time been directed to the extent to which Government control would be needed, the manner in which the Board of Trade would exercise it, or the form to be taken by the controlling organisation. Certain preparatory studies, it is true, had been made from 1936 onwards; but it was only during the Munich crisis that these important questions came under close review. Now the Board of Trade had recognised at an early stage that if they were to be responsible for shipbuilding they would need the expert advice of men connected with the shipbuilding industry, and in 1936 they had consulted the Shipbuilding Conference about the best way in which such advice could be obtained: but it had soon been apparent that the industry was not likely to be content with the giving of advice. It expected some measure of executive control. Meanwhile, however, arrangements were in hand for a 'hiving' to take place within the Board of Trade itself which materially affected the issue. It had been decided

¹ Chairman of the Shipbuilding Conference. See below in this section.

to establish an independent ministry of shipping, on lines similar to those followed in the first World War: the ministry was to grow out of the Board of Trade's own Marine department by coalescence with selected members of the shipping industry; and among the new ministry's functions was to be included the provision of shipping by means of new construction.

Thus, by the autumn of 1938, it was already widely understood that in wartime a ministry of shipping would be set up; and further, that Sir Amos Ayre—Chairman of the Conference and, as we have seen, already Chairman of the Consultative Committee—would be installed there as the executive authority for building and repair.

These plans duly came into effect. The Ministry was set up, and on the 26th October 1939, seven weeks after the declaration of war, the scheme for a merchant shipbuilding and repair directorate within the new Ministry was put into force, and Sir Amos Ayre was appointed its head. His function was defined as being 'to deal with all questions connected with the building and repair¹ of ships by private enterprise, the initiation and carrying out of a Government building programme, and the state of ships ordered or in the course of construction'. The logic of these arrangements was one with which the Admiralty least of all could quarrel—for it rested on the sacredness of that indissoluble marriage of producer and user which the Admiralty never tired of affirming.

Nevertheless, the outstanding problem of satisfactory relations between merchant and warship building remained unsettled. The dissolution of Supply Committee III on the outbreak of war had automatically abolished the organisation—including the Shipbuilding Consultative Committee—which had hitherto undertaken the co-ordination of naval and merchant requirements, at the very time when such co-ordination was most urgently needed. The Minister of Shipping proposed that the Consultative Committee should be reconstituted; but there was a difficulty—the hitherto neutral chairman of the committee, Sir Amos Ayre, was now himself the responsible authority for merchant shipbuilding, with the duty of pressing its claims *ex parte* against those of warship production. Accordingly the Admiralty demurred; they would be happy to attend any advisory body, but could no longer accept Sir Amos as arbiter. Thus the proposed revival of the committee was dropped and the vital question of co-ordination left merely to direct negotiations between Sir Amos himself and the Controller of the Navy.

It was not long before the dangers of divided responsibility began to appear.

¹ This inclusion of 'repair' should be noted. Henceforward repair always ranked with construction in the official nomenclature—and in actual urgency often ranked above it.

One of the first and most urgent duties of the Navy on the outbreak of war was to provide, largely by the requisition and conversion of merchant ships and trawlers, adequate trade protection in the shape of minesweepers, and escort vessels of all kinds—armed merchant cruisers and the like. This programme—because of the nature of the work, of course, as well as its volume—could not but make heavy calls, on naval behalf, on the merchant ship side of the shipbuilding house. Thus at the beginning of the war a considerably larger number of berths were in fact claimed for ‘warships’ than the paper allocation allowed for. So far, at least, the shipping authorities tended to look on the situation with an understanding eye; after all, it was useless for them to send new ships to sea which the Navy could not protect. They fully understood the need to complete at any rate the initial work of conversion—the biggest item involved—so that escort vessels and minesweepers could be got quickly to sea in the first few weeks of war. But this was not all. The speed with which merchant ships completed was even more important than the numbers which could be laid down; and here the new Ministry of Shipping, like its predecessor in the last war, soon found itself suffering heavily from the diversion of labour and material to Admiralty work of all kinds. This was especially felt in those yards where both naval and merchant work was undertaken. Before the end of 1939 merchant ship construction began to be seriously impeded by a shortage of steel—due primarily to the preference given to Admiralty supplies; the number of men engaged on new merchant ship work was steadily falling, in spite of a large increase in total shipyard employment. There was a real danger that the errors of the last war were about to be repeated, at least in a modified form.

In short, if we may pursue our earlier metaphor of the ‘marriage’ of producer and user, the legitimate spouse was failing to hold his own against the co-respondent, and it became clear that divorce and a different marriage was the only solution. In January 1940, the War Cabinet decided that within twelve months the existing rate of output of merchant tonnage would have to be nearly doubled. For this to be possible, it was felt, a single authority *must* once again be responsible for all classes of shipyard work; the Admiralty *must* again add the production and repair of merchant ships to its existing functions, as in the previous war. To this the Minister of Shipping now raised no objection, stipulating only that his department should continue to decide the types of merchant ship to be built.

On 1st February 1940, then, the Merchant Shipbuilding and Repair Division of the Ministry of Shipping, including Sir Amos Ayre and most of the staff working under him (between twenty-five and thirty in number), was transferred *en bloc* to the Admiralty in London. The intention of the move, as we have seen, was to bring merchant

and naval shipbuilding under a single supreme authority; and it now rested with the Admiralty itself to give specific expression internally to that principle.

The previous war provided a variety of precedents. When, ultimately, Lord Pirrie had headed an autonomous department, the keystone of the arch had been the suzerainty of the First Lord himself—since this extended over the Controller of the Navy as well. But to invoke the personal intervention of a First Lord like this presupposed a situation where merchant building had already become a major political issue; mercifully, this was not the present case. Moreover, it was a solution the success of which in the past had derived considerably from the previous experience gained by Geddes as Controller of both navies before he became First Lord. Alternatively, there was the earlier 'Geddes' precedent itself—bringing both kinds of shipbuilding under a single civilian Controller. But that meant finding and bringing into the Admiralty another Geddes; this could hardly be expected to be welcome to the naval side even if another Geddes could have been found. A solution which seems to have been considered was to effect the fusion lower down, at departmental level—by adding merchant shipbuilding to the responsibilities of the Director of Naval Construction. But the technical problems were so dissimilar and the latter authority had (as the First Lord pointed out) so much on his plate already, that this solution was also rejected.

In short, it was decided that Sir Amos Ayre was to remain the director of an independent department. But this threw the problem of a keystone to the arch back once again to the Board level. If no single Board office could be found to provide such a keystone, could it perhaps be provided by the corporate entity of the Board itself?—That, indeed, was the principle of the solution finally adopted.

In brief, a new Board post was created, a controller of merchant shipbuilding and repair. The new post was to be a reflection, as it were, or companion-piece to that of the existing Controller of the Navy, with equal status and parallel functions. In practice, the device worked. But the reader will be quick to see that even as a war-time improvisation it was a considerable departure from the normal traditions of Board composition. For with the two navies inevitable rivals as well as collaborators in their joint field of production resources, the very existence of two controllers, so briefed, meant that there were now two members of the Board potentially operating oppositely in the same sphere of superintendence, two members whose interests were not—as the interests of members of the Board were constitutionally supposed to be—complementary to one another, but could, and sometimes necessarily *must*, conflict.

Sir James Lithgow, a prominent shipbuilder and industrialist, was

appointed to the new post. Under his 'superintendence' Sir Amos retained the directorship of the department. Broadly speaking, the Director was responsible for the technical administration of merchant shipbuilding—for working out programmes, for the distribution of work between firms, for the internal allocation of labour and materials, for the preparation of new designs and the modification of old ones. The primary functions of 'C.M.S.R.', on the other hand, being at the policy level, were to represent the department's interests in its dealings with the outer world—particularly the Ministry of Shipping; and within the Admiralty, in its dealings with the naval authorities at the highest level. A detached assistant secretary was appointed as Sir James's Civil Service adviser—his guide through the labyrinths of Whitehall.

The technicians Sir Amos had brought with him from the Ministry of Shipping had, of course, originally been recruited from the industry itself. These formed the staff of his directorate, while the non-technical staff who had accompanied them from the Ministry were formed into a new secretariat branch, but continued, none the less, to work exclusively for the Director (being only responsible to the Secretary in matters of finance and general administration). In time the organisation of the department was gradually expanded and strengthened; but in comparison with the immense organisation built up in 1917-18, the staff remained at all times small and its general character unaltered.

Thus we see that the changes of February 1940 had tended to make the direction of merchant shipbuilding in practice a matter of industrial self-government rather than of official control as ordinarily conceived. For both Sir Amos and the staff of the department he ruled were men who belonged to the shipbuilding world. Sir James Lithgow himself had helped in the administration of merchant shipbuilding in the first World War; more recently he had served on the Government Industrial Advisory Panel as well as on the Shipbuilding Consultative Committee; but to the outside world, of course, he too was chiefly known as a 'boss' shipbuilder and steel magnate. He was a former president of the Clyde Shipbuilders, the Shipbuilding Employers Federation, the F.B.I. and similar employers' organisations (in 1943 he became president of the Iron and Steel Federation). Naturally enough this arrangement gained for the Admiralty the confidence of the shipbuilders—of the shipbuilding employers, that is—to a degree unobtainable by any other system of Government control; but equally naturally it aroused a certain measure of hostility on the other side of the house—among the shipyard employees. This hostility was voiced in the House of Commons;¹ and

¹ H. of C. Deb., Vol. 356, Cols. 1151-1154.

there can be little doubt that the putting of official authority into the hands of their employers in this way continued throughout the war to be unpopular with shipyard workers, or that it tended to exacerbate unrest.¹

The transfer of the responsibility for merchant shipbuilding to the Admiralty, while it simplified the administration of production, tended to complicate the formulation of programmes; for it divorced (as we have already said) the producers from the users of merchant ships. This appeared to create the classical risk—that programmes would be devised too much from the point of view of production convenience and with too little regard to the changing needs of the Merchant Marine as they appeared to the Ministry of Shipping.² This indeed was the kind of danger that the Navy themselves in their own field had constantly in mind—why they were so insistent that sailors rather than production experts should always be in overall control of the Admiralty production machine. To obviate it the Government, in announcing the transfer, had made it clear that ‘as regards the types of merchant ships to be built, the Admiralty will meet the requirements of the Ministry of Shipping, after consultation with representatives of shipowners’.³ Before the transfer, the principal instrument of liaison between the Ministry of Shipping and the shipowners had been the Advisory Committee on the Merchant Shipbuilding Programmes, which consisted of Ministry representatives—who were themselves shipowners—and representatives of the industry. After transfer to the Admiralty, it was decided that this committee should continue in being and that the Director of Merchant Shipbuilding and Repairs should attend as the Admiralty’s representative. Thus the Admiralty as producers, the Ministry and the shipowners themselves as users were brought together round one table. The business of the committee was to recommend to the Minister of Shipping the proportions from time to time to be maintained between the broad classes of merchant tonnage—tramps, cargo liners, and so forth; and when this involved a change in the existing balance of production, the Director of Merchant Shipbuilding investigated and reported on the practicability of such a change and the effect which it might have upon the total volume of output. If the committee insisted on a revision of the programme, notwithstanding a consequent reduction of output, then the revision was carried out; but any objections raised by Sir Amos Ayre from the production point of view usually carried decisive weight.

¹ See also p. 170.

² In 1941 the Ministry of Shipping was absorbed into the Ministry of War Transport. The change made no difference so far as the Admiralty was concerned and any reference to the Ministry of Shipping in this chapter may be taken to refer equally to the Ministry of War Transport.

³ H. of C. Deb., Vol. 356, Col. 1151.

However, by far the most potent factor amongst those which limited the output of merchant ships continued to be the volume of naval building, which absorbed rather more than half of the physical capacity of shipyards and rarely less than 60 per cent. of the labour force engaged in new construction. It was of the utmost importance that there should be close and harmonious relations between the authorities responsible for these two inevitably competing programmes. The main problem, of course, was not the question of the broad priority to be observed between merchant and naval work: this—a matter of policy rather than organisation—was laid down from time to time by the War Cabinet or the Minister of Defence as interpreted by the Board of Admiralty. It was rather in day-to-day collaboration over carrying out Cabinet policy that an improvement had been sought by the organisational changes of February 1940. Could not an occasional merchant ship be fitted into the programme of purely naval yards in order to correct the balance there between hull workers and fitting-out labour? Must this experienced naval firm be made to devote part of its capacity to merchant work according to the strict terms of the allocation? Cannot the merchant work of this mixed yard be speeded up? How about moving a couple of riveting squads from this yard to finish off that urgent job down the river? Such were the problems which called for the closest possible liaison between the two departments of the Admiralty exercising control over shipyard production, and close personal contact between C.M.S.R. and the Controller of the Navy. In practice, the decisions which were reached generally involved a certain precedence for naval work; but these were usually accepted by those responsible for merchant shipbuilding as right and proper in the circumstances. 'In point of fact', as the C.M.S.R. remarked towards the end of the war, 'the Admiralty has tended to favour naval work at the expense of merchant building. It was bound to do so in order to win the war at sea.'

In the shipbuilding districts themselves, the Merchant Shipbuilding and Repair Department¹ maintained its own local overseers and other officers, entirely distinct from the organisation of warship production superintendents which the naval side maintained. In the course of time, however, the Flag Officers-in-charge—set up as we have already seen² originally to co-ordinate naval repairs with operational requirements—came to exercise a considerable measure of co-ordination over the whole field. When, in March 1941, the control of shipyard labour was put into Admiralty hands,³ the most

¹ At a later stage the department was divided into a directorate of Merchant Shipbuilding and a directorate of Merchant Repairs.

² See p. 102.

³ See p. 182.

important of them were nominated 'District Shipyard Controllers' with power to move labour from yard to yard and job to job. Thus—though they were never entrusted with the supervision of naval new construction in the same way that they supervised repairs—they came to be controllers of the effective sinews of priority throughout the whole range of shipbuilding and repair work, naval and merchant. These powers they exercised, of course, in accordance with directives from the Board; and in order to ensure that they had adequate detailed guidance it became customary towards the end of the war for the deputy principal priority officer at the Admiralty to prepare monthly lists of the work in hand, firm by firm, in each shipyard control district (new construction and repair, naval and merchant) in its order of priority. These lists he negotiated with the many and various conflicting interests concerned, until ultimate agreement on them between the two controllers was arrived at—whereon they were issued to the several district shipyard controllers in the name of the Board. This routine, of course, was in addition to the consideration of urgent and important cases settled by the two controllers between them on a day-to-day basis and to the more technical discussions of the 'Controllers' Liaison Committee', a body which was set up in the autumn of 1942 for the discussion of matters of common interest to the two controllers, to see that they were kept informed of each other's intentions, to avoid overlapping action, and to discuss the allocation of capacity and supplies.

The merchant shipbuilding system as a whole was devised, as we have seen, to produce the maximum carrying capacity for war purposes. By the autumn of 1944 its work was virtually done; the United Nations disposed of a sufficiency—perhaps a superfluity—of austere bulk carriers of this sort. They had been built in very large numbers, both in Britain and in the United States. Thus the national interest now veered to a need, once more, for high-class ships suitable for particular peace-time trades. Forecasts of the post-war difficulties of the British economy were already causing considerable anxiety in Whitehall (an interdepartmental official committee to study them had been set up as early as 1942): the need of a post-war export drive was already foreshadowed, and it was obvious that Britain's carrying trade was going to have a more important part than ever to play in the country's economy in the next period of peace. In October 1944, therefore, it was decided that no further orders should be placed on government account with the exception of certain special types still required for the Far Eastern war. At the same time control over private ordering was sensibly relaxed. Owners were henceforward allowed, indeed *encouraged*, to build ships of the types they considered likely to be most profitable under post-war conditions; most of the war-time regulations as to defensive equipment and special safety

measures ceased to have effect. The need for official backing, however, in order to secure a fair proportion of the means of production for merchant work, was still to be necessary for a while yet.

So much, then, for the administration of merchant ship production. We now have to turn to the case of naval aircraft—Naval Air Service, Fleet Air Arm, Naval Air, as it was variously known at various times. We have seen the Admiralty as a producing agency but not as a user; we now have to look at the reverse picture with the Admiralty in the role of user, but not producer.

(iii)

Naval Aircraft

It is not necessary here to give a complete account of the history of the Naval Air Service, a subject of long and bitter controversy. In the first World War divided control of supplies for the two branches of the flying service led to open and indeed unscrupulous competition between them, not only in Britain but even in France. These events left very unhappy memories. In March 1922 Mr. Austen Chamberlain reminded the House of Commons of this 'fierce inter-departmental competition in the market',¹ and it was largely on these grounds that the policy of a single air force which he was advocating on behalf of the Government ultimately carried the day.

Thus for the greater part of the inter-war years the organisation of the Fleet Air Arm was based on the Balfour Report of 1923. This laid down that the Air Ministry should raise, train and maintain the Fleet Air Arm and be solely responsible for all supplies connected with aircraft. Only at sea would the Fleet Air Arm come under the operational and disciplinary control of the Admiralty (which continued of course to build and control the aircraft *carriers*). Naval air policy was to be concerted by the air staff and the naval staff together.

Despite the so-called 'Trenchard-Keyes agreement' of 1924 between the Admiralty and the Air Ministry, these arrangements never worked to the satisfaction of the Admiralty. Again and again the matter was raised through the following years, until finally, in 1936, a new enquiry by the Minister for the Co-ordination of Defence was ordered. Actually, the disagreements which ostensibly led to this enquiry were confined to questions of the supply and training of pilots and observers; for example, while training at sea was a naval responsibility, training on shore was the business of the Air Force—

¹ H. of C. Deb. 55, Vol. 151, Col. 2471.

which could lead to a pretty kettle-of-fish when a carrier was undergoing her annual refit—and anyhow, the Admiralty considered the period of service in the Fleet Air Arm of Air Force pilots too short. But having at last succeeded in inserting a wedge the Admiralty were determined to hammer it a little further; at last they secured that the Minister's enquiry should be broadened to cover the whole question of the administration and control of the Fleet Air Arm itself.

Sir Thomas Inskip's general conclusion was in the Navy's favour. Carrier-borne aircraft, he declared, were an integral part of the Fleet; therefore, the Fleet Air Arm ought to be administered by the Admiralty. He emphasised, however, that the Air Ministry must still be regarded as the central authority for developing air power—and indeed there was never any question at that time of taking back from them either the production or the development of naval *aircraft*.

On the 30th July 1937 the Prime Minister announced these decisions in the House.¹ The 'questions' on this occasion show clearly the anxiety which the subject had unhappily for so long engendered, and the official pronouncement was correspondingly cautious—much was left to the good will of the two departments . . . but perhaps the official expression of a belief that these would now work together in complete amity expressed a pious hope rather than conviction.

How they did in fact work together we shall presently see; for the moment we must concentrate on the organisational steps taken by the Admiralty to meet these new responsibilities. The Admiralty was most anxious, on principle, to avoid anything like a 'little air ministry' within itself. It had been given back its Air Arm as being an integral limb of the body-naval; it would be illogical itself to treat it as something detached and separate. What was wanted, rather, it was felt, was an air-minded Admiralty, an air-minded Navy—a general suffusion of air-mindedness in every corner, not a self-contained group of specialists; and this was indeed largely achieved. But for purposes of practical administration the principle could not of course be carried to doctrinaire extremes—*some* measure of specialist organisation was necessary, for this as for every other Admiralty activity.

The initial steps taken were the appointment of an 'Assistant-Chief of Naval Staff (Air)', followed in May 1938 by a 'Fifth Sea Lord and Chief of Naval Air Services'; and an air division of the naval staff was created. On the supply side, two new departments were set up: a directorate of air matériel, and a directorate of aircraft maintenance and repair.

Superficially these two departments might seem to correspond to

¹ H. of C. Deb. 55, Vol. 326, Col. 3512.

the directorates of Naval Construction on the one hand and Dockyards on the other: but their functions of course were very different. The Air Ministry, as we have seen, continued to be responsible for research, design and development as well as for production; thus the functions of the Admiralty 'Director of Air Matériel' *vis-à-vis* the Air Ministry were closely akin (indeed, curiously so) to those of the Admiralty's first Director of Naval Ordnance *vis-à-vis* the War Office some seventy years before.¹ He was responsible for making 'representations' only: for conveying Admiralty views and Admiralty advice; he was not a design or production executive. All the same, this limited task was a highly important one on the Admiralty side. *He*, primarily, was responsible for formulating naval requirements. He held a watching brief over research and development in aircraft and engines; he was responsible for the detailed work necessary to ensure that designs and prototypes really provided what was wanted; he was one of the Fifth Sea Lord's principal advisers on their final acceptance or rejection: further, he was told to keep a sharp watch on the initial production order to the manufacturer and to do his best to secure satisfactory deliveries. Again, it was for him to advise the Controller about ship design and ship fittings from the Air Arm point of view.

His colleague, of course, the Director of Aircraft Maintenance and Repair, had a rather freer hand, for in the matter of maintenance and repair Admiralty responsibility was entire. Thus his principal concern was the organisation of maintenance and repair arrangements at the various naval air stations. But modifications were also his responsibility; and, as expert in the effect of naval conditions (such as catapulting), he had a certain advisory hand in questions of design.

These, then, were the principal professional and executive arrangements made by the Admiralty to meet the problems of its resumed control of the Fleet Air Arm. One step only was needed to round off the picture—the creation, in the administrative secretariat, of an independent Air branch. There already existed an Air section, in Military branch; naturally these changes involved an increase in its work and responsibility; in the autumn of 1938 it was detached and given branch status. From then on the new branch was very much part of the naval air team.

This was the organisation for handling questions of air material at the Admiralty when war broke out, and for some months afterwards. But it cannot be said that the Admiralty was altogether happy—even after gaining so much. Storms blew up with a speed and ease which indicated great continuing sensitivity on the whole subject. In the early months of 1940, for example, very strong language was used in

¹ See p. 120 *et seq.*

the Admiralty about an Air Ministry design of an anti-submarine bomb for the Fleet Air Arm: this particular piece of trouble resulted in only very minor administrative changes, but at least it does not seem to indicate that atmosphere of confident inter-Service co-operation which Parliament had so lately been promised.

It was at this stage that there came into being, in April 1940, the 'Ministry of Aircraft Production'. It is doubtful whether in the event this made as much difference to Admiralty supplies as may at first have been hoped. As we shall presently see when we come to deal with it in detail, the new department of State was not so new as it looked: in origin it was only a piece chipped off an old one. But in any case its full resources had almost immediately to be thrown into the Battle of Britain—which necessarily meant an almost exclusive concentration on the production of land-based fighters and on repair—so that it was some time before the prospects of naval aircraft became once more even as good as they had been in the 'bad old days' of the Air Ministry. But all this, of course, is a hindsight view of a development which at the time must have seemed to the Admiralty to augur wholly well for them. For here (it appeared) was a new department of State, largely civilian, obviously destined under Lord Beaverbrook to break with tradition, displaying from the first an independence of air marshals. All this may well have seemed to the Admiralty's air authorities the precursor of a new atmosphere and a new 'fair deal'.

The Admiralty's formal agreement with the new Minister laid down that his Ministry was to 'meet Admiralty requirements' in all aspects of the design and development of aircraft and their equipment and armament. The Admiralty was given an 'absolute right' to determine the types of aircraft, engines and equipment which they wanted. The phrasing of the agreement was all that the Admiralty could desire: we must now turn to the steps taken to put it into effect.

We have seen that when the Admiralty themselves took over on behalf of the Ministry of Shipping the building and repairing of merchant ships, an executive department exclusively concerned with that responsibility was set up within the Admiralty. Further, by including a 'C.M.S.R.' in the Board Patent, tutelage of the merchant shipping interests embodied in him became a responsibility of the Board as a whole, shared constitutionally by every member of it. It was by means of this balance between independent executive responsibility and joint 'policy' responsibility that this new activity was (at least) absorbed into the Admiralty system without being smothered by it. There were no doubt good technical reasons why a similar principle could not be adopted in the organisation of M.A.P.—why, for example, the two Admiralty air directorates could not be transferred bodily to the new Ministry (as Sir Amos Ayre and his party

had been transferred to the Admiralty) and given executive authority there. At any rate, the policy adopted was a different one: there was no separate executive authority for equipment and armament of naval aircraft—the requirements of the Fleet Air Arm, having been stated by the Admiralty, were co-ordinated in detail with those of the Air Force by the Director General of Equipment at the Air Ministry¹ and thereafter the two were closely integrated throughout the whole organisation of the producing ministry.

The Admiralty appointed a naval officer of Flag rank to be 'Chief Naval Representative' in the Ministry, and in due course—when this body came to have a regular existence—he acquired a seat on the Aircraft Supply Council. But his position was in no way equivalent to that of Sir James Lithgow in the Admiralty. For one thing, this Council was a council merely: it had not the Board's corporate status as a high constitutional 'person'. Even more important, he had not (as Sir James had) any direct authority over or responsibility for the execution of policy—no executive department worked under his superintendence. Indeed, even his staff of naval officers was, for the most part, 'his' only notionally: Admiralty work being scattered throughout the Ministry, Admiralty staffs were scattered likewise throughout its various production and development directorates. In these they served like other members of the Ministry staff—under the executive authority of each particular director: they were there to give him the assistance of their naval knowledge, not to relieve him of responsibility or override his authority. By 1943 there were some forty of them—technical civilians as well as naval officers, pilots and observers as well as such specialists as engineer, radio and gunnery officers: they looked to the Chief Naval Representative for Treasury sanction of their appointments and for guidance on Admiralty requirements, but in all other respects they were normal members of normal ministry directorates. In short, their position somewhat resembled that of the scientists scattered, before the war, among the various Admiralty directorates² and the psychological and administrative results were somewhat similar.

Thus we see that the Chief Naval Representative was an Admiralty ambassador, rather than a component authority of the Ministry itself. Indeed, with his immediate deputies and assistants he retained the status of an *Admiralty* department—initiating and receiving Admiralty papers.³ His business was to interpret Admiralty requirements to the various departments of the Ministry: to obtain professional opinions from the Ministry's experts and, in turn, to

¹ See Part IV, Chapter XVI, Section (iii).

² See pp. 127-134.

³ The 'papers' of a department of State do not circulate outside that department: where another ministry is interested it is normally consulted by letter.

interpret these to the Admiralty: to represent Admiralty views to the Ministry on questions of design—in short (and in his own words), ‘to see that the efforts of the Ministry are directed towards providing the Navy with what it requires’.

At the time, these were no doubt the best arrangements that circumstances permitted. Even on theoretical grounds, however, it would have been surprising to find such an organisational relationship working altogether smoothly. In Parliamentary life there is notoriously a difference of viewpoint between the party with the executive power and the party without it: the relations between a production ministry with all the executive power, and an authority representing important interests involved but with no executive power, must surely tend to engender a somewhat similar mentality. But in practice, how did the system work? The very existence of the office of ‘C.N.R.’ was—in the eyes of its holder, at least—proof that in the new Ministry, whose largest customer was still the Air Force, the Navy tended at times to be overlooked or its problems not understood. Certainly the old hostilities did not die away. A debate in the House of Lords early in 1943¹ saw the familiar arguments about an indivisible Air Force and an indivisible Navy voiced with familiar cogency by Lords Trenchard and Brabazon, Chatfield and Keyes. Meanwhile, inside the Admiralty tart allegations were made that new devices were not developed so long as they were required only for naval aircraft but were pushed ahead as soon as the Air Force asked for them (contra-rotating propellers and gyro-stabilised gun-sights in the period 1940–41 were mentioned): that new types of aircraft were envisaged as land-based models first—only at a later stage were ‘marinised’ versions considered, thus naval aircraft were always behind the times. In the summer of 1943 it was even alleged on an official occasion that too much of the C.N.R.’s time was spent in persuading Ministry officials to do what was in any case their plain duty.

These and similar charges were so warmly denied that—in a formal sense—they were withdrawn. The Admiralty allegations were, admittedly, difficult to prove, and it was realised that damaging counter-charges could be made. In fact, neither side wanted open trouble. There was even a section of opinion in the Admiralty which considered not only that current arrangements were ‘an immense improvement’ on the pre-1940 set-up, but also that these arrangements themselves were consistently improving. But, in general, Admiralty discontent and Admiralty suspicions continued. As late as December 1944 we find the C.N.R. concerned at what he considered the ‘disingenuous’ support given by M.A.P. to the Air Ministry,

¹ H. of L. Deb., Vol. 126, 23 February 1943.

when the latter refused to give a certain naval development project known as the 'N.7/44' priority over the Spitfire.

These anxieties over air supplies were soon reflected in changes inside the Admiralty, designed to strengthen the air matériel organisation there. These changes were carried out in two stages, however. First, in the year 1943 the Fifth Sea Lord was provided with a deputy, and also relieved of his Naval staff duties so as to be free to concentrate on production problems—to be an 'Air Controller' purely and simply; while the old Air Matériel department was split in two (it should be borne in mind that by this time the Fleet Air Arm was as big by itself as the whole pre-war Air Force had been). One of the two directorates was responsible for quantitative requirements of aircraft, engines and equipment—the Naval Store department remained responsible for the actual handling and distribution of spares—for initiating supply and for advising on production capacity, while the other took over the selection and planning of air bases on land and the arrangements for stowing and operating aircraft at sea. The second stage came in 1945 (as the result of a report by Mr Justice Evershed) and, at least so far as the post of Fifth Sea Lord was concerned it involved a reversal of the previous one. For the Fifth Sea Lord (Air) became now once more responsible for the general co-ordination and direction of naval air policy, but he shed his responsibilities for supply altogether. These were now assumed by the Controller of the Navy in title: but it was laid down that in practice he should exercise them through a 'Vice Controller (Air)'—and this new post of Vice Controller (Air), it was laid down further, was to be joined with that of C.N.R.

But with this ingenious device for dovetailing the problems of naval air supplies into the older organisation for naval production generally we are already trespassing on the post-war period: it is time to break off the narrative. Enough however has been said already to show that the problems of the administration, as junior customers of another ministry, of production for the Fleet Air Arm were susceptible in the circumstances of no easy solution. In particular, the Admiralty and the Air Ministry could not feel—as in the case of merchant ship-building, a purely war-time responsibility—that any temporary compromise arrangement, depending on goodwill or built round given personalities, was sufficient for the day. This was not only a problem in the present tense: it was a problem almost equally bedevilled by its past and its future. Any arrangement proposed had to remain workable whatever changes in personalities took place. Moreover, it was likely for long after the war was ended to shape the very nature of the relations between the two Services concerned.

(iv)

Résumé

Now, by way of summary, let us remind ourselves on broad lines of the way these two problems were tackled—merchant ships and naval aircraft. First: to ensure unified control of the means of production the entire shipbuilding industry was brought under the authority of the Board of Admiralty. To secure adequate momentum for the merchant programme this was given by the Admiralty, *item*, its own temporary superintending lord; *item*, a new-created executive department which existed for no other purpose; *item*, its own allocation of capacity. The department and the superintending lord were by definition single-minded, so there was no need to reinforce them by introducing Ministry of Shipping watchdogs into Admiralty offices. But all this was only achieved at the expense of accepting at least for the duration of the war an anomaly in Board structure—a direct clash of interest between two Board members, something of a schizophrenic rift in the personality of the Lord High Admiral. Second: in order to ensure unified control of the means of production the entire aircraft industry was put under the authority of M.A.P. But no separate executive department or potentate was set up in that Ministry for the development and production of naval aircraft and nothing else: administratively and industrially land aircraft and equipment and the naval versions of the land types were developed and produced, generally speaking, side by side. In the superior councils of the Ministry the voice of the Air Force necessarily predominated. Thus the Admiralty did have to introduce its own watchdogs there—its ‘C.N.R.’ organisation—not to develop or produce aircraft themselves, but to growl the claims of the Navy. This organisation, however, was like a Parliamentary ‘opposition’—without executive responsibility.

Probably that is quite as far as it is safe to press this particular parallel. For all their apparent resemblance, the two problems differed profoundly in many essentials. There is, of course, no comparison possible between the technical complexity of the two products: merchant shipbuilding was quantity production, the heart-burnings over naval aircraft concerned development and improvement as much as if not more than mere output. The design of warships and merchant ships had already widely bifurcated: naval aircraft were—perhaps even too rigidly—still no more than land aircraft designs ‘marinised’. But even more telling was the difference in atmosphere. The emotions engendered by the rough-handling of merchant shipbuilding in the first war had had twenty years to die down. They

were emotions recollected in tranquillity, and when a new war revived the problem the lesson of past experience could be indifferently conned; whereas the controversy over naval aircraft had continued at fever heat. At least from that point of view, indeed, the closer parallel would seem to be the one already suggested¹ between the twentieth-century problem of naval aircraft and the nineteenth-century one of naval ordnance. It is a comparison which strikes deep.

¹ See p. 120 *et seq.*

CHAPTER VIII

THE FRONTIER TOWARDS WHITEHALL

(i)

Preamble

THE PRINCIPAL theme of this volume as a whole is the administrative steps taken by the Government to meet the changeover, begun with rearmament and rapidly accelerated by the outbreak of war, from a 'free' to a 'planned' economy. We have already seen reflected in the war-time development of the Admiralty production departments themselves some of the steps taken by the Admiralty not merely to carry the greater weight of war-time work but to carry out functions in relation to industry which under a free economy had hardly come within Admiralty responsibility at all. The present chapter will carry the story further: it will describe new organisations specifically invented to meet the general needs of economic planning—to handle problems of the allocation of raw materials and manpower, the formulation of production priorities and production programmes, and the development of private capital equipment to Government account—organisations acting on general Admiralty behalf rather than for any particular department of the Admiralty.

It is not suggested, of course, that many of these were functions never performed before—basically they are the time-honoured commonplaces of industrial management—or that now they were taken out of the hands of industry's own managers. It cannot be emphasised too often in a history such as this that the bulk of the administration of war production throughout the war was in fact the work of the firms themselves. But now for the first time the Government was assuming responsibility for the *co-ordination and control* of the firms' own work on a national scale: now, for the first time, the Admiralty had to set up specific machinery to participate in this new need. Perhaps we had better begin by considering whether or not in the pre-war Admiralty the fundamentals from which such machinery could be developed already existed. Could they be found, perhaps, in the Contracts Department? Let us consider that department's history.

(ii)

The Growth of Contract Work

We have seen that for some time past Admiralty production had been divided into two unequal classes and that it had come to be only the smaller class which still consisted of warships built in the Royal Dockyards and certain armament stores (such as naval cordite and some torpedoes) manufactured in Admiralty industrial establishments. The technical and professional direction of that work was supplied by trained officers seconded from the departments described in earlier chapters. Apart from these, two other Admiralty organisations were directly involved in it: there was the Directorate of Expense Accounts, concerned chiefly with problems of costing, and there was Labour Branch, the secretariat branch brought into existence during the first World War chiefly to handle problems of pay and conditions of service among Admiralty industrial employees at home and abroad.

The larger class of Admiralty work consisted of ships (including, since the completion of the *Royal Oak* and *Royal Sovereign* in 1916, almost all the bigger warships), stores and equipment built and made to Admiralty order—and where necessary to Admiralty design—but by private contractors. In this vast field of work, we have seen, Admiralty responsibility had usually been limited to provision, design and inspection, followed by storage and supply. It was for the contractor to find his own materials, negotiate his own sub-contracts, find and handle his own labour. This was, after all, what we should expect to find in a period of free-enterprise economy; no doubt it constituted the principal advantage to the Admiralty staff in the contracting system.

In earlier days, of course, almost all *wooden* warships had been built in the Royal Dockyards. It was not till the first half of the nineteenth century that this recession from nationalised industry, this change-over in preponderance from direct to contract work, began to take place, coinciding with the advent of steam propulsion and iron hulls. In 1869 the ancient State-owned dockyards at Woolwich and Deptford were closed. In the same year the Admiralty Contract and Purchase Department was set up.

Initially, this department was formed to deal in naval stores and victualling stores only; but later it took over all Admiralty production contracts except for shipbuilding; and finally, shipbuilding being at last included, it became responsible for negotiating all Admiralty contracts except the works contracts of the civil engineer-in-chief.

Subject to the limitations already described, the role of the Director

of Contracts, as intermediary between the Admiralty supply departments and industry, was not, however, entirely a passive or automatic one, even in production matters. The placing of all Government contracts is normally subject to competitive tender; but this does not mean that necessarily the lowest tender would blindly be given the whole contract. 'Educational' orders at least might sometimes be placed with firms whose prices were higher, if it was thought that one day their superior resources would be needed. Where it was found desirable, in the inter-war period, to foster industrial 'know-how' for war potential in particular fields vital to naval equipment—in the manufacture of optical glass, for instance—it was the business of the Director of Contracts, in close association with the technical or professional department concerned, to initiate the necessary policies. For example, he helped the Director of Naval Stores when (as we have already seen) the latter wanted to encourage the cultivation of home-grown flax for canvas.

Again, all stores not subject to technical inspection (i.e. by officers of one of the technical departments) were subject to inspection by the Contracts Department, to ensure that the specifications laid down by the Director of Stores had been adhered to. Thus in certain important fields the Director of Contracts even came to put on the mantle of technical expert. For example, because of his unique knowledge of the oilskin industry it was he who was invited, on behalf of the Ministry of Home Security as well as of the three Services, to build up capacity for the enormous war-time requirements of anti-gas clothing for the whole nation. Presently, moreover, the department's inspectorate acquired other duties besides vetting the work done. It became responsible for ensuring that statutory provisions for the protection of workpeople were properly observed on Admiralty contracts: it even became responsible, when war drew near, for ensuring the provision of proper air raid shelters, black-out and fire precautions on contractors' premises, for negotiating Government grants for this work and watching expenditure on it.

On the outbreak of war, then, if you were looking for one Admiralty department with general and even intimate oversight over the whole industrial field, it was here in the first instance your finger would perforce have pointed—at the Directorate of Contracts; and it was natural, when the interdepartmental Supply Board machinery had been brought into being, and questions of the allocation of industrial capacity had been discussed, that it should have been the Director of Navy Contracts who was nominated to assist the Controller in representing naval interests (though with the assistance of Admiralty specialists, of course, on sub-committees). In short, the Director of Contracts was already engaged in or in contact with a pretty wide field of industrial administration, even of economic

planning, quite outside his titular function of 'financial juggling and haggling'. But nevertheless when the Committee of Imperial Defence suggested, in the summer of 1938, that the three Service departments should each set up 'some form of central organisation to watch the progress of Supply Board work within their departments', the Admiralty reactions contained no suggestion either that the Director of Contracts was already filling, or might be called on to fill, the co-ordinating functions proposed.

(iii)

The Whitehall Frontier

Partly, of course, this was due to an unwillingness on the part of the Admiralty's separate production authorities to envisage a need for any such co-ordinating functions at all. Indeed it was often to seem to other departments of State, during the course of the war, that the Admiralty showed considerable reluctance to keep in step with the kind of developments of which this suggestion may be regarded as a harbinger. Almost every new piece of co-ordinating machinery, outsiders felt, had to be set up over the Admiralty's dead body, as it were. Allowing for exaggeration, there was perhaps an element of truth in this impression. But if so, there was a good deal more behind the Admiralty's attitude than a mere mossy conservatism—the Admiralty could move quickly enough when it wanted to, or a departmental nationalism. First: the Admiralty, with so wide a field of interests to cover already, and staffs so diversified in type and function, naturally inclined to resist anything not demonstrably essential which called for the enrolment of new staff or which multiplied procedures, because the greater the expansion of Admiralty staffs and procedures the greater the risk of incoherence—of breaking down the semi-informal multilateral contacts within the Admiralty on which the success of its work had always depended. Second: there was a definite difference, at least of degree, between the Admiralty's possible advantage in new machinery of the kind, and the advantage of the other supply departments. The new need sprang from greatly expanded demands and the need to develop unexplored capacity, more than anything else. But production for the Navy was not and could not be expanded in wartime to the same extent as production for the Army or Air Force; thus the Admiralty throughout the war was still dealing with known and tried firms of contractors to a greater extent than the other two departments were. From the firms' point of view, the Admiralty was an old customer, and was likely to remain a customer even after the outbreak of peace. This

special relationship with the majority of their contractors provides a useful key to Admiralty policy. One has only to look for example at the original priority edicts in favour of aircraft, issued from the highest quarters in the early years of the war—a typical product of the earlier and clumsier phase of State control of industry—to see that if they had been interpreted by all firms woodenly and *au pied de la lettre* war production in general could have been brought practically to a standstill by such ‘working to rule’. Naturally the edicts caused great anxiety in the Admiralty; but the general disposition there was to trust the firms to interpret them sensibly, rather than to fight these priority directions themselves at official or Cabinet level; and indeed one suspects that as soon as a raid by Lord Beaverbrook’s ‘priority enforcement officers’ (to coin a title) was over, production in the factory concerned usually did settle down much as before—just as life in the Spanish colonies no doubt settled down as soon as the fires were out and Drake’s raiders had vanished over the horizon.

Nevertheless, sooner or later the Admiralty had to ‘play’, and to develop machinery for the purpose, and the important point is this: when that time came, an entirely fresh start was made not developed from the existing functions of the Directorate of Contracts, but within, and as an integral part of, the Secretariat.

The Secretariat had played very little part in production questions hitherto.¹ Even its financial interests were of comparatively recent growth; in the first World War there had been no specific finance branches in the Secretariat at all, although a detached post of ‘Assistant Secretary for Finance Duties’ had been created in 1911. For it was not till 1921 that the Secretary himself became accounting officer for the department (as elsewhere in the Civil Service); and not till 1932, when the Secretary’s department and the Accountant General’s department were amalgamated, that the first true finance branches of the Secretariat, Estimates branch and Material Finance branch, were set up. The latter embodied an older branch—‘Ship branch’—whose principal business in the production field was to conduct the Director of Naval Construction’s official correspondence with contractors, but which also had acted to a limited extent as the Controller’s advisers on financial matters. But the work even of this new organisation was naturally at least one further remove from industry than was the Directorate of Contracts; and the two branches acted as critical co-ordinators only in the preparation of Navy estimates, for which the individual requisitioning departments were separately responsible in detail.

But the decision to build the new machinery within the Secretariat ceases to appear surprising, if we look a little more closely at the nature of the work for which the new organisation was envisaged.

¹ See pp. 11, 12.

Every Government department has at least two frontiers—one facing a section, or phase, of the nation at large; the other facing its Whitehall fellows and Downing Street (the Admiralty of course has also a third frontier, facing the Navy). The principal function of the Director of Contracts, his contractual negotiations with industry, lay for the most part on the first frontier—that was his familiar ground. But the functions of any Admiralty organisation concerned with economic planning and with the competition of the needs of the other Services must lie principally on the second—facing towards Whitehall. The allocation of raw materials and manpower, the negotiation of priorities—fundamentally these were questions not lying between the Admiralty and industry but between the Admiralty and the rest of the Government machine. Any direct contacts with industry they might call for were proportionately slight, and it was intended from the first that these should be channelled through other and experienced Admiralty agencies. All this would clearly seem to indicate a normal secretariat function.

The original proposal of the Committee of Imperial Defence in 1938, to which reference has already been made above,¹ was greeted by the individual Admiralty supply departments with distaste. As we have seen, they were largely autonomous bodies. Each was separately responsible for its supplies, and for planning in its own field against an emergency; they were unanimous in support of the view that for the Admiralty a central organisation was neither practicable nor desirable.

These views they put forward severally and at leisure on the papers during the autumn and winter of 1938. But meanwhile events were moving fast, both at home and abroad: by the time the question reached the administrative authorities in the Admiralty the sky was changing; the 'emergency' was already six months nearer, and the co-ordinating machinery of government with which the Admiralty would be called on to deal was taking more definite shape. In particular the intention of vesting sole executive authority to determine production priorities in a central priority department was under advanced discussion. The Ministry of Supply Act was in draft, and the various priority committees to be set up were being outlined. No *immediate* action might be necessary, but by now it was clear to those most conscious of these measures that in wartime a focal organisation in the Admiralty of the kind called for would be necessary. Moreover, it might have to be set up at short notice; thus there were obvious advantages in making arrangements for it in advance.

In this way a good deal of attention began to be given to the question behind the scenes. As a result, almost as soon as the Ministry

¹ See p. 162.

of Supply Act became law a 'co-ordinating' section sprang into being within Estimates branch. Its duties were 'to assist the Board, and the Superintending Lords concerned, by co-ordinating departmental views and submitting proposals on matters of general policy arising out of the existence of a Ministry of Supply and a central priority organisation and on plans for the creation of a priority machinery inside the Admiralty'.

This was purely an interim measure and was very shortly to be superseded. On 22nd August the chairman of the Supply Board had officially communicated to permanent heads of departments the recommendations made a month earlier by the Committee of Imperial Defence that in each supply department a 'principal priority officer' should be appointed, through whom the departmental requirements should be notified and who should be responsible for communicating priority decisions within his department. These officers would be *ex officio* members of the priority sub-committees, and each should have under him an appropriate internal organisation for dealing with the departmental administration of priority questions. Sir Arthur Robinson envisaged that this internal organisation would probably consist of subordinate priority officers attached to demanding and ordering sub-departments. On receipt of this letter in the Admiralty things moved quickly. Within forty-eight hours the First Lord had approved formal proposals for the appointment of Mr H. V. (later Sir Henry) Markham as Principal Priority Officer, and three days later Priority Branch, as an independent Secretariat Branch, came into being. At the same time Admiralty departments were asked to nominate sub-priority officers, as the chairman of the Supply Board had suggested. But these were to remain entirely within their nominating departments, merely as points of contact with Priority Branch; they would be under the direction of the Principal Priority Officer in priority matters only, and would not actually form part of his organisation. Thus the Admiralty organisation was not precisely what Sir Arthur had envisaged, since its main body as well as its head was solidly drawn from and located in the Secretariat; the departmental sub-priority officer remained outside it.

These events have been described at length, because as it turned out they were crucial in their particular field. As will be recounted elsewhere, the Central Priority Department itself was a short-lived institution, and the rigid administration of production priorities by carefully graded certificates soon became a dead letter. As this happened, the priority organisations in the other two supply departments tended to diminish in stature. In the Admiralty, however, the Principal Priority Officer, as his original function atrophied, tended to become more and more the administrative pivot

of a very much wider field of work, wherever the Admiralty supply machinery came into contact with the ever more complex central machinery of Government and with the other supply departments. It would be fair to say that by the end of the war, although he was by that time no longer responsible for labour matters, he had become the Controller's right-hand man in the rest of this particular field. He did not, of course, trespass on the professional domains of the supply sub-departments themselves; and labour questions, as we shall see, although his for some time, ultimately evolved an organisation of their own.

In any assessment of the reasons for this development peculiar to the Admiralty it would be totally unrealistic to ignore personalities. The first appointee and first architect of the 'P' organisation was H. V. Markham, the head of Estimates Branch (where the original priority section had been formed). At that time he was a substantive principal with the acting rank of assistant secretary. He was promoted acting principal assistant secretary shortly after his appointment as 'P.P.O.': a bare fourteen months later—still technically a substantive principal at the time—he was appointed to succeed Sir Archibald Carter as Permanent Secretary. It would seem, then, that the Admiralty had deliberately chosen for the new post the most promising of the younger administrators on the secretariat staff.¹

But this is to anticipate. The beginnings of the organisation were modest enough: a small branch, in the immediate charge of the principal priority officer and acting as little more than his personal staff.

At the very beginning, however, two problems reared their heads which were going to bedevil the new organisation almost throughout the period under review. The first was geographical. As we have seen, the bulk of the Admiralty's supply organisation had been evacuated bodily to Bath. With it were all the heads of the Controller's departments and their newly-appointed 'sub-priority officers'. But the central government machinery, the priority committees, the Central Priority Department and the Ministry of Supply, with which the new branch was intended to link them, were of course in Whitehall. At which end of the gap should the new branch be placed? The initial answer to this difficulty was to locate the branch in London under the eye of its chief, but to appoint a 'priority liaison officer' as a detached post in Bath to act as a channel of communication between the branch proper and Bath departments. But this, as we shall see presently, could only be a temporary expedient; far more contact with Bath departments was needed than any single officer could provide.

¹ Sir Henry Markham died in 1946 at the age of 49 and was succeeded as Secretary of the Admiralty by Sir John Lang, the former Director of Labour.

The second problem, equally difficult of permanent solution, was the question of general responsibility for contractors' labour. At first sight it might appear that labour supply was just as much a matter of priorities as the supply of raw materials and space in the firms' order books. Nevertheless there were reasons from the beginning for regarding the question as distinct. At Board level, labour questions had always been a ministerial rather than a sea-lord responsibility; for labour problems inevitably have a political tinge. The Controller represented the Admiralty on the interdepartmental committees dealing with materials and capacity, but it was the Civil Lord who sat on the Manpower Committee; there was, then, a division of function right at the top. Secondly, there was already a branch in existence—Labour Branch¹—experienced in the human side of labour problems, in trades union practices, questions of dilution and the like; and these might seem to be inseparably bound up with problems of labour supply. Accordingly the new principal priority officer at once proposed that problems of *labour* priority should be handled by Labour Branch. This offer, however, was strenuously resisted. The head of the older branch argued that labour supply questions were not an Admiralty responsibility at all, but lay in the province of the Ministry of Labour; that it was for Priority Branch to determine the relative priority of Admiralty demands and arrange things with the Ministry of Labour accordingly, and that Labour Branch need not be brought into it. His assistants, he maintained, were fully occupied without getting involved in negotiations with contractors.

These matters seem to have rested for the time. The Principal Priority Officer accepted interdepartmental responsibility for such labour questions as the Schedule of Reserved Occupations and sat for the Admiralty on the Beveridge Manpower Committee. But Labour Branch could not altogether escape the fate they feared—getting involved with private firms. As soon as mobilisation began difficulties had arisen over questions of the exemption or deferment from call-up of skilled men engaged on Admiralty work. At first for a brief while these seem to have been handled direct between the Admiralty supply departments concerned and the recruiting authorities of the armed forces; but clearly the work had to be centralised, and by the end of August it was decided that Labour Branch willy-nilly should act as the channel, for men employed at Admiralty establishments and contractors' men alike.

A month later the branch's responsibilities were added to further. It was named as the Admiralty authority on all questions of labour supply both for Admiralty establishments and for the due performance of Admiralty contracts. An officer of the Ministry of Labour and

¹ See p. 12.

National Service was accredited to the branch as Ministry of Labour Liaison Officer, and a manpower section in Labour Branch was set up.

Nevertheless this arrangement very soon gave rise to difficulties. Apart from the general overloading of the branch already forecast by its head, it meant (since the branch was located in Bath) visits to London by officers of the branch whenever important Whitehall meetings had to be attended. There was general anxiety in Bath lest the machinery should break down—and an increasing stringency of labour supply had to be expected as time went on. Accordingly the new manpower section was titularly transferred from Labour Branch to the discipline of the Principal Priority Officer. The section itself was to remain in Bath with only liaison in London; but the transfer entitled the P.P.O. henceforward to represent the Admiralty on manpower questions, at the official level, instead of sending for the head of Labour Branch every time. These arrangements came into force on 15th January 1940.

Thus a new administrative pattern to meet geographical difficulties was adumbrated in this particular field, which was presently to be given wider application; the pattern of lower staffs in Bath to handle day-to-day business with Bath departments and the Deputy Controller there, and to feed with 'Bath's-eye' briefs a policy-head located in London whose principal business was to negotiate with the superior or extra-mural authorities concerned.

But even with the addition of a manpower section, this tentative 'P' organisation was to prove inadequate for the demands that were shortly to be made on it. As we have foreshadowed, 'priorities' in the narrow sense were found to be only one of the administrative aspects of the war economy which required central co-ordination in the Admiralty and negotiation with the central machinery of government. For example, in addition to the manpower question, there was the administration of the allocation by departments of raw materials to be attended to. This called for the formulation of *material* (as opposed to *financial*) estimates on general Admiralty behalf, and subsequently the issue of steel authorisations to firms. There was the new inter-departmental 'area organisation', throwing up production questions of all kinds for headquarters consideration. There were the general questions discussed by the new Industrial Capacity Committee and other similar Whitehall bodies. Once it was decided that the Principal Priority Officer's functions should be extended to co-ordinate all this wider field of work, it was clear that his organisation must be similarly expanded and consolidated.

In addition to the existing work of P. Branch in London and of the liaison officer and the manpower section in Bath, some of the questions for which the Principal Priority Officer was now to become

responsible were already being handled by other parts of existing machines. In January 1940, for example, Material Finance Branch had split into Shipbuilding Finance and Contract Finance Branches: steel allocations were already being handled by the former.

The general picture in the summer of 1940, then, was this. Manpower and materials were succeeding money as currency. The Secretariat's financial co-ordination in the production field had largely atrophied; under conditions of war economy, administrative planning and ordinance were succeeding money at the controls. Clearly it fell to the Secretariat to provide a new machine for estimating in the new currency and for co-ordinating the new means of control, in place of the old.

On 5th September 1940 a consolidated organisation came into being. Following the experimental pattern of the manpower section, the new 'Production and Priority Branch' was to be stationed in Bath, in daily contact with Bath departments. It took over the non-financial work, together with the staffs that were handling it, of the divided finance branches, the remnants of which were now re-combined into a purely Finance Branch under the old name of Material Finance. The post of 'priority liaison officer' was now redundant and was abolished; it was the staff of the original branch in London which now became a liaison staff. Both looked to the 'P.A.S. (PR)'—as the P.P.O. was now more usually styled inside the Admiralty—for direction; but the branch in Bath, in accordance with the usual Admiralty practice, was put under the immediate control of an assistant secretary.

This pattern, with one major and a few minor exceptions, was to last throughout the war. The major exception was the handling of questions of contract labour.

The head of the new branch was an Admiralty career civil servant, but the bulk of the staff under him, including the administrative staff, were temporary recruits from a variety of professions, most of whom had no previous experience of the Government service at all. Thus his task was not only to build a new organisation to handle entirely new problems but as well to teach many of his staff the very elements of their job. It was a heavy load from the first. For example, all questions of raw material (including the issue to firms of steel authorisations) and all questions of manpower and contractors' labour, came at first jointly under a single temporary principal fresh from an academic post. Particularly as labour problems multiplied, signs of strain in the organisation became evident. Something had to be hived off and contractors' labour was the natural subject to choose.

(iv)

The Problem of Labour

This would probably have had to happen in any case; but in the spring of 1941 the trigger was pulled by an event of outstanding importance. This was the promulgation of the Essential Work Orders, which provided for the control of munitions labour generally and in particular for the control of all shipyard labour—the latter to be administered by the Admiralty.¹ Clearly this would create problems and involve a volume of work requiring an independent organisation of its own.

We have seen² that with the assumption by the Admiralty of responsibility for merchant shipbuilding and repair a new Board office had been created and Sir James Lithgow, a leading shipbuilder and industrialist, had been appointed Controller of Merchant Shipbuilding and Repair. To balance and soften somewhat the impact of this 'boss' appointment on the labour in the yards a leading trades union official, the General Secretary of the Shipwrights and Shipconstructors Association and President of the Confederation of Shipbuilding and Engineering Unions, Mr William Westwood, had been appointed Principal Labour Adviser to the Board at the same time. Now, in the hope of making the new control of shipyard labour more palatable to its subjects, it appeared a politic step to put its administration in Mr Westwood's hands. This meant, of course, taking it outside the Secretariat altogether; it meant setting up not a new 'branch', but a new Admiralty 'department' or 'directorate'. Nevertheless, since the new director could hardly be expected to be very conversant with the techniques of the Whitehall machine, inter-departmental negotiations on policy questions—indeed, all the Principal Priority Officer's former responsibilities at the higher level—were to remain with the latter. His *branch* had secured relief, but for the Principal Priority Officer himself the change involved an increase rather than a diminution of work.

This change from 'branch' to 'department' was a change not merely of name; it largely involved a change in the type of staff appointed. For his immediate subordinate, the assistant director to take charge of his department in Bath, the new director elected to borrow a deputy divisional controller from the Ministry of Labour; and indeed there seemed obvious advantages in such a course, considering how closely the new department would have to work with

¹ Shipbuilding and Ship-repairing Essential Work Order No. 1 of 7th March 1941.

² See p. 145 *et seq.*

that Ministry. For the officers next in rank, the tendency was to look for technical rather than administrative qualifications: i.e., to put a man with engineering experience in charge of the general munitions section, and to recruit for the shipyard section from the shipyards themselves. Only one of the officers of administrative type who had been involved in contractors' labour questions at the Admiralty from the beginning was posted to the new department.

Such a policy, however, turned out to present difficulties of its own. Undoubtedly technical experience gave the department a useful insight into the trades with which it had to deal; on the other hand, the work it was called on to do was itself not technical, it was administrative. The Board's *technical* advisers were the Admiralty production departments themselves. Moreover, there were limits to the extent to which the new department could be allowed to go its own way: willy-nilly, it was part of a great administrative machine and had to conform to Civil Service methods rather than to those of industry or throw the whole machine out of gear: one cannot in Whitehall rule that the whole battalion is out of step with Sam. Thus the new department proved to be short-lived. In July 1942 a new post was created; that of 'Chief Industrial Adviser to the Board'. In order to appoint Mr Westwood to it he was freed from departmental duties.¹ The opportunity this afforded of reassessing the problem was taken. The 'department' was wound up, and replaced by a new secretariat branch in charge of a career assistant secretary.

At the same time it was realised that the volume of work falling on the principal Priority Officer had by this time become too heavy for any one man, so it was therefore decided that Labour Branch and the new 'Contract Labour' Branch should now together form a new secretariat division,² and a new principal assistant secretary post was created at the head of it with the title of 'Director of Labour'. Thus all labour and industrial manpower questions would be co-ordinated, whether they concerned labour employed by the Admiralty itself or by its contractors—and indeed the increasing stringency of labour supply rendered this new co-ordination most opportune. In the meantime there had been a change in the assignment of responsibility at Board level for labour questions. Hitherto this responsibility—always a ministerial prerogative—had normally been laid on the Civil Lord. But as labour difficulties multiplied it became apparent that new arrangements were necessary. Accordingly the offices of Financial Secretary and Parliamentary Secretary, hitherto united, were divided, and a third junior minister appointed (with the former title) specifically to undertake the superintendence of labour

¹ Mr Westwood was raised to the peerage in 1944 and from 1945 to 1947 was a Lord-in-Waiting to the King.

² See p. 11, footnote.

problems. Thus it was to this 'Financial Secretary' that the new organisation was ultimately responsible.

Initially, the staff of the former 'department' was taken over by the new 'branch' bodily, the former 'assistant director' being graded as an acting principal. But shortly afterwards he returned to his parent ministry, and the few remaining technically-minded officers also preferred to return to their former work in industry. Within a relatively short time, then, the staffing of the branch conformed fairly closely to the secretariat pattern—to the *war-time* secretariat pattern at least.

(v)

A Production 'Intelligence Unit'

In May 1942 Admiral Wake-Walker succeeded Admiral Fraser as Controller. By this time the new secretariat organisations—the Production and Priority division and the Labour division—had evolved or were just about to evolve what was broadly speaking their final war-time shape. The next step was an endeavour to bring both of them in closer touch with the fountain of production authority—the Controller himself. In times past there had once been a detached post known as 'Assistant Secretary for duty with Controller', or 'A.S.(C)'. This officer had then acted chiefly as the Controller's civil adviser on financial matters. On June 3rd 1942 the post was revived; but it was explained that it would not now be concerned with finance, it was intended rather to act as 'an additional link between the Controller personally and the administrative machine of the department'. In other words, an officer was to devote himself to finding ways in which the work of the new machine could best be adapted to assist the Controller in his policy-making, and to making the new Controller himself more fully *au fait* with the work this machine was already engaged in.

It soon became clear that the former of these two ends could best be served, so far as P. Branch was concerned, by developing within the branch something in the nature of an intelligence unit based on statistical research. The use of statistical methods in the field of personnel administration was already (in 1942) fairly far advanced; the time had now come to extend it more fully in the production field. The branch was already a considerable repository of facts and figures. In its production 'war rooms', set up (both in London and Bath) in 1941, these were made available at a glance in the form of graphs and maps—for shipbuilding and a number of critical stores, for manpower, for the location of Admiralty industries and other general questions. The data, in short, were there: but not as yet in general

any more advanced technique of interpreting and forecasting than the primitive method of extrapolation (though a beginning had perhaps been made as early as 1940 when the branch had devised a 'percentage loss' method of reporting to the Board on the hampering effects on Admiralty production, week by week and throughout the country, of enemy air attack). It was not, of course, expected that any statistical interpretation could ever be a substitute for the reasoned and seasoned advice of the Admiralty's technical authorities; but it could, surely, supplement it and might even on occasion serve as a check.¹ Moreover, manifestly it could assist the Controller to answer the questions of the Cabinet and other central authorities in the requisite form.

This development of a subordinate statistical section in a secretariat branch—of a dispersed statistical service, that is, in preference to a centralised statistical department—was in accordance with certain considerations carefully pondered in the Admiralty before the war. The authorities there did not, of course, argue as economists or statisticians, but as administrators. The lay mistrust of arguments based on figures—what the layman conceives to be 'statistics'—derives from the truism that no conclusion is likely to be more reliable than the data on which it is based, and even the most honestly compiled numerical data are liable to depend on unrevealed rules of classification which may be valid for one purpose but not for another. The celebrated dictum of Mr Punch's railway official that 'Dogs is dogs, and cats is dogs, but this 'ere tortoise is a hinsect' may have been perfectly valid within the terms of his company's by-laws; but it hardly carries universal validity. The master of a vessel in which the present writer once sailed ruled—no doubt correctly in the context—that alligators were to be counted as livestock; but such a ruling could make a sad mess of the agricultural statistics of a country like Florida. No one, of course, is more alive to these risks than the professional statistician himself; indeed, it is precisely in the detection of such flaws that his particular skill resides. But it was perhaps only natural for the Admiralty to take the view that in a field so various as admiralty, involving as well 'populations' often too small really to be susceptible of certain statistical techniques at all, the risk of dangerous errors from this source was particularly great. The statistician's task would be proportionately eased, it was felt, the nearer he could be placed to the original sources of his figures.

Moreover, there was a lively recollection that in the previous war much time had been wasted in the compilation of tables which were no doubt correct but which were of no practical use to anybody; and this was another argument for placing the statistician in intimate

¹ See p. 100.

touch with the workaday world of current administration rather than in some central but secluded eyrie. For the kind of statistical research that was needed now was essentially a tool; a handy aid to daily administration which works strictly to a timetable, especially in times of war, when an approximate or probable answer from the statistician—however much the purely mathematical mind might deplore its laxity—provided it was available for a paper to be submitted on Thursday evening might be very valuable, while an exact and certain answer not available until Friday morning might by then be useless.

All these arguments tended to make the Admiralty authorities prefer a scattered to a centralised statistical service. On the other hand, there were obvious reasons for not asking departments themselves to be entirely responsible for their own statistical work. A compromise was necessary, and the preferred compromise was to entrust the statistical work in each particular field not to a central all-Admiralty bureau but to a specialist section within the secretariat branch administratively concerned with that field. In this way the statistician would be in close personal touch with the departments from which his basic figures were drawn. He could probe to the bottom the rules of classification by which the figures had been compiled. Moreover, in this way he had perhaps better hopes of breaking down in time the almost morbid dislike apparently felt by production authorities everywhere for the divulging of any numerical data whatever.

Again, this arrangement, which left the statistician at a level fully exposed to the blasts of informed criticism, was calculated to reduce any risk there might be that he would succumb to using his arts as a basis of advocacy rather than of judgment—a very real risk, it was felt, whenever statistical work is controlled by someone placed in the temptations of too exalted or too political a position. For the skilled use of figures in the formation of policy is perhaps even more open to the corruption of rhetoric than is the use of words.

These at least seem to have been the considerations governing from the first the general tenor of Admiralty policy over the organisation of statistical work of all kinds.

But to return to the narrative of events. P. Branch was duly strengthened with additional mathematical staff, including a bunch of young actuaries; and shortly afterwards, the headship of the Branch falling vacant, the posts of A.S.(C) and Head of P. were temporarily combined. As A.S.(C), the new head naturally remained in London at the Controller's side: for purposes of local control a temporary principal was sent to Bath as his vicar, with the problems of adapting the techniques of statistics to the needs—and speeds—of administrative purposes particularly in mind.

This arrangement seems to have served its purpose in so far as

relations with the Controller and the development of statistical work were concerned. For example, a close actuarial study was made of the man-hours expended on different classes of warship at different yards, and the number of men employed together on a ship at any given stage in its progress. In this way a somewhat crude but useful 'unit of production' was evolved, which for the first time made possible a numerical assessment of the overall load imposed on any given shipyard by its particular mixed programme of warship construction in various stages of completion. By numerical comparison with the calculated resources of the yard, overloading could be assessed and the extent to which completion-promises were likely to be kept or broken could be fairly confidently forecast.¹ Crude though this particular method might seem when measured against the theoretical possibilities of an actuarial approach to the planning of industrial output, and against the mathematical techniques actually developed later on both in the Admiralty and in the other supply departments, it was in the circumstances of the time a novel and historically interesting attempt to arrive at methods of independent analysis, instead of remaining entirely dependent on the experience and personal expertise of senior Admiralty production officers if any criticism of firms' promises was to be attempted at all.

This development of the branch's activities depended very much in its early stages on the combination of posts mentioned above, which gave the head of the branch direct daily access to the Controller. But from the administrative point of view absentee headship of a Bath branch now over a hundred strong could hardly be an unqualified success.

In November 1943 the posts of A.S.(C) and head of the branch were divided. A new head of P. Branch was appointed, with headquarters in Bath. It was the office of P.P.O. which was now joined to that of A.S.(C)—an arrangement clearly more consistent with his geographical location in London than the headship of a Bath branch had been, and a principal was appointed to a new post of 'Deputy P.P.O.' to assist him, but at the same time to take charge (under the Bath assistant secretary) of the branch's liaison staff in London.

However, it is only to a limited extent that these changes should be regarded as an isolated attempt to solve the geographical difficulties of the particular situation; actually they were part of a much more fundamental reorganisation, with wider repercussions, which was carried out at the same time. This reorganisation derived from two important considerations.

First: it has already been remarked how widely, in wartime, questions of the financial and administrative control of production had drifted apart, and we have seen how this was reflected in the

¹ See above, p. 100.

Admiralty organisations which had grown up. But this separation could only be expected to last for the duration of the war, and to a far-sighted eye it must have appeared desirable that a reversal of this trend on the ultimate outbreak of peace should not catch the Admiralty unprepared.

Second: at about this time what was substantially a new grade was finding its place in an expanded Civil Service: an 'under secretary',¹ superior to the existing grade of principal assistant secretary.

A new 'under secretary's' post was now created in the Admiralty with the particular charge, on the Secretary's behalf, of co-ordinating the work of the finance and production divisions, and of strengthening the arrangements for dealing with important questions of contract finance. And since, with the interposition of this new post, the P.P.O. would no longer report direct to the Secretary, it was felt to be no longer necessary that the office of P.P.O. should carry with it the rank of a principal assistant secretary: the post of P.A.S. (PR), therefore, lapsed, and the combined offices of P.P.O. and A.S.(C) were to be carried at assistant secretary level.

It is arguable whether this part of the arrangement—recognised from the start to be in the nature of an experiment—was really satisfactory. For the production division now consisted of a full-sized branch in charge of an assistant secretary, stationed in Bath, and also included a detached assistant secretary stationed in London: the latter was in close touch with the Controller (the fountain-head of production policy), but, being of equal status with the head of the branch, he had no longer formal authority over the branch to which he must inevitably look for nourishment and for carrying out the Controller's wishes. Indeed, he had no longer any staff at all under his direct control, except his official deputy—and even that control he shared with the head of the branch in so far as the work of branch staffs in London was concerned.

On the finance side, the new under secretary had a principal assistant secretary as a link between the finance branches and himself. But on his production wing there was now no principal assistant secretary to control this rather loosely knit organisation. Moreover the attention which he himself could give to questions of production policy was inevitably less than the former P.A.S.(PR) had given—for, as the Secretary's direct representative over finance, production, and contracts, he had a large kingdom (almost an empire) to oversee.

But in August 1944 the post of principal priority officer was raised once more to its former superior rank: the post of P.A.S. (PR) was revived for him. Thus the old pattern of the production division was

¹ Strictly speaking the *title* of 'under secretary' was not new, but it was now about to be given a new general application.

substantially restored, and thereafter continued unaltered throughout the period under review. The new P.A.S. (PR) still carried the functions of the A.S.(C), though the latter title itself lapsed; and, indeed, at the time of writing the head of the production division of the Secretariat was still very close indeed to the Controller.

These, then, were the Admiralty's principal dispositions on the metropolitan frontier facing the rest of Whitehall—the section of the interdepartmental frontier, that is, which was located in London. But detached sections of the same frontier were also to be found elsewhere. In North America as well as Britain the competitive demands of the three Services had to be negotiated. Thus a section of the Whitehall frontier passed through Washington and even Ottawa. With the development of the Regional Board system in Britain other sections of the frontier came to run through the regional sub-capitals as well as through the capital itself. All these sections of frontier had to be organised and manned.

(vi)

North America

The history of North American supplies is a vast and a separate subject: *Overseas Supplies* have a volume to themselves in this series, so it must not be supposed that the little which is said about it here is any measure of its importance to the Admiralty; here, there will be only the barest résumé of Admiralty trans-Atlantic organisation.

On the fall of France, with the threat of invasion imminent, it was decided as a precautionary measure to set up a shadow-Admiralty in Canada. A mission composed chiefly of representatives of the Controller's departments and headed by an admiral—the 'British Admiralty Technical Mission'—was sent to Ottawa. An assistant secretary as civil adviser to the mission was also appointed, but for various reasons was long prevented from taking up his post; thus it happened that initially at any rate the Secretary was only represented in Ottawa by officers below even staff-officer level.

When it became apparent that the mission was unlikely to be needed for its original purpose it soon found for itself a new and valuable role in training and fostering war production in Canada, and thus it continued in being throughout the war. But meanwhile, on the passage of the Lend-Lease Act, a somewhat similar but more elaborate organisation had been set up in Washington—the 'British Admiralty Delegation'. The Admiralty Secretariat in Washington was headed by a new post of 'Deputy Secretary, North America'—a post vastly senior of course to any secretariat post in Ottawa.

Obviously it was in Washington that the most important tasks of civil negotiation might be expected to lie: the work in Ottawa was primarily naval and technical.

This 'British Admiralty Delegation' in Washington came ultimately to reflect remarkably closely, in the principles of its organisation, its parent at home—Board and all, except for its lack of ministerial posts. Changes in detail were so frequent that it is difficult to keep track of them, and it is always difficult to know at what point to fix any kaleidoscope: nevertheless the following brief sketch may perhaps be regarded as a not unreasonably inaccurate picture of the delegation, in its latter days at any rate.

The delegation comprised 'all Admiralty missions in the United States'. At its head was an admiral, as representative of the First Sea Lord. He superintended all British naval staff work in America, he represented the Royal Navy on the Joint Staffs Mission, and he was in general control of all naval missions in North America. Other members of the Board at home were represented on the delegation chiefly by the heads of the constituent Admiralty missions. Thus the British Admiralty Maintenance and Supply Representative¹ distinctly represented the Second Sea Lord, as administrative authority for all British naval personnel in U.S.A., as well as representing the Controller and the Fourth Sea Lord. The Naval Air Representative represented the Fifth Sea Lord. The Under Secretary represented the Civil Lord for purposes of procurement, as well as representing the Secretary. The professional and technical staffs bore the names of the parent departments from which they had been seconded, merely differenced with a (W): and the pure doctrine of Board superintendence was preserved by the rubric that they 'serve equally the representatives of the Board of Admiralty'.

Contact between these two organisations—the B.A.D. in Washington, and the B.A.T.M. in Ottawa—and Admiralty departments at home was canalised for the most part through a section of the secretariat in London; a section which though 'independent' never achieved full 'branch' status, remaining throughout a staff-officer's or principal's charge. It reported through the financial or the production principal assistant secretary as appropriate. The work of this section had had its origin as early as the autumn of 1939 in the task of presenting Admiralty demands to the Treasury's Exchange Requirements Committee, but the section itself was not formally constituted until June 1940, when, as the North American Section, it was made responsible for the co-ordination of all signals to the

¹ Originally there had been a head of a British Advisory Repair Mission and a British Admiralty Supply Representative (both vice or rear admirals), but as programmes neared completion in 1944 the two posts were combined. Similarly the post of deputy secretary was reduced to under secretary.

new mission in Ottawa; then the imminence of Lend-Lease enlarged its functions to include the advertising (as it were) of the production facilities of the United States to Admiralty departments chiefly accustomed hitherto to dealing with contractors in the British Isles. Thus it ultimately came to handle all messages about naval requirements to Washington as well. With the entry of the United States into the war and the setting up of munitions assignment procedure its functions were further extended to undertake the presentation of British demands to the Naval Assignment Committee in London, and its title was changed from North American Section to Munitions Assignment Section. The money value of the business which passed through its hands was ultimately vast: by 1944, total outstanding Admiralty demands on North American production were of the order of 1,500 million sterling; but at the height of its expansion the section never contained more than ten members of all grades.

(vii)

The Regions

In Britain, the development of the Regional Board system—which will be discussed at length in another part of this volume—extended the ‘Whitehall frontier’ beyond the metropolis; it set up a devolutionary machinery of contact and local decision in all twelve Regional sub-capitals.

As early as 1936 the Supply Board had recommended that the central supply organisation of the country should, in time of war, seek the assistance of an area organisation to facilitate the progress of production and the administration of priorities, to assist firms and develop new sources of supply. The Supply Board, which reconsidered the matter again in 1938, was not in favour of setting up such an organisation in time of peace, but on the eve of war a system of area boards was worked out and agreed between the three supply departments. The production ‘areas’, as they were originally called, were to be co-terminous with the ‘regions’ of the Civil Defence Commissioners and the ‘divisions’ of the Ministry of Labour; and on the outbreak of war it was agreed that the boards should consist of local representatives of the three supply departments and of the Ministries of Transport and Labour. Later, representatives of both sides of industry were added.

From the outset the Admiralty had viewed the proposals with dubiety. As we have seen,¹ they already had not one but a whole

¹ See pp. 107–108.

system of separate area organisations (inspectories and the like) of their own, each based upon the needs and responsibilities of a single, sovereign, headquarters department. Warship production superintendents, engineer overseers, district electrical engineers, gun mounting overseers—these are merely samples of the dozen or so different kinds of local representatives which the Admiralty maintained. The officers of these organisations might find themselves working in close collaboration with their ‘opposite numbers’ or not at all, entirely as the nature of a particular job required—there was no organisational tie-up between the officers of one department and those of another, nor had the need for it ever made itself felt. Indeed, any such organisational tie-up was rendered well-nigh impossible by the fact that their geographical territories were in no case co-terminous, but were laid out separately to suit the geographical layout of the particular industry in which the particular department was most interested.

This smooth-working and strictly utilitarian machinery, the Admiralty felt, would be put in jeopardy, if it were forcibly tailored to fit the Procrustean bed of the proposed regional lay-out, with its local centres of authority. Surely, moreover, the allocation of industrial capacity for carrying out the naval programme, whether in war or peace, had already been worked out by the headquarters departments through the interdepartmental machinery which has already been described? Within the Admiralty the apprehension was candidly expressed that the other departments, arriving late in the day, would try to use the regional machinery to profit surreptitiously at the Admiralty’s expense. Official candour did not go so far as to say in set terms that in these circumstances it would be even more risky to remain outside the new organisation than it would be to join it, but in putting forward the arguments in favour of participation the Deputy Controller¹ remarked that ‘it would ensure that Admiralty interests are not overlooked at any time’. It is true that he specified times when air raids, and the resulting interruptions of communications, would call for the Civil Regional Commissioners to exercise their emergency powers; but the phrase in fact may be taken as expressing the Admiralty’s attitude to participation as a whole. If the Admiralty foresaw any positive advantage in the area organisation, it lay in the contribution which it might make to solving problems of labour supply—if the Ministry of Labour’s intention to use the area boards for the local implementation of national policy were in fact to be realised.

It was in a spirit of acceptance of the inevitable, then, that the Admiralty considered the details of their participation in the new

¹ The officer later styled Vice Controller, not the Deputy Controller in Bath.

system. They were very anxious to fit all innovations to their existing organisation rather than to alter the latter; for 'to lay violent hands on so balanced a mechanism at a time when it had to bear the strain of maximum load and the utmost cohesion is required, would be unthinkable'. It would therefore be impossible for the Admiralty to build up a homogeneous area organisation, covering all its departments and all the different functions of production, inspection, progressing and so forth.

More than one proposal was made for getting round the difficulty. It might, it was thought in certain quarters, be sufficient if steps were taken to ensure close contact between the various Admiralty representatives in their various areas and the representatives of other departments, irrespective of geographical limitations. Again, it might be possible to appoint one or two senior overseers in each of the Civil Defence regions to effect liaison between the other Admiralty production officers whose provinces covered any part of the region on the one hand, and the regional area organisation on the other. A third proposal was to appoint a specific Admiralty representative in each of the Civil Defence regions but strictly to limit his powers, and it was this last proposal which found favour. It could be carried through without disturbing the existing machinery; the new appointments would be less executive in their nature than of a co-ordinating and liaison character. For on one point the Admiralty was throughout very clear: whoever was the officer appointed, he must not be *above* the existing overseers nor able to come between them and the heads of the Admiralty departments which they served. He should not even exactly represent them; when he attended the meetings of the area boards, overseers should accompany him, not merely brief him, when their particular business was under discussion. The details of the work to be carried out by the new officers were deliberately left a little vague; the appointments were experimental—and in any case the Admiralty foresaw no vital positive role involved, their representatives were to be essentially guardians of the status quo.

This nebulous and difficult role, then, of Admiralty representative on an area board was one which the Admiralty considered could best be performed by a retired engineer rear admiral. Officers could be found whose earlier experiences in inspectorates would mean that they were already familiar with the Admiralty departmental outport set-up and with the industrial set-up as well. For status, their exalted rank would perhaps help to compensate for the lack of any well-defined position of authority.

Seven were appointed in the first instance. At headquarters the Admiralty team was to look to the Deputy Controller in London (later styled Vice Controller) as their head; but their normal channel of communication with headquarters would be P. Branch, who would

co-ordinate all general questions of administering the system, see that their enquiries and reports reached the right Admiralty department, and that questions of interest to the Admiralty raised at Area Board meetings (the branch received the minutes of all such meetings) were not overlooked in the proper Admiralty quarter. When the Contract Labour Department was created, naturally it was laid down that on labour questions the regional officers' channel of communication was to be the Director of Contract Labour; and as time went on, an increasingly large proportion of the problems they dealt with were labour questions; but there was never any formal change in their general allegiance and when, under the Ministry of Production, the Regional Organisation Committee was set up, it was the Admiralty Principal Priority Officer who was appointed the Admiralty representative on it.

In another part of this volume the history of the regional boards themselves will be written; they were an exceedingly interesting and novel experiment in administration, not merely for their devolution of interdepartmental co-operation to the outfield but even more for their integration in an official body of unofficial representatives of both sides of industry. But the Admiralty never relaxed the safeguards to its more senior machinery which it had insisted on at the first. Other departments might in name and perhaps in fact promote their representatives to be 'Regional *Controllers*', but the Admiralty stuck realistically to its earlier designation of theirs as 'Regional *Officers*', for never at any time did they 'control' all Admiralty activities in their regions. Again, the Admiralty's autonomous control of shipyard labour,¹ since unlike other munitions labour this lay entirely outside the purview of the regional boards, was administered not through the Admiralty regional officers but through 'District Shipyard *Controllers*', who were in fact certain flag officers in charge of the more important naval sub-command areas. Nevertheless, the Admiralty's regional officers came in the end to play a part in the Admiralty administrative pattern out of all proportion to their written executive powers—or lack of them. There is perhaps a tendency in all headquarters administration to deal in generalisations and fight rather shy of particular instances. The regional officers did a lot to redress the balance. To headquarters, 'Industry' was spelt with a big I: to the regional officer it was Messrs. Brown, Smith & Company—Jones Bros.—even 'that able little chap with the red moustache'. Thus, whenever a question relating to a particular firm or group of firms arose at headquarters, it became the automatic and most valuable practice to refer it to the regional officer in the first instance for his *opinion*, even where the involvement of general principles or

¹ Shipbuilding and Ship-repairing Essential Works Order No. 1 of 7th March 1941.

extra-regional interests might still make it necessary to reserve the *decision* as a headquarters one. Perhaps it was not altogether realised in the Admiralty at the time how important a part the regional officers played in such questions, and what an immense load of the particular they took off headquarters' shoulders—the work of the Admiralty's contract labour authorities at least would have been virtually impossible without their help. In addition they played a valuable part in opening a window, as it were, from the *hortus inclusus*, the Convent Garden of officialdom, on to the industrial field: they provided a rapid means not only of giving effect to new measures but of judging the need for them and their success or failure in operation; and certainly they were never niggardly of a salutary criticism of headquarters, where they thought they saw a need to bring cloistered meditation or nunnery bickerings down to brass tacks.

As their work—and being ill-defined it naturally tended to be multifarious—increased, it presently became necessary to increase their staffs. Assistant regional officers were recruited from civilians with experience of the engineering industry; labour officers were seconded from the Ministry of Labour. Even then, of course, an Admiralty regional officer never approached in numbers of staff the regional offices of the other two supply departments, with their more definite 'controlling' responsibilities.

CHAPTER IX

CLIMAX AND STRAIN: CONCLUSION

(i)

Climax and Strain

BECAUSE THE Admiralty had remained a single undivided department the Navy had only one minister of Cabinet rank to attend to its interest, whereas the Army and Air Force had each of them virtually two. Administratively, the supply side of the Admiralty could hope for only half of the First Lord's attention even in theory, while in practice First Lords have seldom interested themselves in supply matters nearly as much as in service matters. It is difficult to see how so much responsibility could have been carried at the top at all if it had not been for the Board system by which quasi-ministerial powers of policy-making devolved on the several Lords Commissioners—particularly, in this case, on the Controller: the 'mainspring belonging to everything naval', as Lord Barham had described him even a century and a half earlier.

As has already been seen, a considerable part of the production field came under the superintendence of the Fourth Sea Lord. But that does not mean that the personal load on the Fourth Sea Lord *from this source* was necessarily comparable. The Board-level pre-occupations of the Fourth Sea Lord were in practice chiefly with supply and transport—functions which lie outside the scope of the present volume; his production responsibilities were of such a nature that they could be handled in the main at departmental level. Again, he had not the same vast organisation to supervise. For the Controller's personal burden did not only devolve on him from above. In normal times, before the last war, roughly one-half of the Admiralty's non-industrial staff (leaving common services out of the count) belonged to departments working under the Controller's superintendence, and there were even then ten of these departments: ten directors all with the *entrée*—access, that is, to the Controller personally on all questions. In wartime their several problems increased and their number as well increased ultimately to twenty-five and traditionally all these twenty-five heads of departments had the *entrée*. The First Sea Lord enjoyed the advantage of several immediate

subordinates with seats on the Board; but before the war the Controller had no deputy at all and even in wartime he commanded no Board seat but his own. As we shall presently see, he was virtually alone between the upper millstone of the supreme direction of the war and the huge nether stone of his departmental machine.

Similarly, the Permanent Secretary could give only a part of his mind to the supply side of the department, and even a considerable measure of upgrading of the responsibilities of his subordinates could provide him only limited relief.

A few weeks after the end of the Japanese war the then Controller, Admiral Wake-Walker, died in harness. The Secretary, Sir Henry Markham, who was still a comparatively young man, also died in harness within a year. The Deputy First Sea Lord, Admiral Kennedy-Purvis, who specifically relieved his chief on the material policy side, died shortly after retirement. In passing, it must be remarked that this unhappy mortality has rendered the task of the present student much more difficult, particularly in preparing this concluding chapter where we shall concern ourselves chiefly with organisation at the highest levels; for at these levels documents give little real guidance; matters of importance are discussed and settled by word of mouth by those with authority to settle them out of hand: the action taken goes on to official paper, perhaps, but seldom the full reasons for it: the more important the proposal the more likely it is to be scribbled on an old envelope, and administrative suggestions from comparatively exalted quarters that are unacceptable are more usually 'lost' than contra-minuted. But this singular incidence of mortality in high places is also surely indicative of the strain under which the machine was working in these latter days. The organisation administering war production for the Navy and the Merchant Navy did not break down nor even show serious signs of loss of momentum; the Normandy and the Far Eastern fleets sailed on time, as fully equipped probably as was humanly possible. But there was this mortal strain. Even subordinate officers might find themselves, particularly as D-Day drew near, working 100 or more hours in a week.

It is not suggested that strain at this time was peculiar to the Admiralty. It was felt everywhere—the feeling of diminishing returns for increased effort. In 1943–44 war production had reached, and passed, its climax. There is a first period in the colonisation of any undeveloped country when every problem, it seems, can be solved by pushing further into the wilderness; but sooner or later the pioneers reach the further ocean, and not an acre of territory is left unclaimed. At once there is a change of atmosphere; a *malaise* is felt, typical of such periods of history. That point had now been passed in British war production. It could no longer expand: through industrial wastage and the manpower demands of the fighting forces for the

final assault on Europe it had even begun to contract. This was common to everyone. On the other hand, the Admiralty had never comparably with its sister departments enjoyed the *élan* of any halcyon 'go-west-young-man' period at all—any period when, as in some other fields of supply, the answer to every new problem was to harness new capacity to the war effort. Every available building slip in the country had been earmarked from the very first either for naval or for merchant work, and no considerable extension of them was feasible as a war-time measure; indeed, the limiting shortage throughout was a shortage of experienced labour even more than of berths. This shortage was aggravated, it is true, by the antiquity of much shipyard plant: there were machines still in use in some of the Tees-side yards which had been in use for eighty years: in 1942-43 the Admiralty spent nearly £7 million on schemes of modernisation, and particularly on the introduction of welding; but this factor was only marginal, any substantial expansion of the industry as a whole was not practical economics, for Britain. One cannot, in the teeth of geography and hydrography and within a limited time, without unthinkable cost to the economy of a country such as this one, call new shipyards into being as one can new ordnance or airframe factories, even if the experienced labour was there to man them.

The disadvantages of such a situation were by no means only quantitative. Perforce, naval capacity in the yards had been from early rearmament days filled to the brim (or running over) with orders; for even so it could scarcely meet even the minimum aspirations of the naval staff for a war-time Navy. It will be remembered that treaty obligations had prohibited the laying down of any new capital ship prior to 1935, so that now a rush of work came all at the same time. Subject to treaty limitations, all of this had had to be undertaken as far in advance as possible, since it takes seven years to design and build a new battleship and all warship construction is at least proportionately slow. But just because it is so slow, a full programme of warship construction once undertaken is inflexible. Once a large ship has been laid down she may have to be completed in a hurry even if she is no longer the most urgent need; for the only alternative may be dismantling her; until she is launched she occupies a slip, and thereafter until she is completed she occupies a fitting-out berth. Thus it was not at all easy to switch naval production in the course of the war, when strategic or tactical demands changed—there was no elbow room. Yet such changes were bound to happen; only a superhuman naval staff with complete prescience of the entire course of the war to come, on land as well as on the sea, could hope to avoid them. Such changes in demand certainly did come, even in the early months of the war—or rather, new demands were superimposed. The magnetic mine was

not the unanswerable weapon the Germans seem to have hoped it was; but counter-measures not only made vast calls on the electrical cable industry, they led to congestion of fitting-out facilities as well. Of even greater importance were two other unexpected factors; the fall of France, and the not wholly foreseen scale of the successes of the German submarine campaign. The first meant that there could be no hope of ultimate success without a huge programme of landing-craft and other equipment for an invasion of the Continent, and in the meanwhile a very considerable increase in 'mosquito-craft' for use in coastal waters. The effect of the second was threefold. The swingeing losses of merchant shipping made unexpectedly urgent calls on the facilities for building new merchant ships; the lengthening queues of damaged vessels drained away more and more shipyard labour on repair work: if the menace was to be scotched at its source an entirely new programme of anti-submarine vessels—corvettes, frigates and auxiliary aircraft-carriers—had somehow to be added to the existing naval programme and pushed ahead with the highest priority.

Early in the war, the building of certain large warships had to be postponed or even abandoned—for what that was worth—in the face of these difficulties; but there could be no one answer, recourse to a variety of expedients was needed. It was hardly practicable to start important new yards in Great Britain, but under Admiralty aegis new capacity for building at least the smaller types of war vessel could be conjured into being in other parts of the Commonwealth—in Australia, India, Africa, and particularly, of course, in Canada. The United States were still neutral, they could not yet be called on for warship building; but for merchant ship construction, spectacular new shipyards sprang up there like mushrooms—largely in the first instance with the aid of British 'know-how' and even of British capital.¹ For mosquito-craft, the Admiralty spread their net beyond the shipyards proper to the yacht and boat building firms of Great Britain itself; these were mobilised into a kind of co-operative, to build in concert craft of types more ambitious, perhaps, than they could have undertaken singly. These little yards often used, for wooden craft, prefabricated parts prepared by teams of carpenters drawn from the building trade: but the main prefabrication programmes, of course, were those devised for the production of landing-craft and anti-submarine vessels. Prefabrication itself was nothing new for the Navy; until the British shipbuilding slump in the 'thirties made the practice undesirable, river gunboats (for example) had usually been prefabricated in Britain for assembly

¹ See H. Duncan Hall and C. C. Wrigley in the forthcoming volume in this series on *Studies of Overseas Supplies*, Chapter VII (H.M.S.O.).

in China. For landing-craft it was first used in Britain as early as 1940. Only thereafter did the idea spread to the new American merchant shipyards, and then came home again for the escort vessel programme and for landing-craft once more.

This was the historical background, then, against which we must envisage the Admiralty's problems in the later phases of the war. Somewhat over-simplified, the strategic needs which at that time the Controller found himself called on to meet were these. In the summer of 1943, by the combined efforts of the Navy, the coastal command of the R.A.F. and the Americans (and largely through the agency of the newly-developed device of centimetric radar), the mounting enemy submarine offensive seemed to collapse almost with the suddenness of a pricked balloon. The possibility of its resumption had of course always to be kept in mind; but generally speaking the highest priority need no longer be given to escort vessels—in fact, a large part of the escort vessel programme so painfully undertaken was cancelled. Its place at the head of *immediate* strategic needs was taken by a vast and motley array of the landing-craft and combined operations vessels generally used in the invasions of North Africa, Sicily, and ultimately France; to which were presently added certain elements of the Mulberry Harbour for which the Admiralty assumed responsibility. But the Navy, unlike the other two Services, dared not sacrifice almost everything to the coming assault and occupation of Europe; ahead of them, it was supposed, even after the defeat of Germany and Italy, lay a long and predominantly naval war of attrition against the Japanese in the Far East (for the eventual sudden collapse of Japan was not at that time something which could have been counted on). This war, it was supposed, would be fought under conditions without precedent in naval warfare. All Britain's Far Eastern bases were in enemy hands; Ceylon was the nearest established base remaining. In short, the fleet would have to take its bases with it—in floating form. Floating docks, repair-ships of all kinds, store-ships—even floating breweries had to be included in what came to be known as the 'fleet train'; while for striking power it was essential to increase to the utmost the Navy's strength in aircraft carriers. All this would take a great deal of preparation. It was essential that the multifarious requirements for D-Day should be met on time, but it was no less essential, in the long run, that Far Eastern requirements should be ready on time too. Third, there was a load of merchant repair work accumulating which bid fair, unless it were drastically reduced, to immobilise civilian shipping at a time when the greatest calls were likely to be made on it, as well as to immobilise the firms which had it in hand at a time when they might have an unforeseeable amount of urgent repair work thrust on them following the Normandy landings.

Fourth, there was a variety of projects no less vital because they were multifarious; the building of whale-factory ships for example, to safeguard the nation's fat ration—work which the Government regarded as so important, the Admiralty were told, that not even landing-craft for Normandy might be allowed to delay it.

The Admiralty's contribution in 1943 to the Cabinet's manpower budget for the succeeding year was a demand for an addition of 71,000 to its labour force. Taken at its face value such a 'demand', especially at such a time of manpower famine, was palpably unrealistic, indeed the statisticians who compiled it warned the Board at the time that what they must actually expect was a shrinkage, which they estimated at a loss of 68,000 (a forecast which was almost precisely fulfilled). But the figure was realistic if understood rather in the sense of a numerical estimate of the degree of overload—something at least of the order of 10 per cent. at that time—from which the Admiralty's programmes, as approved by the Cabinet, were then suffering. It was a warning to Pharaoh that by so much the tale of bricks could not be completed. Henceforward, the word 'priority' was to have a new meaning; no longer what project was to be pressed forward most keenly, but what project was to be carried out at all. Priority had now come to mean for the Admiralty a competition for survival between divers approved operational needs, within the ever-contracting wall by which the manpower of the Admiralty industrial effort was now inexorably bounded.

All this responsibility, on top of the daily business of administering a swollen number of swollen departments, lay (subject of course to the special responsibilities of the Fourth Sea Lord and of Sir James Lithgow) on the shoulders of Admiral Sir Frederic Wake-Walker, who had taken office as Third Sea Lord and Controller of the Navy in the spring of 1942. It has been sketched here at some length because it is only against such a background that the various organisational steps taken to lighten his personal load can be understood and appraised. It will make it apparent that the efficient co-ordination of the Controller's expanded organisation, together with the sufficient delegation of the Controller's authority, was the major internal administrative problem with which the Admiralty, on this side of its work, was faced.

Naturally the problem was one around which much inventive speculation had revolved in the Admiralty from the earliest days of the war and earlier. But these discussions took place more often behind the scenes than in front of them, and we are left with only an occasional shadow on the curtain to indicate what then went on. For example, there is a letter on the files which seems to indicate that in 1939 it was mooted to divide the office of Controller from that of Third Sea Lord. This had been done for a brief period in

the previous war, it will be recalled, when a civilian Controller, Sir Eric Geddes, had taken charge of naval and merchant shipbuilding both.¹ But in September 1939, of course, it was not yet known that the Admiralty would once more find itself responsible for merchant shipbuilding, and the idea seems rather to have been the appointment of a civilian Controller in Bath to take supreme command of the departments, while the Third Sea Lord remained in London. Presumably both the Controller and the Third Sea Lord would then have been equal members of the Board; but there can be little doubt that the reins of real power would have been in the hands of the former—if indeed it did not make of Bath virtually a separate supply Ministry. An alternative suggestion of which we get hints was of an opposite nature: instead of relieving the Third Sea Lord and Controller of responsibility for superintendence of the departments, ‘an additional member of the Board’ was imagined as relieving the Controller ‘especially in respect of interdepartmental duties’. For example, the new functionary would have been supreme head of the Admiralty’s priority organisation, then at the stage of gestation.

Neither of these proposals, however, was put into effect. In the summer of 1939, Sir Reginald Henderson had died, and the new Controller appointed then had been Vice-Admiral Fraser.² On such a question naturally the new Third Sea Lord and Controller would have virtually the last word. He seems to have felt that any definite partition of his office on one side or the other was unnecessary and undesirable, if not impracticable. Further still, he showed himself reluctant to allot any specific major share in his responsibilities even to subordinates. He seems to have preferred instead the appointment of assistants to himself with no very definite role other than what he might parcel out to them from time to time.

No doubt it would be superficial to criticise this preference as the origin of a system (or lack of system) which was to leave the office of a war-time Controller latterly at least inadequately supported under its great burdens of work and responsibility. ‘I think he (the Controller) neither is, nor can be, happy about his organisation’, an important member of the Controller’s entourage was to write in 1943: ‘. . . There are about twenty directors with direct responsibility and access to the Controller in everything—except to such (small)³ extent as Deputy Controller, Bath, co-ordinates. . . . The Controller has not achieved what he wanted, nor will the present system give it’; and earlier (in 1942) a senior official had written to the Controller:

¹ See p. 140.

² Later Admiral Lord Fraser of North Cape.

³ This, of course, was a ‘London’ view with which Bath authorities would not necessarily fully agree. The Deputy Controller (Bath) undertook a great deal of detailed and semi-technical work—more perhaps than was realised.

'I am sure that if you do not in some way as this rationalise the Controller's organisation and delegate responsibility it will be impossible for you to relieve yourself of work in any satisfactory manner'. But, just as it was impossible for the naval staff to foresee, years in advance, the precise material needs at every turn of the naval war to come, so it was no doubt impossible for a newly-appointed Controller, in 1939, just entering on his duties on the outbreak of a new war, to foresee precisely where the administrative shoe was going to pinch, in which particular spheres he could delegate with the best advantage—other than in the case of certain obviously minor activities. It is difficult to recall any large measure of delegated authority, once mistakenly bestowed; thus it may well have been a prudent decision to keep the nascent organisation as flexible as possible. Moreover, the Controller's intention was to work with a team drawn entirely from his own colleagues in the Navy—men accustomed by their whole training to work together in harness without the need for over-much detailed 'paper' organisation, a point which it is very important, throughout what is to come, to remember.

The first appointment made, then, was of a Deputy (later re-christened Vice) Controller. It has been mentioned that it was customary in peacetime (when the Controller had no deputy) for the Director of Naval Equipment to sign in his absence. The current Director of Naval Equipment, Vice-Admiral Tower, had just been placed on the retired list and relinquished his post; he was now recalled and appointed to the new office. He was, and throughout the war remained, the senior member of the team; but Admiral Fraser's intention from the first was clearly to make him a sort of Lord Marcher, in almost independent control of certain outlying and widely separated minor parts of the Controller's realm, rather than in any sense vice-regent of the realm as a whole or in charge of a substantial and coherent slice of it. This remained the position; throughout the war it was only on rare occasions that he was ever called on to act for the Controller outside his own private domains. Thus by the terms of his original appointment he was 'to carry out such duties as the Controller may delegate to him and particularly to represent him on the Supply Board' (which was of course shortly to become extinct) 'and Priority Committees' (a responsibility which in practice was presently taken over by the Principal Priority Officer) 'and to deal with questions of motor torpedo boats and their bases and with converted merchant shipping'. A few months later he took over salvage cases, oversight of the regional organisation, and all North American supply questions. It is difficult to find any visible connection between so heterogeneous an array of duties; but they had this in common, that while calling occasionally for decisions at a high level, they all seemed to need more detailed attention than the

Controller himself could spare them. In practice, headship of the regional organisation was to give the Vice Controller comparatively little work; his principal attention was turned to the highly complex mosquito-craft and landing-craft programmes and (secondarily) to North American supply questions.

If it should be thought these were hardly sufficient spheres of activity for the Controller's senior subordinate and 'Vice', bear in mind that it would have been difficult for him to sustain much greater responsibilities on his own authority and from his own knowledge of that war-time Proteus, high policy in the making, unless, like the Vice Chief of Naval Staff, he was given his own seat on the Board—a step which does not seem to have been contemplated.

The second appointment to be made—an 'Assistant' (later 'Deputy') Controller in Bath—was governed by wholly different considerations.¹ It was given to the new Director of Naval Equipment in addition to his directorship. It is certain that it was not ever intended he should take over entirely in normal circumstances the superintendence of the departments there; that would have virtually come to a separation of the offices of Controller and Third Sea Lord, or at least would have made him more important in practice than his senior, the Vice Controller. Nor was it apparently even intended that he should take over for the Controller all questions of departmental organisation and manning. In short, the post was not originally envisaged as having any very significant part at all to play in the normal working of the machine: it was an emergency insurance, born of the need to have ready a 'shadow' Board in Bath if air raids or German landings made temporarily impossible the exercise of authority there by the Board in London; an Admiralty counterpart (with the Under Secretary, Bath) of the Home Office Regional Commissioners. All that was said in the terms of appointment was that he was 'to act in Bath as the Controller might direct'.

It was difficult with no further guidance than these instructions to find a place for him in the normal working of day-to-day business. For example, it has been mentioned in the introductory chapter that Admiralty procedure involved the co-ordination of papers and their submission by or on behalf of the head of a secretariat branch, through a principal assistant secretary (acting generally on the Secretary's behalf), to such members of the Board as might be concerned. The principal assistant secretaries handling production and financial questions were both stationed in London, in close touch with the Controller with whom they could if necessary discuss the question personally; naturally there would be a disinclination to return papers to Bath for approval instead—even assuming that the Deputy Controller had valid powers (except in emergency) to 'approve' for the

¹ See pp. 87, 88.

Board, which was never absolutely clear. A further difficulty arose where any other member of the Board was concerned in addition to the Controller. Papers going to several Board members were submitted to them in reversed order of precedence. But it would have been improper to submit the papers, for concurrence merely, to a full member of the Board, and then for final decision to the Deputy Controller who was not a member of the Board. The most, usually, that could be done in such cases was for the head of P. Branch in Bath to consult the Deputy Controller 'off the record' before framing his submission; and this, of course, though it gave added weight to the submission, afforded comparatively little relief in day-to-day business for the Controller.

In practice, then, the creation of the post doubtless meant a certain easement—perhaps greater than was always realised in London—for the Controller of the special difficulties arising from his geographical severance from his departments, and a certain amount of assistance over detailed work of a co-ordinating nature—for example, it became customary for the subject-matter of the Controller's monthly meetings with his directors¹ to be chewed over at a preliminary meeting with the Deputy Controller in the chair. But the post could not—that was the crux—relieve the Controller of a very substantial part of his responsibilities without taking from him altogether too much.

The third appointment, that of Assistant Controller in Bath, made in November 1940, was designed rather to relieve the Deputy Controller than the Controller himself. By its terms he was to 'carry out duties as delegated by the Deputy Controller, and particularly to deal with overseas production, Allied ships and co-ordination of berthing and mooring requirements'.

On paper, then, the complementing of the 'Controller group', at least for the earlier stages of the war, may have seemed adequate. It consisted (after the Controller himself) of three naval officers of Flag rank, holding appointments as Vice Controller, Deputy Controller and Assistant Controller. But, as we have seen, the degree of relief which it could afford the Controller was hardly commensurate.

Your immediate subordinates have therefore had unusually indefinite functions and although they have to a more or less extent done a great deal of work on your behalf and so lifted the burden, the lack of definition has meant that many of your departments have tended to go direct to you about all sorts of questions, great and small, and in varying degrees according to the characteristics of the heads of the several departments. They will undoubtedly continue to do this to an unlimited extent and the position will tend to remain rather unsatisfactory unless or until the duties of the Controller group are more exactly defined.

¹ See p. 97 *et seq.*

We must now turn to three of the various proposals which were made from time to time for the reorganisation of the group. No doubt there were others, but it is only of these three that any documentary record would seem to be extant. These particular proposals were put forward at the invitation of Admiral Wake-Walker, Admiral Fraser's successor, two of them in the autumn of 1942 and the third in 1943.

The earliest critic—critic at least in private—of whom any record can be found seems to have been the first Deputy Controller in Bath himself, Rear-Admiral Dorling. Admiral Dorling relinquished his post in 1941 and there is no evidence that before doing so he ever laid his views before his chief; but they were put on record by an official with whom he had discussed them, and thus found their way in due course on to Admiral Wake-Walker's desk. The second scheme was a modification of Admiral Dorling's proposals put forward by one of the Controller's principal advisers—the A.S.(C).¹ The author of the third and most far-reaching scheme, put forward a few months later, was a well-known public figure—Lord Reith. For on relinquishing political office as Minister of Works Lord Reith had volunteered for the Navy. He was presently posted to the Admiralty with the rank of Lieutenant-Commander, R.N.V.R., and with appointment as an 'additional naval assistant' to the Controller. The post was itself a comparatively junior one, but with Lord Reith's experience, and particularly as supreme architect of the organisation of the B.B.C., it was natural that the Controller should consult him on organisational questions.²

All these proposals were based on a common principle: the division of the departments into groups, the superintendence of each group being put in the hands of its own sub-controller ('group-controllers' Lord Reith called them, and the term is a convenient one).

Admiral Dorling's suggestion was that the first group should consist of the main shipbuilding and ship repair departments including the Electrical Engineering Department. The second group would be the weapons group; the third group would be the 'scientific' departments—the Department of Scientific Research itself and the Departments of Signals, Anti-Submarine Warfare, and Compasses. It was taken to be his intention that the Vice Controller should have charge of the first as the most important group; that he himself should have charge of the second; and the Assistant Controller of the third.

The A.S.(C) endorsed Admiral Dorling's proposals in principle, but advised a revision of Admiral Dorling's grouping. His reasons were two-fold. A sub-division of the Controller's responsibilities on strictly geographical lines had, as we have seen, already been ruled

¹ See p. 172 *et seq.*

² Shortly after the submission of his report Lord Reith left the Controller's immediate circle; he was promoted Captain (R.N.V.R.) and appointed first Director of the Combined Operations Material Department.

out of court as undesirable; but that did not mean that geography could be altogether ignored. Secondly, he felt it to be politic that change should never be more drastic than was absolutely necessary. Admiral Dorling's grouping of the 'scientific' departments under a single head was particularly open to criticism on geographical grounds: signals work was centred on Haslemere and Bath; anti-submarine work was done in Bath and London; the Director of Scientific Research was in London, and the Director of Compasses had long been stationed at Slough. Secondly, the Vice Controller was established in London and, as the Controller's right-hand man, the latter would no doubt wish to keep him there; but the Engineer-in-Chief's Department and the Directors of Naval Construction, Dockyards and Electrical Engineering—the 'ship' group—were all in Bath. In the interim, moreover, since Admiral Dorling had framed his plan, the Controller's departments had proliferated: there was a mass of new-born war-time departments and—since most of these had originated directly or indirectly out of various material activities of the naval staff—most of them were stationed in London. The A.S.(C) proposal, therefore, was that the Vice Controller should take charge of all London departments, whatever their nature, including Compasses and Signals (after all, he was an 'odd-jobs man' already). The Deputy Controller in Bath would then automatically have taken charge of the shipbuilding group (for which task he was, as Director of Naval Equipment, already constitutionally fitted); and the Assistant Controller would have assumed charge of the weapons departments. There could be a minimum of upheaval.

The Controller's initial reactions to this second proposal—which must indeed have seemed by that time the more practicable of the two—were apparently favourable. But on broaching the matter to certain directors he found that any such scheme would be far from popular—presumably for reasons which will be suggested presently—and therefore unlikely to work smoothly. He decided to postpone his decision until certain other appointments then already in train were established. In short, it seems that he was at this time still undecided between the principles of delegation to group-controllers advocated by his advisers but resisted by the directors and a different principle of delegation altogether.

These two new appointments (which were shortly promulgated) involved the creation of two additional assistant controllers with specific titular spheres of activity, but did *not* involve any division of the departments into groups. The first was the appointment of an 'Assistant Controller for Research and Development'. The genesis and nature of this appointment have already been described.¹ Now it leaps to the eye that the terms of this post were more closely in

¹ P. 132 *et seq.*

accordance with the pure formula of Board authority so often reiterated in these pages—that a superintending lord superintends particular work, rather than commands or directs particular staffs—than any other appointment of a Controller's delegate yet made or suggested. For Dr Goodeve was not given command of a group of departments—not even of the Department of Scientific Research; his business was rather to superintend on the Controller's (and indeed the whole Board's) behalf all questions of research and development in whatever department or other subordinate authority they might arise.

This distinction is more than a quibble. The opposing doctrine, the doctrine of 'group-controllers' advocated in the two memoranda we have already examined, was essentially a doctrine of super-directors rather than a doctrine of sub-controllers—a doctrine of directors general standing on the shoulders of the directors, at least in the sense that it was conceived in terms of groups of staffs (the kind of authority pertinent to directors) rather than in terms of phases of work (the kind of authority pertinent to the Board). The proposal for group-controllers foundered, on this occasion, on the opposition of the directors themselves. In effect they suspected that if such 'group-controllers' had been appointed they would have tended in practice to draw up into themselves, by the natural magnetism of *Gestalt*, much of the independent responsibilities of the directors under them, rather than to draw down upon themselves much of the responsibilities of the Controller they purported to relieve. It is true that a naval officer had not the necessary professional knowledge to act as a *technical* director general (at least so far as shipbuilding, engines, and electrics were concerned, though this would not have applied so strongly in the case of the 'weapons' group) but there was nothing to prevent him from taking as full executive charge as he liked in the *production* field.

No doubt such appointments would have served to keep directors perhaps more constantly on their toes. That may have been what the proponents had in mind at the time as the prime need. Or they may have felt that the increased number and size of the departments made a degree of formal co-ordination necessary that had not been necessary when they were few and fully familiar with each other's functions. But it can be argued against any system of grouping that while it makes certain ties closer it makes others, by the same token, more tenuous. In any case, as we have seen, such appointments were unlikely to take much from the Controller's personal burden: if they had to be imposed in the teeth of opposition they might indeed have added to it. Dr Goodeve's appointment, on the other hand, seems to have been accepted without opposition, and his functions to have been performed without causing any noticeable friction.

The second appointment created at this time was an 'Assistant Controller for Warship Production'. It is tempting to take this appointment at its face value as something precisely similar to Dr Goodeve's, and to adduce it as evidence that the Controller had come to a clear-cut decision to solve all his problems of delegation on similar lines. But this would be an over-simplification. Even Dr Goodeve's appointment, as we have seen, had come as an answer to a particular problem arising at a lower level rather than as an essay in delegation; and in fact the very title of this second post was virtually a contradiction in terms. Delegation, to be effective, must be virtually plenipotentiary; subject to broad guidance on matters of policy, and to the reservation of certain exceptionally important instances to the high delegating authority himself, the delegate must be entitled to negotiate and to decide in his own right if he is to afford his superior any real relief at all. But in this case the implied field of delegation was much too wide and important for a comparatively junior subordinate, any mere 'Assistant' Controller. One can imagine a scientist, as an Assistant Controller, exercising effective supervision over research and development on the Controller's behalf; but a controller's plenipotentiary in the whole warship-building field would be carrying responsibility for the most important single part of the Controller's work: how for example could a junior, an assistant controller, exercise effective oversight of the entire field where his senior, the Vice Controller, with his superintendence of mosquito-craft and landing-craft, had already oversight of a minor part? Again, at this period of 'climax and strain' the principal factor limiting warship building and repair (and the Controller's principal source of anxiety) was the competition of merchant work. How, in such circumstances, could any subordinate—even perhaps a 'Vice' Controller actually elevated to his own seat at the Board—adequately in the Controller's stead sustain naval interests against so formidable a competitor as the C.M.S.R.¹ with the whole political weight and pressure of the Minister of War Transport² behind him?

Moreover, Sir Stanley Goodall—the recipient of the new title—remained still titular Director of Naval Construction; Dr Goodeve, as we have seen, had no such departmental tether. In short, the two posts resembled each other only superficially. On the other hand, with no specific jurisdiction over any department but his own Sir

¹ Cf. pp. 145 and 157, where the anomalous nature of any such direct clash of interest between two 'parts of the High Admiral' has already been argued.

² Lord Leathers. It is constitutionally notable that not infrequently this conflict of interest was only resolved by means of direct personal discussion and negotiation between Controller and Minister, with the First Lord's knowledge but without his intervention. Perhaps this should be regarded less as a war-time irregularity than as a telling example of the quasi-ministerial functions which, under the Commission, a Lord Commissioner might, where it was expedient, quite properly be called on to fulfil.

Stanley was not a 'group-controller' either. Thus the very nature of the post precluded it from the very first from relieving the Controller materially except of a limited amount of detailed committee work and the like.

All this, of course, is not to contend that the conception of a Controller's plenipotentiary delegate with supervision of the whole ship-building and ship-repairing field is in all circumstances an impossible conception, but only that it could not possibly have been grafted in so casual a manner on to the existing set-up.

These two assistant controller posts were already in existence when the last of the three sets of proposals for reform that we are considering came to be drafted. From our present post of vantage we may perhaps feel that there was a valuable precedent to be studied in the first post and obvious inferences to be drawn even from the weaknesses of the second; or, at any rate, that a considerable pointer was afforded by both to the way Admiral Wake-Walker's mind was now working and the sort of solution he was tending towards. Lord Reith perceived, it is true, the flaws in the 'warship production' post and proposed to abolish it—but not in favour of any further advance on functional lines, a conception which he did not even discuss. Presumably he felt that the prime need was for departmental overlords to help the departments to set in order their war-time houses; for he returned unequivocally to that doctrine of controllers of groups of departments which had been canvassed twice already without success. He would have altered Dr Goodeve's appointment to conform with this pattern. Even the Vice Controller, who was to become the Controller's *alter ego* over the whole field and to undertake co-ordination of the groups on his behalf, was to have his own departmental charge in addition. However, it is hardly necessary to discuss these particular proposals further; they were not adopted, and even more importantly they differed little in principle from the two earlier schemes already described in detail. But a second project now put forward by Lord Reith as part of his scheme is of rather greater interest (though in the event it proved equally abortive). He advised the Controller to set up a 'functional directorate of progress, properly institutionalised and staffed'.

Hitherto, of course, the sovereign departments had each been responsible for 'progressing' in its own field. Let us consider, then, what Lord Reith had in mind. From the epithet 'functional' we might suppose something similar to (say) the directorate of scientific research:¹ a director and small headquarters nucleus (with a statistical and records section, perhaps, in lieu of a laboratory) administering a pool of trained progress officers farmed out among the various technical departments; in short, the emergent new 'guild' at last formally

¹ See p. 129 *et seq.*

recognised, given a director as professional head and co-ordinator and its own executive focus.¹ This conception is itself an interesting one, but it is doubtful whether it is quite what Lord Reith intended. For when the memorandum comes to describe the proposal in greater detail the emphasis is rather on the headquarters organisation of the directorate and it is clear that this was intended to be of considerable size—a 'department' in the more conventional sense.

No record seems to be extant of the Controller's reactions to this proposal with its obvious attractions; nevertheless, certain reasonable surmises regarding them are not impossible in the light of the historical circumstances. For example, the director was to be responsible for the co-ordination of information from progressing machinery in all departments and empowered—this, of course, is the crux—*empowered* to question departments on progressing machinery and information and, where special action seemed necessary, 'to be satisfied that it was taken'. Other directors, it was laid down, were to be 'receptive of advice' from the new director. In blunter words, directors were to find themselves required to carry out the instructions of a new-created authority enjoying no higher status than their own. The difficulties inherent in such a proposal must have struck anyone really familiar with the Admiralty atmosphere. Moreover, the Controller would at this time have had very fresh in his mind the difficulties which habitually faced the Director of Scientific Research—although his was a department of some twenty years' standing—in similar circumstances; difficulties which had led so recently to the appointment of an assistant controller in the field of research and development as their only solution. Perhaps, then, it was at this stage that the Controller first conceived the possibility of creating a similar high post in the 'production' field (as we shall presently see). But failing—or pending—such an appointment, the normal Admiralty alternative where co-ordination of a phase of the work of departments was needed at a lower level and there was administrative rather than executive responsibility to be shouldered was to set up a new secretariat 'branch', not a new independent 'department'. These were proposals for a new 'department'; and a department, moreover, to take over most of the work and, presumably, most of the staff of P. Branch² leaving only a rump of the branch, restricted to external relations. Here, too, the Controller would have had fresh in his mind recent experiences—in the field of contract labour, where the reverse had proved necessary: as lately as July 1942 the 'department' had been wound up and its duties handed over to a new secretariat branch.³ Most of the *work* of P. Branch came in any case under his

¹ See pp. 136–137.

² See Chapter VIII, iii.

³ See pp. 170–171.

superintendence in accordance with the normal constitutional working of Board superintendence; there is no evidence that he felt that his interests had suffered because he did not also directly command and control the *staff*.

In any case the Board might well have decided that the creation of a large new department of such integral importance to the organisation as a whole and the disruption of a large secretariat branch were somewhat formidable undertakings for so late a stage of the war. But the logical outcome, as has already been suggested, was rather the creation of a post in the field of progressing at a level higher than a directorship. This brings us to the latest¹ addition to the Controller group actually made during the course of the war, the appointment of a 'Deputy Controller (Production)'.

Admiral Wake-Walker already appreciated the value to other departments of State of some at least of the industrialists who held high office in them, and he was particularly influenced, in setting up the post, by the views of certain colleagues at the Ministry of Production whom he consulted. Thus when, in August 1944, the appointment came to be made, the appointee was an industrialist who had served that Ministry as one of their regional Controllers; and in office he was confined to questions of 'inland' industry—the sphere in which that Ministry was specifically interested. But it is difficult to assess at all clearly either the functions or the success of this appointment, for it was made so near to the end of the war that the new Deputy Controller scarcely had time to settle in the saddle. One thing, however, is clear; though the new Deputy Controller was stationed in Bath his responsibilities were in no sense geographical nor was he the overlord of any particular group of departments. The outlines of the post, however hazy, were unequivocally of a functional sort.

To sum up. On becoming Controller at a time when that office carried vast responsibilities, Admiral Wake-Walker received as a legacy from his predecessor a group of assistants rather than a system of deputies or lieutenants. This group consisted of a Vice Controller chiefly occupied with certain rather heterogeneous responsibilities of his own, and a Deputy Controller and Assistant Controller whose functions, so far as they were defined at all, were primarily geographical. The flexibility of this arrangement had no doubt commended it for earlier stages of the war, but now three proposals were put before Admiral Wake-Walker for reforming the group on rational lines. All three proposals assumed that reformation must take the form of allotting direct overlordship of a particular group of

¹ Except for the 'Vice Controller (Air)', a post created in April 1945 to cover the transfer from the Fifth Sea Lord to the Controller of titular responsibility for naval aircraft and equipment. See p. 156.

departments to each one of these lieutenants. Admiral Wake-Walker's own mind, on the other hand, seems to have come more philosophically to incline rather to a functional sub-division of his own sphere of superintendence as a member of the Board. At any rate the three additions to the group made in his time all partook of this character to some degree—an Assistant Controller (Research and Development), an Assistant Controller (Warship Production) and a Deputy Controller (Production). But these three were new appointments, be it noted; additions to, not a reformation of, the set-up he had inherited. That set-up he left virtually untouched. Thus the picturesque exaggeration would perhaps be pardonable if we were to describe the Controller group in its latter days as a vehicle running on six wheels all of different sizes and all somewhat differently aligned, each with its own distinct connection to the steering wheel itself. If the cynic should maliciously remark that such a vehicle would be only in accordance with Admiralty custom, he must admit that it is equally strictly in accordance with the Admiralty genius that it was in fact held on the road.

Before leaving the subject of delegation there is one further aspect of the problem that perhaps needs to be touched on, for there are distinct signs that it most materially affected the issue. The difficulty of course is not only to delegate sufficient power to secure effective relief for the superior; the particular difficulty is not to delegate too much. No scheme of delegation will work in practice unless the high delegating authority, however overburdened, has complete confidence that the proper balance between master and man cannot be upset by it. No doubt fear of this Charybdis contributed, at least, to the apparent unwillingness of the Board to be more specific in their allocation of powers to all these deputies and assistants. Yet it might well be argued that precise definition is just as important for the effective restriction of powers as for their effective bestowal.

This, then—the problem of relieving the Controller of some of the burden of his superintendence of the work of the departments—was the major problem in the general task of lightening his personal load. But it was not the only problem. There was the question of affording him relief in his quasi-ministerial relations with the general machinery of government and also his relations with his fellow-members of the Board. In the first of these two fields, it will be recalled, it had once been intended to appoint an additional member of the Board for the purpose. In the event neither this nor any other specific appointment was found necessary; in both these fields sufficient assistance, it appeared, could be derived from day-to-day working arrangements. In the field of external relations, particularly the Principal Priority Officer, as that post gained in experience and stature, came more and more to act as the Controller's deputy in fact if not in name. Many

of the Controller's briefs of course came from his pen, but in addition where he could with propriety attend interdepartmental meetings instead of the Controller he was often called on to do so—especially in the latter part of the war. On other occasions he accompanied the Controller (to such bodies for example as the Joint War Production Staff, when it was set up). Again, it was the Principal Priority Officer, not the Vice Controller as titular head of the Admiralty Regional Organisation, who represented the Admiralty officially on the Regional Organisation Committee, and customarily he took charge on Admiralty behalf at meetings of the Materials Committee and a wide variety of *ad hoc* meetings of all kinds (in addition of course to meetings of the Central Priority Committee itself). This was part and parcel of the war-time development of the Admiralty secretariat: indeed it became noticeable as an Admiralty characteristic at that time that administrators were sometimes sent to meetings where other departments tended rather to be represented by executives or serving officers.

Within the Admiralty, in his relations with other members of the Board, the principal task was to bridge the gap between the main Admiralty building and Dorland House—between the Controller of the Navy, that is, and the C.M.S.R. Curiously, apart from negotiation of the shipyard priority lists already mentioned,¹ members of the priority organisation as such played little direct part in this. Nor did the Merchant Shipbuilding Branch, which seems in practice to have been rather cut off from the rest of the secretariat. But the two Controllers themselves met frequently and informally. Usually these meetings were amicable, but when (to put it vulgarly) there was a scrap on, it was no place for an intermediary who valued his hide; thus these meetings at the highest level tended to be supplemented rather by the work of committees than of individuals. The Shipyard Development Committee, for example, was set up to further financially-assisted schemes for the modernisation of shipyard plant and for the introduction of welding methods of construction, in the common interest of both sides of the house. Another body, which was intended, at least, to cover a rather wider field, was known as the 'Controllers' Liaison Committee'. It was charged to discuss all matters of common interest to both Controllers, and particularly to ensure that each was well aware in advance of the other's intentions where these might affect him—but this proved an almost impossible task in a situation which changed almost daily. Again, the exceedingly complicated naval side of the monthly lists of shipyard priorities was sometimes threshed out in a preliminary way at meetings with the Assistant Controller for Warship Production in the chair: these meetings were attended by the interested members

¹ See p. 149.

of the naval staff as well as production and repair authorities, and the Deputy C.M.S.R. would often be present as an observer so that his chief should be aware in advance of some at least of the naval issues involved before the draft list came to be presented to him. Thus in one way or another a good deal of preliminary detailed work was done on matters requiring the joint approval of both Controllers; but final powers of decision, of course, were retained in their own hands.

On the other side of the Controller—or no, in this context he should rather be invoked by his title of Third Sea Lord—lay his links, of paramount importance, with the chiefs of the naval staff. As fellow Sea Lords, lifetime members of a common Service, charged with complementary phases of a common interest, there was little likelihood here of the kind of difficulties and clashes of interest inherent in divided authority over the shipyard field. In peacetime no special machinery of liaison was needed, and in wartime, none for the immediate needs of the war; but the Board did in time come to feel some anxiety lest, with both sides so fully occupied over the immediate and urgent problems of waging the war already on their hands, the long-term problems of naval planning might get too little of their joint attention.

For naval planning has to be long-term, and to be continuous—modified but not interrupted by the temporary accident of war or peace. New naval construction can only be undertaken on a year-to-year basis, in accordance with a yearly Parliamentary grant; but the eyes of the Plans division of the naval staff must sometimes at least be focused on a point ten years ahead—for it might take even longer than that to repair any major mistake. It has been demonstrated more than once in this century and by more than one country that a great army, even a great air force can be built out of almost nothing in some five years or so; but the comparable period for building a great navy out of nothing would be fifty years at least. Such a period, of course, is far too long for any politician to venture to forecast over it the chances of peace or war, a fact which in the previous century had been the basis of accepted doctrine: the strength of the Navy was then regarded as the principal guardian of peace, not as its weathercock, and if the horizon looked placid the tendency was rather to congratulate the Navy than to 'axe' it. It was only in that way—by an effort sustained equally in times of the profoundest peace as well as war over a number of generations—that the ship-building resources of the comparatively meagre littoral of the British Isles and the manpower of a comparatively small nation had been able to create, to maintain and to renew the greatest navy the world had ever seen. But by 1942 the picture was a very different one. The fleet had been allowed for two decades to dwindle and grow

old; the fountain from which alone its youth could be renewed had been allowed to dwindle and partially dry up. Now, both the Navy and the industrial resources behind it were stretched in a violent conflict. It was already apparent that Britain would come out of the war impoverished. It was already certain that by no conceivable effort could Britain remain owner of the largest fleet in the world—that position must shortly be yielded to the United States. But this did not at all diminish the Admiralty's duty, though in a measure it complicated the Admiralty's task, of thinking ahead; and it was clearer than ever before that in such forward planning the production authorities as well as the strategists and specialists must play their part.

With some at least of these considerations in mind the Board decided in 1942 to set up a Board committee on which the staff authorities and the production authorities could discuss round a common table the material needs and characteristics of the Navy of the future, particularly in the light of the areas where it might be expected to serve, and formulate tentative proposals for future naval programmes. The Deputy First Sea Lord—a senior member of the Board—was appointed chairman. Membership of the committee varied somewhat with the subject under discussion, but broadly speaking it consisted of the appropriate assistant chiefs of naval staff and the directors of several staff divisions on the one side and the Controller's naval assistant and some of the senior directors of departments on the other, with a secretary drawn from the production side of the secretariat. In practice, the 'staff' side predominated. It is perhaps symptomatic that one of the most influential members of the committee was a 'staff' civilian scientist (representing the Director of Operational Research), but there was no balancing civilian economist on the roster.¹ Thus such questions as the future of the shipbuilding industry itself and the part the Admiralty might play in fostering it were scarcely touched on.

Nevertheless, the subjects discussed ranged widely, from a series of meetings at which a picture was gradually built up of the 'balanced' Navy needed to meet the circumstances of the future (and particularly the part which shore-based and ship-borne aircraft would have to play in the traditional naval task of controlling sea communications) to the 'staff requirements' of the types of war vessel of which that fleet would be composed and even (on occasion) to the particular weapons to be installed in particular ships already building. However, though this was technically a 'committee of the Board' it did not possess Board powers of decision. It could come to conclusions and make recommendations, but the character of the subjects it discussed was such that necessarily approval was reserved.

¹ Indeed there was no professional economist as such in a responsible position in the whole Admiralty at that time.

(ii)

Conclusion

In these six Admiralty chapters a picture has been drawn: it is hoped that certain broad features now stand out. For historical reasons the modern Admiralty is better studied as an organism rather than an organisation; but it would be a mistake to assume that its shape was haphazard just because it was the outcome of growth in the main rather than carpenter's work. Growth of this kind has its own logic of balancing forces, its own ingenuity in turning towards the light. In any case, from time to time at least in the course of the centuries the Admiralty's growth had been consciously guided by minds of singular originality and ability. Naturally it is not propounded here that the Admiralty system was necessarily right or that it always worked perfectly: there were critics of this and that about it in the Admiralty itself as well as in the Navy and outside, and some, indeed, of these criticisms have been recorded here. But at least it should be no surprise to find that the surface variety of Admiralty institutions is in fact informed by certain basic principles. The main object of this study has been to clarify these. They may be of interest to the general student of human institutions, as well as to the particular student of naval affairs or of the humdrum of supply.

Let us, then, summarise what seem to be the four chief principles. As we shall be reminded in a moment, special circumstances on occasion led to departures from each of them. But whether these departures and exceptions were inadvertent, or necessary and made with eyes open, it appears from the record that a price in each case had to be paid.

First—the Board, the Lord High Admiral in Commission. Sufficient has been said sufficiently often in these pages about the nature of the collective responsibility of the Board and the several complementary responsibilities of its members for recapitulation to be unnecessary. In brief, the system is calculated to carry a breadth of Crown responsibility, including professional responsibility, greater than any minister could be expected or be competent to carry alone. In times past it was in naval affairs that this situation first arose. In modern times the vastly increased load on *all* ministers entailed by the scope of contemporary government, and particularly by the inclusion of technical and professional matters in that scope, has become a major problem of public life. But it must be emphasised that any wider adoption of the system (if that were desired) would be much more than an administrative device. It would be a major constitutional change, requiring perhaps an exercise of the Royal

Prerogative comparable, in modern terms, with that far-away creation of a Lord High Admiral of England from which the Board derived. Only the Crown itself could empower a minister to share the responsibility entrusted to him with anyone else. Moreover, the system inevitably takes away lustre from the minister. In practice it is only occasionally that a First Lord has in fact been the most outstanding, or even the most influential in Admiralty business, of the Lords Commissioners of the day. The reader should not leap to deplore this; ultimate control by the Cabinet and Parliament is not affected, and the truth is that most Admiralty business requires even at the highest level other skills than the political one. Thus some of the most successful Boards have been ones where the First Lord was in practice no more than a wise and valued 'Chief of Political Affairs'.

Now for the exception. In the course of the war one notable departure (as this record has shown) was made from the proper *complementary* principles of Board composition. A Controller of Merchant Shipbuilding and Repair was appointed, with powers that rivalled and interests that sometimes directly opposed those of the Controller of the Navy. Much of his duty was owed to another department of State altogether. But the only really logical alternative, if the Admiralty was to control all shipbuilding, would have been a resumption by the Admiralty of the Lord Admiral's earlier jurisdiction over 'all maritime affairs' making the Minister of Shipping, in place of his chief supply officer, a Lord Commissioner; and that, of course, was hardly practical politics at the time.

At least in passing we should note one typical example of the working of the Board system as reflected, in the Admiralty, in the organisation of the secretariat. Contrary to the practice in certain other departments of State, here civil servants of the administrative grades were never placed under the discipline of any other authority than the Secretary's, but remained members of the Secretary's department always, reporting through their own hierarchy. Thus we have seen how the Secretary's department tended to become a shadow, as it were, of the Admiralty as a whole (a shadow reproducing its outlines without aping its substance) with branches adumbrating administratively almost every phase of Admiralty responsibility. This consummation was a direct product of the doctrine of Board superintendence; for that allowed secretariat *work* to come under the ultimate control of the appropriate member of the Board without any need to disturb the secretariat *staff's* professional chain of allegiance to the Secretary himself and to his lieutenants.

Further, we discern no slight break or kink in the direct flow of personal authority from the Secretary to the officers under him such as (we are about to be reminded) is normally found between a Lord Commissioner and the directors within his superintendence. No

secretariat branch is a formally chartered sub-authority as an Admiralty department is. Hence, perhaps, arises the well-known doctrine that constitutionally any officer of the secretariat may act for the Secretary; for indeed, possessing no other source of authority, that is the only way in which he *can* act.¹

Secondly, we have seen that a nice distinction is drawn between responsibility for policy—a prerogative of the Board, of course—and technical and executive responsibility, the several prerogative of the several directors.² Wherever such differences in kind of authority exist, though one is superior, they are of particular importance when a post ranking between them is to be considered. It has to be decided early and clearly to which kind, the upper or the nether authority, the new post is to conform; for that is the authority it will tend to relieve of responsibility. With the war-time expansion of the Admiralty organisation such intermediate posts—something above the directors, but below the Board—became necessary for the first time. In the constant changes and flux of war it is not always easy in practice, it is true, to draw a definite line between ‘policy’ and ‘execution’; in particular, it is virtually impossible to keep any but the highest levels of all constantly in the strategic picture. Nevertheless, it seems to the present writer perhaps the least satisfactory story appearing in this record, this story of how the question was never clearly enough asked—or at least, was not clearly and consistently answered: are these new posts to be tuned to the key of departmental direction or to the key of Board superintendence? For from that decision their practice must derive, whether they were to overrule in departmental matters the directors below them, or to partake of a portion of pure Board authority descending from their Lordships above. Without any such clear decision at all they could, of course, do neither properly.

Thirdly, the present writer has suggested that we can best understand the remarkable variety and flexibility in function, in organisation and in staffing displayed by the departments, old and young, if we regard it as erected from two simple elements: from a series of foci of executive responsibility related to, but not necessarily co-terminous with, a series of technical or professional or semi-professional ‘guilds’, Service and civilian. In a way these ‘guilds’ reflected the structure of the Navy itself where specialist officers divided between them, facet by facet, the practice of the naval art.

Usually the more notably composite departments were under naval direction; the highest posts in them, therefore, were not open to

¹ In this context, of course, ‘action’ is to be distinguished from his function of ‘advice’ to his superiors and to the Secretary himself.

² In this we can perhaps pursue the analogy between Board and Cabinet a little further: for at least in some respects this distinction even approaches the relations between a minister and the directing body of a nationalised industry (the Navy, indeed, is surely the prototype of all nationalisation).

members of the civilian guilds. But the system provided compensation for this apparent inferiority. Typically each guild or corporation had its own parent department, its Zion, where a specific parcel of executive responsibility resided in the director, and the director was also, distinctly, the guild's professional head. Thus an officer might be posted away to one of the composite departments for a time; his work would then be controlled by the alien director, but his career would usually remain in the hands of his own professional chief and in due course he himself would return to the fold. Conversely, the controlling element in any department would be drawn from the guild considered most important to the work—that might well be the 'user', the naval officer himself; but any other guild might also be drawn on for any particular skills required. In this way it was possible to supplement the broad divisions of work between the departments with many of those nice gradations of specialism that the nature of the work so often called for.

In wartime one notable exception was apparent to the general principle that each guild of any importance enjoyed the advantages of its own professional head. In peacetime the Electrical Engineering Department had been the only department to recruit its staff at all widely from men with previous inside experience of private industry. In other departments, such 'progressing' as there might be was left in those days to technical inspectors who understood the product but who were unlikely themselves ever to have worked as the servants of a private firm. Under war-time conditions, however, most of the departments found it necessary to recruit staff with precisely this type of experience—men who understood production rather than products. Taking the Admiralty as a whole, there were soon large numbers of them and they had an important part to play. But right down to the end of the war these 'production' or 'progress' officers were given no focus or professional head of their own; they remained scattered and isolated, and professionally voiceless, as the scientists had been scattered and isolated before the formation under their own director of the scientific and technical pools.

The *fourth*—perhaps the greatest and certainly the most all-pervading of these four principles of Admiralty organisation—is the doctrine of 'user-control'. Never must production be allowed its head; the customer's hand on the bridle must be firm and the customer's eye must be sleepless. Few things about the Admiralty have so exasperated and so bewildered the outside critic: here is a man (they say), in this age of excellent utility reach-me-downs, who not only orders his suit bespoke but holds the cutter's elbow as he plies his shears and dictates to the seamstress the number of stitches that must go to an inch of seam—he could have a whole trousseau of ready-mades for the price his constant interference has added to that

one suit! Yet to the sailor it is axiomatic; and indeed it derives logically enough from that fundamental of British naval thinking, that the seaman matters more than the ship. The suit must be tailored to fit the man—or the man will have to be tailored to fit the suit. The doctrine makes itself felt at every level and all the time. It is the basis, of course, of naval insistence that never must the Admiralty be divided, nor the Board as a whole relinquish its direct and intimate control of production. Again: that the Controller of the Navy himself must be a sailor fresh from the sea, not a technician or an industrialist. Again: that generally a sailor who knows other sailors makes a better departmental director than a landsman who merely knows his job; but where there are reasons for keeping a department purely civilian, then other means must be found of ensuring naval control. The Director of Naval Construction, for example, is a civilian; but his sketch designs are scrutinised by the naval staff and the Sea Lords, the Director of Naval Equipment (an admiral) stands at his elbow while the ship is building, the 'Admiral Superintendent of Contract-built Ships' must pass her for service when she is done. Likewise the Director of Armament Supply is a civilian, but requirements are strictly laid down by the naval staff and the Chief Inspector of Naval Ordnance, who must pass his work, is a naval officer. Indeed there is hardly an aspect of Admiralty work that this doctrine of the unity of the Navy and the production undertaken for it does not colour; and the present writer has constantly felt in trying to describe the supply side of the Admiralty *alone*, that he is playing Hamlet without the Prince of Denmark, or painting a portrait of half a face.

In the war-time Admiralty there were two notable and momentous departures from this cardinal Admiralty principle. The first was assumption by the Admiralty of the production and maintenance of merchant ships which it did not 'use'. This was certainly a departure made with eyes open: the only alternative considered—division of control of the shipyards between two departments of State—had been tried and had not worked. By contrast, Admiralty control of merchant shipbuilding on behalf of another 'user' was somehow made to work. But the anomaly remained, and anomaly breeds anomaly, and it was this first breach of principle which directly gave rise to the anomaly in Board composition of two rival Controllers. Yet the clash of interest between them—that schizophrenic rift, as it has been called earlier, in the personality of the Lord Admiral—was surely illusory rather than real. For if the business of navies is the control of sea communications (perhaps a

¹ This point seems first to have been made clearly by Sir Julian Corbett in 1911. See that author's *Some Principles of Maritime Strategy* (Longmans, Green & Company, 1911), p. 90 and elsewhere.

more accurate phrase than 'command of the seas'),¹ defending our own, that is, and inhibiting the enemy's, to talk of a clash of interest between the instrument of control and the friendly half of the very stuff of the thing controlled surely savours of the absurd. In short, it was the figment of an arbitrary organisational pattern which alone gave the problem the practical reality it unfortunately had.

The second departure, of course, was no temporary war-time expedient but an inheritance. When, in 1937, the administration of the Fleet Air Arm had been returned to the Admiralty by the Inskip award, the Air Ministry had not resigned any part of its functions for the design, development and manufacture of naval aircraft. In due course these passed to its offshoot, the Ministry of Aircraft Production—a step which must have seemed as necessary as the assumption by the Admiralty of merchant shipbuilding had been. But it can hardly be claimed that war-time experience of this arrangement brought much nearer in sight any clear solution of the whole devilish and hoary problem of air-sea relations. Perhaps here too part at least of the difficulty lay in a similarity—almost an identity—of strategic purpose, overlaid by a misleading institutional pattern. In strategic philosophy the Air Force and the Navy must be regarded as a closely coupled pair; for both are principally engaged in attacking and defending communications and bases, rather than in the occupation of territory—a function of the Army. In short, these two Services were fighting what was essentially the same kind of war; but it was not only their principal weapons which differed—their chains of command, their administration, their traditional channels of loyalty and their paths of ambition were separate right to the top. No wonder, then, that boundary disputes and frontier incidents were rather commoner between Navy and Air Force, where no natural frontier existed, than between either of them and the Army, where the cleavage was no artificially drawn line, but a chasm; a fundamental difference of purpose, a different job to do.

PART III

Administration of Departments:
Ministry of Supply

CHAPTER X

THE ORGANISATION OF THE MINISTRY OF SUPPLY: 1939-45

(i)

Introductory

WE HAVE ALREADY traced, in an earlier chapter, the long road which led to the setting up, on the 1st August 1939, of the Ministry of Supply. When we approach the war-time history of the organisation and administration of that department we find that we must face some of the difficulties over again. The planners faced the hypothetical question: what should a Ministry of Supply do? The historian faces a question which is simpler but by no means altogether simple: what did the Ministry of Supply do? By comparison with this question the answers to the same question about the Admiralty (as we have seen) and about the Ministry of Aircraft Production (as we shall see) are fairly simple. The Ministry of Supply, in the shape in which it actually came into being, occupied a space in the Government organisation for which quite a number of different shapes had been contemplated. There had been for example the shape of two complementary ministries, of supply and of materials resources, dealing respectively with the production of finished stores and the control and supply of essential raw materials. The broad design of the new department provided for both these functions. Accordingly the organisation comprised at the first two distinct although closely associated sides, which corresponded to the two separate departments which had once been proposed.

We shall not, in this volume, enter exhaustively into the side of the organisation which the Ministry of Supply set up for the control of raw materials. This subject is fully studied elsewhere,¹ and although references to it will be made here, they will be incidental, and designed to throw light on our own main theme. It will be sufficient at this point to note that powers were given to the Ministry of Supply by Defence Regulations² to make orders controlling the acquisition, disposal and manufacture of, and the prices charged for, raw materials.

¹ See J. Hurstfield: *The Control of Raw Materials* in this series (H.M.S.O. 1953).

² S.R. and O. 1939, No. 927.

For our purposes, therefore, we look upon the Ministry of Supply as a department responsible for the production of finished stores, and it is necessary, before examining in detail the organisation which was brought into being for the purpose, to define somewhat more closely what was meant by this exceedingly comprehensive term. The Ministry of Supply Act of 13th July 1939 was so framed as to enable the Minister to assume and to discharge such responsibilities for the supply of stores as might be assigned to him by Order in Council. In the same month an Order in Council¹ transferred to the Minister the powers and duties, first, of the Secretary of State for War in relation to the supply of all munitions of war; and secondly of five specified Government departments in relation to the supply of such articles as might be agreed between those departments and the Minister. In 1942 a regulation made under the Emergency Powers (Defence) Act extended the powers of the Minister of Supply to cover articles required by any Government department for the discharge of its functions. In practice this meant that the Ministry was responsible from the first for all munitions stores demanded by the War Office, the term munition being used in its broadest sense to include such things as clothing and general stores, mechanical transport vehicles, War Department vessels, railway stores and Royal Engineer works stores, and it soon became responsible for an immense variety of other items which were called for by the War Office and other departments.

Amongst the most important responsibilities assumed by the Ministry of Supply for all three Services was the manufacture of ammunition and the manufacture and filling of shells and bombs. The manufacture of shell bodies and cartridges and their components was not a problem which had ever presented serious anxiety; private industry would be drawn in, and where new capacity had to be created it presented no special problems of the siting or construction of factories. The great problem was that of the filling factories; on the eve of rearmament filling capacity was in effect restricted to Woolwich Arsenal. Progress in creating new capacity was slow, and although by the time war broke out the Ministry of Supply was able to report that equipment was available for eighteen to twenty of the thirty-two divisions scheduled for completion in 1940, when in the winter of 1939-40 the Military Requirements Committee of the War Cabinet surveyed the equipment of the B.E.F. in France, ammunition generally was one of the most serious deficiencies. To make good these deficiencies and build up an organisation for the supply of all three Services in this field was perhaps the biggest inter-Service task

¹ The Ministry of Supply Transfer of Powers No. 1 Order 1939, S.R. and O. 1939, No. 877. See also Cmd 6034.

of the new department. Also important from the outset among its inter-Service activities were general stores, initially important in the form of clothing and personal equipment, later presenting problems in the provision of packaging and containers, especially during 1942 and 1943, when something like a crisis arose over the supply in vast numbers of the jerrican petrol container.

Among similar responsibilities which were added at a later date were medical supplies. Before the war, there was no co-ordination of the supply of medical necessities, even although the extent of Britain's reliance upon imports was a source of anxiety. Competitive stockpiling by the Service departments, other Government agencies and local authorities eventually made the need for co-ordination imperative, and in April 1940 the Ministry of Supply took over the responsibility for planning the output of surgical dressings. Further steps led, after some delay, to the setting up of a separate directorate in the Ministry of Supply to assume responsibility for drug supplies.

The nature of the responsibility which the Ministry acquired by agreement was not the same in every case. The War Office had been responsible, by virtue of being the largest user, for providing on an agency basis large quantities of stores for other departments both civil and defence, and also for the dominions and colonies. To this extent the responsibility for supplying 'common user' stores was inherited by the Ministry of Supply as part of the transfer of War Office functions; but a general tendency developed among departments to invite the Ministry to extend its activities into new fields. This grew to an extent which made it necessary in February 1943 to warn all directors general of production within the department that fresh responsibilities should not be accepted without a central consideration of the effect they would have on the allocation of labour and of materials allowed to the Ministry.

As to 'common user' stores there was, first, the central provision of the requirements of all or most user departments. This applied, for example, to many types of small arms, all small arms ammunition, all mechanical transport, anti-tank equipment, steel helmets, textile barrack stores and many types of clothing. Secondly, there was the co-ordination of supply and demand for products which in the main were not bought directly by the departments but nevertheless were essential to them. Examples of this class of product were ball-bearings, and tools, electric cables, cranes, and woollen and cotton textiles. Thirdly, the Ministry of Supply was responsible for sponsoring the requirements of certain industries for labour or materials. Examples in this class were laboratory equipment, precision chain, chain wheel and allied production.

One common-service organisation deserves special and separate mention. This was the Machine Tool Control, which was originally

a part of the munitions production division of the department and remained attached to that division for the purposes of administration, even when, at a later stage of the war, it became responsible to the Ministry of Production on questions of policy relating to supply.

The area of industry with which the Ministry of Supply was concerned thus became very wide. Inheriting the experience gained from the period of pre-war preparation, which included not only planning but a considerable building up of production capacity and of reserve stocks by the War Office before the fray, the new department came to be involved in comprehensive dealings with a field which included the engineering, chemical, textile and clothing industries and most of the principal basic trades. In the case of many trades it exercised full control, either formally, as in the case of iron and steel, or on the basis of planning as in the cable trade, or by virtue of the fact that its purchases covered the whole or most of the product, as in the case of the motor trade. Further, for most of these areas of productive activity the Ministry became the parent department for labour supply, for the allocation of materials, for the provision of plant, for the sponsoring of building projects and for the detailed allocation of manufacturing capacity. To a varying extent the trades looked to the Ministry for guidance on most of their general problems, including in many cases price levels as well as production; while as a result of its sponsoring function the Ministry was concerned with the practical application of general policy to the location of war-time expansion capacity and to the provision of new capacity.

The initial structure of the Ministry of Supply had been carefully planned by the Permanent Secretary designate, Sir Arthur Robinson, who brought to the task great experience and authority derived from having been chairman of the Supply Board, and by colleagues and assistants who, like the Permanent Secretary himself, had watched development in the concept of the new department over a long period. The basic plan of the new Ministry was simple enough. It provided for the creation of a number of 'blocks' consisting, on the one hand, of large production divisions each of which would be self-contained as far as possible, in order to meet any call for dispersal; and, on the other hand, of a secretariat in which a number of general services, such as Parliamentary and establishment duties, would be centralised; while other common services, such as finance, would be operated, on behalf of the Secretary, principally through detached sections appended to the production divisions. The intention was that each production division (under the control of a director general) should be a unit covering, for a group of products, all the functions involved in supply from the receipt of a demand to the delivery of the finished and inspected store—that is to say, design, development,

production planning, provision of the necessary production facilities, ordering, 'progressing', inspection and deliveries. The common-service section attached to the production divisions would include finance, contracts, research and statistics.

This interesting and novel scheme was planned on the assumption that the new Ministry would start its career in a modest way with functions confined in the main to army supply, although wider fields of supply might follow. The method of providing the common services would make it relatively simple to deal with expansion by adding other production divisions; and much, as will be seen, of this original conception took shape and survived through the many changes which were made later in the shape of the department. If the plan lost its clear-cut outline this was due at least partly to physical causes associated with rapid expansion and dispersal. The difficulty of providing suitable accommodation to allow people with common interests to be alongside one another also proved, in circumstances of great stress, to be a very serious handicap to carrying out these early plans.

To understand some of the other causes which operated to shape the organisation of the new department, it is necessary to look once again at the production situation when it came into being in 1939. It will be recalled that the Army Deficiency Programme, which had started to take effective shape in 1936, was based initially on a three-year programme of strictly limited scope. It was expanded in the early months of 1939, but in its final form it had still provided only for equipment, reserve and war potential capacity for six Regular and ten Territorial Army divisions, training equipment for a further sixteen Territorial Field Army divisions, such war potential as must be created before the outbreak of hostilities, and equipment for the air defence of Great Britain. The Ministry had existed only for a month when the outbreak of war changed the whole picture. In the third week of September the first Minister of Supply, Mr Leslie Burgin, was authorised by the War Cabinet to initiate the necessary plans for the supply of fifty-five Army divisions within the period of two years. This task involved not only the erection of factories and the provision of materials, but also the collection of the necessary labour force and the procurement of machine tools on a vast scale. The new Ministry was confronted at once with a Herculean task and the need for rapid action.

The translation of plans into an organisational reality was undertaken during the 1939 crisis, and went on into the succeeding months when Germany was demonstrating in Poland what the lack of modern arms might mean to a victim of Nazi aggression. As it worked out, the Minister was provided, when his department was set up, with three lieutenants, that is to say three senior officers who

were directly responsible to him. The first of these was, of course, the Permanent Secretary. The second was the Director General of Munitions Production. The third was the Director General of Equipment and Stores. To the office of the Permanent Secretary we shall return later, since the position and function of the chief administrative civil servant in each of the departments which we are studying is a subject of special interest calling for separate attention. The Director General of Munitions Production had come over from the War Office with his department. We have already traced the development of this office, and seen that the directorate general, created in 1936, had in 1938 absorbed the ancient office of Master General of the Ordnance. For the two years before the war, therefore, the holder had been responsible for clothing and general stores as well as for the so-called 'warlike' stores to which the title of the office referred. His responsibilities for clothing and general stores were however much less far-reaching than his responsibilities for warlike stores. In the case of the latter he was responsible for all stages of supply, including research, development, planning, production, inspection and the placing of orders; in the case of the former he was responsible only for demand, inspection and receipt, and not for the intermediate stages of planning and ordering. In the new department therefore, the duties were split, and thus there came into being the third of the three offices which have already been referred to, that of the Director General of Equipment and Stores. Sir Frederick Marquis, later Lord Woolton, was invited to fill this post, and the great efforts that were made during the months immediately before the outbreak of war avoided the severe psychological setback—to put it no higher—that would have been caused by a big shortage of uniforms for service recruits. Even so an exceedingly heavy burden was still left upon the shoulders of the Director General of Munitions Production and on the outbreak of war two further directors general of production were appointed, each of them taking over a particular field of responsibility from the Director General of Munitions Production. The first covered explosives and chemicals, the second tanks and transport. The addition of a Director General of Finance, a Senior Military Adviser, a second secretary with the title of Director General of Raw Materials, and of a Chairman of Raw Materials Controllers, completed the top level of the hierarchy.

The four directors general of production, together with the Director General of Finance, Chairman of the Committee of Controllers, Senior Military Adviser, and the Parliamentary Secretary, constituted the Supply Council, which was set up in the month following the foundation of the department itself. To the Supply Council, the titular ruling body of the department, we shall return; it calls for, and will receive, separate treatment.

(ii)

The Main Developments: 1939-45

So the Ministry of Supply was launched. To anyone who was not familiar with its origins and pre-history its functions seem a rather haphazard assortment; certainly its organisation was experimental. Many different forecasts were made about its development; few expected it to be regular, straightforward, and free from surprises. Yet in fact the original conception weathered the storms of war with remarkable buoyancy, as may be seen from a quick survey of the main happenings of the war years. Even a rapid turnover of ministers and permanent secretaries in the earlier part of the war—the department had three of each before the end of 1940—did not disturb the steady march of expansion, both in scale of effort and range of function, which was the most normal and natural of war-time developments.

Thus in 1940 new director general posts were created for ordnance factories and for programmes (the latter being filled by Sir Walter Layton), while in September a second post of parliamentary secretary was added. The next year, 1941, saw the process of expansion carried much further. In June the head of the Machine Tool Control was raised to the rank of controller general, and in July the advent of Lord Beaverbrook and the retirement of Lord Weir, who had played an important part in the affairs of the department up to that date, brought further changes and new appointments at the highest departmental level. Two were of outstanding and permanent importance. The first unified and centralised responsibility for production in the hands of a controller general who was in fact the Director General of Munitions Production, Admiral Sir Harold Brown, with his status raised and his sphere extended.¹ By the second research and development² were separated from production and made the responsibility of a second controller general. Wheeled vehicles and engineer and signal stores were broken away from tanks and became the responsibility of a new director general. Indeed, as the Air Ministry had proliferated directors in 1938, so now in 1941 did the Ministry of Supply proliferate directors general. Eight further new posts at this level were created, with responsibility for weapons and instruments; ammunition production; tank supply; tank design and development; filling factories; production services

¹ See p. 27.

² Research and development will receive separate treatment. See Chapter XIII.

(such as heating and electricity); supply services (such as transportation); and the regional organisation.

Thus by the spring of 1942 the range and complexity of the department's task had produced a vast machine.¹ On the raw materials side the number of controls was twenty-three, and the work at headquarters included the co-ordination of general policy over a field which ran from iron and steel to paper and silk. On the production side the Controller General was already responsible for ten directorates general; these comprised some forty directorates or their equivalents. There were in addition twelve controllers in the regions. Responsible to the Director General of Ordnance Factories, the array of ordnance factories, some of great size, already numbered twenty-two engineering, eight explosive, and ten filling factories. Outside the production divisions, but closely concerned with their work, the Director General of Supply Services had five controllers responsible to him, while the Controller General of Machine Tools had two controllers and seven directors. The Controller General of Research and Development had four departments for the general run of work and three which dealt with special subjects, such as rockets. There were almost a score of establishments dealing with one field or another of research or development. The contracts division was placing orders at the rate of some 80,000 a year, and the finance directorates, apart from their central duties such as estimates, forecasts, banking and exchange, were paying the bills of an army of contractors, dealing with loans and capital assistance to firms on a very large scale.

In 1942 the main structure of the organisation took what was more or less its final shape. The most important event of the year in production organisation was the founding of the office of the Minister of Production in February. This had of course a profound effect on many aspects of the functions and organisation of the Ministry of Supply. In the high-level organisation it meant the departure to the new office of the three of the senior administrators who had been concerned with raw materials; the adjustments that followed are described later.² In February Sir Andrew Duncan returned for his second spell as minister, Sir Walter Layton retired, and a new permanent secretary, Sir William Douglas, destined to remain for the duration of the war, was appointed. At this time also the post of second secretary (supply) was created and filled by promoting Mr, later Sir George, Turner, who had at that time the post of under secretary (general) and who, both because of the key post which he had occupied under Admiral Sir Harold Brown, and the lack of

¹ A table of non-industrial civilian staff employed in the Ministry of Supply is given as Appendix VA.

² Part V, Chapter XX.

continuity in the office of permanent secretary, had played and continued to play a part in the affairs of the department not usually given to a member of the secretariat other than the permanent secretary himself. In June Admiral Sir Harold Brown, who as Controller General of Munitions Production had also played a leading part in the affairs of the department since its foundation, was appointed to a new advisory post of senior supply officer; his old office of controller general was however kept in being. This process of bifurcation of authority went on at all levels and in all fields of responsibility. Thus ammunition production was split between two directors general, one looking after gun ammunition and the other after small arms ammunition. Again, in September, an armoured fighting vehicle division was created and put in the charge of a chairman (as he was, rather unusually, termed) with responsibility for the work of the two directors general who operated in this sphere.

In the field of armoured fighting vehicles the story was the same, but the frequent and complex changes that were made here call for rather more prolonged scrutiny. For amongst all the problems which belonged to the central and basic activity of the Ministry of Supply, the problem of the development and production of tanks was the most formidable and the most stubborn, and no part of it was more formidable and stubborn than that of providing the best organisation at headquarters. Even before Mr Churchill formed his Government in May 1940, it had been agreed to appoint a Tank Board, and the board which had been appointed in that month was in effect a committee of enquiry. Evidence which was put before it by the Director General of Tanks and Transport of the Ministry of Supply suggested a melancholy and indeed alarming state of affairs, in which the sins of omission—adding up to a general failure to appreciate the nature and possibilities of tank warfare—were much more prominent than the sins of commission. The proposals which the Tank Board made amounted to a rationalisation of the whole business of planning, demanding, and organising output.

A new post, that of Director of Armoured Fighting Vehicles, was created, and civilian directors of production and design were appointed shortly after. The Tank Board itself remained in being, and at its first meeting upon its new basis as a permanent board, consisted of independent members from both sides of industry, an 'outside' industrialist as chairman, and representatives from the Ministry of Supply and War Office. Although the Tank Board met frequently, and got through a good deal of work in its early meetings—for instance, it examined in detail the specification of the new infantry Mk IV tank—it was not until January 1941 that it acquired executive powers. At this time it was reconstituted as a strong policy-making body, still however upon the same basis of independent members

together with representatives of the two interested departments. From this stage onwards the Tank Board, with very wide terms of reference, became the focal point of all policy decisions about the production and the design of armoured fighting vehicles.

Meanwhile, within the Ministry of Supply, a directorate of tank production was formed when the first Director General of Tanks and Transport was appointed in the summer of 1940, and was divided into four main branches, dealing with progress, production and capacity and armoured policy. Design was divorced from production in July 1941, when three directorates—for the supply and delivery of materials, tank erection and component supplies—were formed under the Director General of Tank Supply. Finally, in September 1942 a Director General of Fighting Vehicle Production was created under the Chairman of the Armoured Fighting Vehicle Division.

The process of subdividing tasks and creating new posts continued during 1943, but at a rather slower rate, and by the end of the year it was becoming clear that the Ministry of Supply was reaching a state of maturity. By the middle of the year the last two new posts of directors general—for artillery and scientific research—had been brought into being by upgrading existing appointments, and this was partly balanced, at the end of the year, by combining the two directors general in charge of armoured fighting vehicles into one. This step foreshadowed the eventual contraction of the department to its peace-time size, but the shadow was still, at the end of 1943, a long one. It was not until the end of the following year that the Ministry began to reflect in its organisation the beginnings of a 'running down' in production.¹ The summer of the year 1944 may thus be taken as the period when the organisation of the Ministry was operating in its most elaborate and mature form. At this time it consisted of, on the administrative side, the Permanent Secretary, two second secretaries, the Director General of Finance, the Deputy Secretary and an official with the title of Senior Economy Officer.² On the production side there was a tier of five senior officers—the Senior Supply Officer, the Controller General of Munitions Production, the Chairman of the Armoured Fighting Vehicle Division, the Chairman of the Ammunition Board, the Director General of Raw Materials and the Senior Military Adviser. Immediately below this level, on the production side, came fifteen directors general.

Enough has been said in outlining the principal developments which occurred in the formal organisation of the department during the war to demonstrate the truth of the suggestion which has already been made, that this development, if not altogether smooth or free

¹ See Appendix VA.

² This senior administrative staff, it may be noted, covered the work of the entire department, including raw materials, with which we are not here concerned.

from surprises, was at any rate not wildly divergent from the expectations of those who, in the inter-war years, had formed the plans for a Ministry of Supply. It developed as any long-established department, with its powers and responsibilities clearly defined through decades of experience, might have been expected to develop in conditions of 'total' war. The main adjustments which it was called upon to make were *vis-à-vis* the Minister of Production when that office was created. The main points of interest lay not in any dramatic changes which took place in the external shape of the department as a whole, but in its internal organisation, where some matters of considerable historical interest arose. We have already touched upon the tank side of this development. Amongst other matters there figures the place in the affairs of the department which was occupied by the secretariat.

(iii)

The Place of the Secretariat

On the foundation of the Ministry of Supply, and throughout its history, administrative civil servants, among the advisers of the Minister, occupied a place of the highest and most extensive authority. For a number of reasons this was a remarkable circumstance. The organisation of the Ministry of Supply, as we have seen, drew heavily upon that of the War Office, and the administrative structure of the Service departments, depending as it does on a statutory council, does not provide the chief administrative civil servant in these departments with the same dominating position as he occupies in the civil departments. The authority of the first Permanent Secretary in the Ministry of Supply, Sir Arthur Robinson, was however such that when the Supply Council was instituted it was he, and not the Parliamentary Secretary, who became its deputy chairman. The special experience Sir Arthur had acquired by having been permanent chairman of the Supply Board was a considerable factor in the early history of the Ministry of Supply.

From the beginning the Permanent Secretary was not only the Minister's principal adviser, but also in direct control of a major element in the department's work. It goes without saying that he was responsible for finance and establishment; and also of legal and parliamentary business. This field was the direct responsibility of the Deputy Secretary, an office which originally involved the control of two small 'general' divisions and four establishment divisions and also of the Director General of Finance, who was responsible for financing contracts. The Director General of Raw Materials, as has been noted, was an administrative civil servant with the rank of

Second Secretary, and he was responsible to the Permanent Secretary for three directorates. Finally, but not least important, there was the Production Secretariat. If we are to understand the part played by the administrators in the Ministry of Supply we shall have to consider the development of all these aspects of what, in Civil Service terminology, would be called the Permanent Secretary's charge. If, in doing so, we start at the centre and work outwards, that is to say start at those duties which in every department are the inalienable and primary responsibility of administrative civil servants, and proceed to consider others which might be allocated to other classes of people, we shall begin with finance, contracts and establishments and proceed to raw materials.

It was, as has been said, through the Deputy Secretary that the Permanent Secretary maintained his supervision over establishments and common services such as the machinery for answering parliamentary questions, registry, and so forth. This was the basis of a charge which underwent a good deal of development with the passage of time. Legal work and public relations were soon added to it; and in May 1940 provision was made for 'the numerous labour questions which are now arising'. By the autumn of the same year these questions had become even more numerous and a second principal assistant secretary was appointed to deal with them. The next major development was a reversal of the general trend of expansion and upgrading, since in May 1941 the office of Deputy Secretary was allowed to lapse and control of the functions allotted to the Deputy Secretary was turned over to an under secretary.

It was not until the end of 1942 that the post of Deputy Secretary was revived. The new Deputy Secretary assumed responsibility for the 'general' secretariat branches and for establishments and had in addition responsibility for an element of departmental activity which was beginning to acquire some importance—organisation and methods. This core of non-financial business continued unchanged under the Deputy Secretary until the end of the war. Organisationally it was composed of two branches under a principal assistant secretary, dealing with land and legal business; the Establishments Division organised into three large branches under the Director of Establishments; an Organisation and Methods Division; the Directorate of Public Relations; the Security Branch; the Directorate of Passive Air Defence; and the Directorate of Technical Administration.

The other great responsibility of the Permanent Secretary was of course finance. This was a separate charge, and the Director General of Finance, Mr Ashley-Cooper,¹ was directly responsible to the

¹ Mr (later Sir) Patrick Ashley-Cooper, Governor of the Hudson's Bay Co. This appointment from the business world to a high position on the finance side of the department was something of an innovation, and reflected the desire for business experience in a department which was to have extensive dealings with industry.

Permanent Secretary for both finance and contracts. Considered from the point of view of the organisation of the department as a whole, the most striking feature of these two divisions was their almost complete separation from the raw materials side of the Ministry. Nowhere, in fact, was the independence of the raw materials side from the rest of the department more clearly demonstrated. So far as concerns contract work, the Raw Materials Department was buying, selling and operating its commodities and markets quite distinct from those with which the Contracts Division was concerned, and it conducted its own business arrangements.

The Contracts Division (which was finally organised in a secretariat branch and twenty-six executive branches) was an expansion of that part—the larger part—of the army contracts directorate which was transferred from the War Office in August 1939. In the War Office this directorate had been responsible to the Director General of Munitions Production. In the Ministry of Supply it became responsible through the Director General of Finance to the Permanent Secretary. Apart from a natural expansion resulting from the vast increase in the volume of business, there was no notable change in the shape of the organisation during the war other than the segregation of a secretariat section for the better co-ordination of questions such as contracts procedure and conditions and for work connected with the interdepartmental Contracts Co-ordinating Committee. From February 1943 to January 1944 the head of the division held the rank of under secretary. In April 1945 it was reorganised under a principal director of contracts, four directors of contracts and seven deputy directors. There was a Contracts Board consisting of a principal director and his four directors, with a secretary who was in charge of the secretariat branch.

The arrangements for finance in the Ministry of Supply, like other elements in the organisation of the department, long bore the mark both of their War Office origin, and of the attempt which had been made at the foundation of the new department to arrange it in self-contained units. The purely 'finance' element in the Finance Division remained surprisingly small; it was the accounts directorate, and also the Costing of Contracts Branch which came over to finance in 1943, which developed into a really large machine. Up to February 1943 the division as a whole was organised under three directors (general, production and commercial) and a director of accounts. From that date onwards there was an under secretary of finance in charge of the two directors of finance (production and commercial), the Director of Accounts and a central finance branch. From an administrative point of view the outstanding feature of the Production Finance Directorate was its distribution in branches which dealt exclusively with the financial business of

directors general of production and worked in close association with the appropriate production directorates. There were four such branches, dealing with munitions, tanks and transport, explosives, and equipment of stores. It is here that we may see the mark of the original plan of the organisation, for the division is that of the four original directors general of production. In fact, however, as the department grew, the four branches divided the financial business of all the director general divisions between them, with the exception of the Armoured Fighting Division and the Directorate General of Mechanical Equipment where the Director of Finance (Production) was represented by administrative officers 'bedded out' from the production secretariat, who acted in a dual capacity, financial as well as secretarial. These branches were responsible for the control of production expenditure, including capital assistance schemes, and for deciding the principles on which financial action should proceed in particular cases. In one case, and one case only, production finance was concerned in price fixing. This was a system for fixing the prices of machine tools—a system unique in the field of price-fixing arrangements, which was operated by Machine Tools Finance in conjunction with Machine Tool Control.

The Directorate of Commercial Finance had no precedent in the War Office. It was a specialist body manned by officials, many of whom were temporary civil servants, who had been trained in the City and were familiar with company finance, and it represented the response of the Ministry of Supply to the war-time need of overcoming the financial difficulties of firms whose continued operation was essential to the activities of the department. It concerned itself in particular with the working capital problems of contractors, financial assistance in the case of air raid damage to contractors' works and compulsory dispersal schemes, and the financial aspect of schemes for the departmental control of a particular undertaking. It handled all questions of loans made by the Ministry, other than those made by the Raw Materials Department.

The Directorate of Finance (General)—later known as the Central Finance Branch—exercised a co-ordinating function in questions of common financial policy; was the channel for the submission of memoranda to the Treasury Inter-Services Committee, and handled all such general matters as foreign exchange, banking, insurance, and cash losses. It collated estimates, forecast expenditure and dealt centrally with the briefing of the Accounting Officer for the Public Accounts Committee. It also had certain specific functions, of which examples are the finance of salvage, hostels and publicity, and financial relationships with the Ministry's overseas organisations such as the British Supply Mission in North America and the Eastern Group Supply Council. The co-ordinating function of central finance

was well illustrated when it was decided as early as the spring of 1943 to make preliminary arrangements for the end of hostilities. The problems which would arise at the end of the war in the fields of finance and contracts were considered by a standing committee, under the chairmanship of the Under Secretary of Finance, composed of finance and contracts directors and attended by the Director of Finance (Raw Materials). We may also see, in one of the activities of the Central Finance Branch, how responsibility for the expenditure of public money—however different might be the scale and the methods employed in wartime—maintained finance near the centre of affairs. This branch was the means of liaison between the Ministry of Supply and the Select Committee on National Expenditure, and from the early months of the war provided written answers, memoranda, or the attendance of witnesses to deal with questions on almost every phase of departmental activities. Since this task continued throughout the war the branch became the repository of a comprehensive synopsis of every element in the work of the Ministry of Supply viewed from the angle of economical administration.

It has already been said that the Directorate of Accounts grew from a small beginning to be a very large organisation. The nature of the work—cash accounting, payment of bills and wages and audit—did not vary greatly and need not be dwelt upon. In April 1945 the Director was supported by two deputy directors and four chief accountants with twenty-one assistant chief accountants in charge of forty-three sections. The other element in finance whose growth was somewhat out of proportion to the growth of the rest of the organisation was that of costing. The costing responsibility was transferred to the Director General of Finance and Contracts Division in February 1943. It was organised under a director and a deputy, with four assistant directors of cost investigation, and it worked in liaison with the other departments. The Principal Controller was also in charge of a Controller of Raw Materials Accountancy and a Controller of Ordnance and Agency Factory Audits.

So much for the heart and centre of the Permanent Secretary's responsibilities—establishments and finance. There was however another area in which his part was less specialised, an area in which he operated as the lieutenant of the Minister rather than as the commissioner of the Treasury. In this sphere his authority was largely wielded through the Second Secretary (Supply), Mr G. W. (later Sir George) Turner. When the Director General of Munitions Production came over to the new department from the War Office in August 1939 he brought with him a civil assistant together with a small body of civil servants who at that date formed something in the nature of a personal staff for the Director General. This small body

was destined to undergo very important developments, which will be dealt with in some detail later on.¹ By March 1942 it was officially described as the Production Secretariat. Originally this group comprised the Munitions Production Central Branch and a new secretariat branch to handle departmental priority work, orders placed overseas, the Anglo-French Mission and the Purchasing Missions in Canada and the United States. In February 1941 correspondence with the Eastern Group Supply Council was added. Meanwhile the Director General had urged since the first weeks of the war that the department would need a strong branch to deal not only with the day-to-day business of appeals for the retention of key workers and releases for the Forces, but also with the general questions of labour policy and manpower questions in relation to munitions programmes, including the training and the welfare of workers. These subjects had called for the creation of a new directorate in September 1940. The new director was in fact an administrator and he became a principal assistant secretary in November.

Thus the responsibility for labour questions within the Ministry of Supply—here and elsewhere one of the most important keys to the successful administration of war production²—was from the outset in the hands of the secretariat. The recruitment of labour for the Ministry of Supply section of the munitions industries had, in consonance with the general progress of rearmament, been slow in developing during the pre-war years by comparison with recruitment for the aircraft section. During the years 1940-42, however, there was a great swelling of the labour force, and many special problems—for example, recruitment for the new ordnance factories, some of them in remote rural districts; of recruiting women in large numbers for light ammunition and ball-bearings; of recruiting men for the uninviting heavy industries; and of recruitment from Ireland—had arisen. In consequence the Ministry of Supply organisation had grown, by 1941, to comprise a labour supply section and a labour management section, each under a principal assistant secretary. The labour supply section was, in the main, a liaison organisation, conveying the requirements of the Ministry of Supply to the Ministry of Labour, and watching the departmental interests in the quarters where labour supply policy was fashioned. But it was also more than this, since upon it there came to fall the responsibility for determining what in fact were the departmental interests which should be watched and furthered—that is to say, for forming the labour supply policy of the Ministry of Supply and so, to a degree, the labour supply policy of the country as a whole. The Labour Management Department, as

¹ See following chapter.

² The subject will be fully treated in the forthcoming volume in this series, *Labour in Munition Industries*, by P. Inman.

its title indicates, was concerned with questions of wages, hours of work, and conditions, although it thus was, of course, frequently involved in the recruitment problems dealt with by the Labour Supply Department. The partnership between the two departments was particularly close and their joint problems particularly intractable in dealing with the uninviting heavy industries.

Thus, when in March 1942 the post of Second Secretary (Supply) was created, one of his two under secretaries had an exclusive responsibility for labour questions, while the other was 'general'. Between them, under the Second Secretary, they had control both of the Central Secretariat proper, and of the branches (with which the Labour Division was closely associated) having 'general secretariat co-ordinating functions in respect of the work of the Production and other directorates' and now, as has been said, officially described as the 'Production Secretariat'.

In this account of the development of the secretariat in the Ministry of Supply, expansion has been the theme, but it was an expansion of function rather than of numbers of personnel. The figures have already been given, but they are worth repeating. In 1941 there were 140 administrative civil servants (excluding temporary assistant principals) in the department; in 1945 the number was hardly larger. The number of higher executive and senior staff officers had risen in the same period from 239 to 323. But it is clear both that individuals accepted an increasingly heavy burden of responsibility, and that means were found of ensuring that the growth of the department's business did not mean a corresponding growth in this burden. Among the administrative devices which were employed to this end was the Supply Council.

(iv)

The Supply Council

The Supply Council, which was originally set up on 26th September 1939, was not statutory, but it was modelled to some extent upon the statutory bodies which ruled the Service departments—the Board of Admiralty, the Army Council and the Air Council. Thus although there was not the same delegation from the Minister to members of Council as there was in the councils of the Service departments, the Supply Council was an executive body and was in theory at least responsible for directing the general policy of the department. Correspondence between theory and practice varied under different ministerial regimes, yet it is generally true that the discussions of the Council from its earliest days ranged over the entire field of the

Minister's responsibility, from the internal organisation of the department to such widely differing subjects as Anglo-French co-ordination, the use of the motor trade for munitions production, and the production of machine tools in the United States.

When the Supply Council was first formed in the early months of the war it met at regular weekly intervals in order that each member could report on the work of his department during the past week, as well as for the discussion of other business. During 1940, and particularly while Mr Herbert Morrison was Minister, meetings became less frequent, and in March 1941 Sir Andrew Duncan, who had succeeded Mr Morrison, remarking upon this circumstance, said that as the programme and policy of the department were now largely settled he proposed that the Council should meet at approximately monthly intervals. It would discuss matters of general policy, while a smaller Executive Committee consisting of the Minister, the parliamentary secretaries, Lord Weir, the Director General of Munitions Production and the Director General of Programmes, would be formed to meet two or three times weekly to deal with more routine matters. It was arranged however that Council members would receive all Executive Committee papers dealing with subjects which concerned their departments and that weekly reports would continue to be circulated.

The first task of the Executive Committee when it was formed was a general review covering the building programme, labour problems, raw materials, machine tools, and various particular items of munitions. It was intended that this review should increase the statistical material provided by the weekly report of the Director General of Programmes, and that later the Executive Committee would deal with specific items as they arose.

The activity of the Executive Committee was indeed always very closely associated with plans and programmes, and Sir Walter Layton, as Director General of Programmes, played a leading part in its deliberations until he left the Ministry of Supply for the Ministry of Production. During 1940 the Executive held many meetings, and as it grew in influence and importance it paid the inevitable price of an increase in membership above the number which might have been considered as an optimum; by September, in fact, its membership had increased to fifteen. Later in 1941 it began to concentrate mainly on building projects and a reorganisation took place in February 1942 when Sir Andrew Duncan became Minister for the second time.

A part of the Committee separated to form the Building Executive while remaining members continued as the general policy body. This now consisted of Sir William Rootes, who was appointed chairman of the Supply Council and Executive, the Permanent Secretary,

the Controller General of Munitions Production, the Controller General of Research and Development, the Director General of Finance, the Director General of Supply Services, the Senior Military Adviser and the Director General of Army Requirements (War Office).¹ The Executive was made responsible under the Minister for the general direction of policy and it was arranged that senior members of the department would be invited to attend meetings as necessary when matters that concerned them were under review. The newly reconstituted Building Executive consisted of the Director General of Production Services as chairman, the Under Secretaries (General) and (Labour), the Director of Finance (Production) and the Controller of Building Construction. The Director of Planning and the Director of Building Construction acted as advisers to the Executive. Throughout these changes the main Council continued in being as the supreme policy-making body. For example, at the 53rd meeting, the Controller General of Munitions Production said that in view of a series of papers on capital expansion which had come before the Building Executive he felt it necessary to raise with the Supply Council the question of the general policy to be adopted. The Council, however, like the Executive, displayed a tendency which is characteristic of bodies to which prestige is attached, and which was certainly very characteristic of such bodies in the war-time Supply departments—it expanded.

At the time when Sir William Rootes became chairman of both the Supply Council and the Executive the former reached a peak membership of thirty-two. With this number it could hardly be an active body, and in October the Permanent Secretary reduced the membership to ten, apart from ministers. At this time the Minister said that while every member of the Council should regard Council work as of first priority, he did not wish to trouble members by asking them to put in reports on the day-to-day work of the Ministry. He assumed that members would bring to the Council any questions of policy. He also decided that the Council should meet weekly. The Minister was anxious to widen the responsibilities of the Council as far as possible; he was not content that it should discuss production matters only, and a little after the reforms which had just been described commented adversely on an agenda which he thought too narrow in scope and reminded members that since the Council was responsible not only for production but for general policy all broad issues of policy should come before it.

Such aspirations, not always expressed specifically, about the part to be played by the Council, were an interesting feature both of the Ministry of Supply and of M.A.P. The general ideas of departmental

¹ See Chapter XII (i).

organisation current in both these departments, particularly at the higher levels, long bore the imprint of the Service departments which had given them birth. And the Service departments were of course 'conciliar' departments. No doubt also there is much to be said for a council as an instrument for running a supply department—it had been a feature of the Ministry of Munitions in the first World War. Yet it seems clear enough that the Council never quite lived up to the aspirations. The student of its activities senses about many of them a lack of positive activity; there was at all times a tendency to note information rather than to give decisions. The decisions indeed were made by the men who sat upon the Council, but they were not made *in* Council. It will be observed, too, that the Council tended to play a larger part in the affairs of the department during each of the several periods when a new Minister was gathering experience, but that when the Minister took a knowledgeable grip upon authority the Council lost effectiveness. Indeed, it may well be that the Council was always intended to be effective in this sense only. It is also probable that it was to some extent a device for conferring status and avoiding difficulties about precedence. It may well have shared this nature with its M.A.P. equivalent the Aircraft Supply Council.¹ Judged by these more modest standards the records of the Council during the last two years of the war are not unimpressive either in their scope or their authority, and it is significant that a full attendance of members was the rule rather than the exception. Whatever might be said of the Council it was undoubtedly an influence in obtaining coherence at the highest level among the multifarious responsibilities of the Ministry of Supply.

¹ See Part IV, Chapter XIV (iii).

CHAPTER XI
THE CENTRAL CONTROL OF
PRODUCTION: INSTITUTIONS
AND METHODS

(i)

Production Directorates and Production
Secretariat

THE GREAT ORGANISATION which has just been described may be looked upon rather in the light of a machine, drawing in at one end an inchoate mass of demands, information and problems, and producing at the other the contracts, programmes and solutions. The drawing of all these things into, and through, a focal point, constituted a technique which may be described as the central control of production—the central control, that is to say, of more than one-third of all British resources of war production. The achievement of central control posed two main problems, the problems of institutions and of methods. We have already given some account of the institutions of the Ministry of Supply, but only of those which operated at or near the highest level of authority. On the other side, that of method, the main instrument was the production programme, and this is of such importance as to call for full and separate treatment.¹ Our subject in this chapter is accordingly to some extent interstitial; it concerns the institutions of central control, but not the most exalted; and the methods, but not the single most important instrument. Its importance will not be underrated on that account; it represents, not the general headquarters, but the front line of the supply war. In this front line it is the production divisions which claim our first attention.

In the earliest days of the Ministry of Supply production was, as we have seen, divided in two. There were divisions for munitions production on the one hand and for equipment and stores upon the other. The subsequent history of the latter was fairly simple, being in the main a history of straightforward expansion. As early as October 1942 responsibility for the equipment and stores was divided among

¹ See following chapter.

nine directorates covering such items as clothing and textiles, medical supplies, textile and clothing reconditioning, Service footwear, and so on. The division was closely associated with the Munitions Division inasmuch as it provided ancillary stores, such as heavy tarpaulins for vehicles and guns, hand tools, textiles for shell and cartridge filling, and narrow fabrics for bomb harness. Apart however from rapid expansion and from its being relieved in 1941 of its initial responsibility for storage, it remained unaffected by subsequent changes.

The Munitions Production Division by contrast was wholly transformed as the war proceeded. The roots of the organisation for most munitions stores had been transplanted from the War Office in the form of a team of officers who brought with them working arrangements and established contacts derived from three years' practical experience in the development of the production programme and the planning of industrial mobilisation. In the War Office, the Director General had had under him a Directorate of Artillery, a Directorate of Mechanisation, a Directorate of Industrial Planning; a Directorate of Ordnance Factories, a Directorate of Scientific Research and a series of branches which dealt with the 'progressing' of orders and with the nucleus of the area organisation. Following on its transfer to the new Ministry and the creation, upon the outbreak of war, of two new production divisions for explosives and chemicals, and for tanks and transport, the original Munitions Production Division was split up. The Directorate of Mechanisation went to the Director General of Tanks and Transport and the Directorate of Industrial Planning was dissolved, some sections joining the two new directors general and the balance remaining with the Director General of Munitions Production. The Contracts Division, which at the War Office had served under the Director General, was now made responsible to the Permanent Secretary, and the responsibility for the area organisation was similarly transferred. As a result of these changes the charge of the Director General of Munitions Production in the first months of the war comprised seven directorates, dealing with weapon production, development and research and also with movements and components. An account has already been given¹ of the process of sub-division by which these original seven directorates were either raised individually to the status of division or included in other divisions serving under other directors general.

Whatever might be the details of their growth and of their splitting up, the basic function of the production divisions remained the same. Nor did the fact that their organisation and methods of operation might differ in detail according to the type of store which they

¹ See pp. 219-223.

handled seriously interfere with this basic similarity. Here, contributed by the individual efforts of an army in which the private soldier was known as a production officer—an army large by pre-war Whitehall standards, but small by comparison with the industry it dealt with—here was the knowledge gathered upon which the Ministry of Supply finally depended. It is hard to say what a particular production officer might or might not do for the firm or firms with which he was associated. His tasks ran from orthodox ‘production’ assistance to the most extraordinary tasks of personal nursemaiding. Nor was the boot always on the same foot; out of the wealth of their experience many firms nursemaided raw production officers. In this immense welter of intimate contacts however something like a pattern of activity may be traced. Each branch received in the first place figures of requirements to be provided over a period and worked to an authorised rate of output for a particular store. The initial task for the production branch was to find and collect the sources of production. This involved consideration of the estimates of potential output given by each selected firm, and in many cases the giving of technical advice about methods of production and suitable plant. The need of firms for advice of course varied very greatly; inexperienced general engineering firms dealing with specialised weapons represented one, and professional textile manufacturers the other extreme in this respect.

The main needs of the selected contractor fell under the heading of buildings and plant, labour, and materials. In regard to the first the production branch was concerned to ensure that the buildings and plant which the contractor proposed to use were suitable and not extravagant, and so far as new provision was necessary, to consult the finance branch allotted to the division for the settlement and approval of the financial arrangements. If the firm was to be expanded the question of the availability of labour had also to be explored with the Labour Supply Branch, and in the case of new buildings higher authority had to be obtained for their construction. In the case of materials, the requirements of materials subject to allocation had to be calculated and included in the estimates put forward by the directorate of its total requirements for a period ahead. Production branches also gave advice and assistance to the contractor about sources of supply, and in particular cases decided questions of bulk supply and free issue of components. Finally, as to the supply of labour, we shall see later that production branches made a progressively more extensive use of the local knowledge and contacts available to the regional offices.

The one important element in the department’s relations with its contractors which was not handled directly by the appropriate production branch was the placing of the order. The branch worked in

concert with the Contracts Division but did not itself correspond with the contractor on the subject of the terms and conditions of contract. From the time that the order was placed however it acted *in loco parentis* to the firm and was concerned to watch the due execution of the work at all stages. This was the work of 'progressing' the contract, and involved advice on all the problems which the producer encountered. On the one hand there were the technical production problems which centred upon the best use of the plant and the application of technical processes which experience had shown were productive of the best results. On the other hand there were administrative problems, as, for example, the need for preferences in labour supply, the delivery of materials, or the special steps to obtain an extra allocation of materials for an important order when the allocation made to the directorate did not suffice for its whole programme.

These were no more than the basic functions which every production branch had to discharge in dealing with individual orders, however straightforward the case might be; but in practice each case had aspects of its own which called for special consideration. Emergency measures when a factory was damaged by air raid attack constituted one special problem. If the branch recommended the dispersal of the works it was necessary to certify the importance of the firm, to settle on premises for the new location, assess the cost as accurately as possible, and provide the department with full information as to the needs of the dispersal scheme in materials, labour and supply services. Another side of the work of the branch was concerned with the progress of its programme as a whole. The compilation of forecasts of output was an unremitting and exceedingly responsible task; and measures such as the reduction procedure for cutting individual orders made special demands on branches in the detailed scrutiny of programmes and the necessary revision of plans.

With all these main tasks, as well as with others both occasional and constant, all production branches were concerned. Or rather—since production directorates contained special branches not directly concerned with production—we might say all production directorates. In the formal organisation of these directorates there was naturally some variety, as well as development, throughout the war. The differences between different directorates and different periods were not however so very great and a brief account of the organisation of a particular directorate in its maturity may therefore do duty for a more extensive survey. Let us take the Directorate of Weapons Production as it stood in April 1945. Under the Director a deputy director was in charge of three branches responsible respectively for the production of: (i) coast defence, heavy and super-heavy equipment, (ii) all guns except the Bofors A.A. equipment, and (iii) gun mountings and carriages. A second deputy director had three

branches responsible for the production of: (i) the Bofors and certain other automatic guns, (ii) machine guns, small arms, and (iii) sundry weapons such as bomb-throwers, flame-throwers and mortars. A third deputy director responsible for materials had four branches dealing with the requirements of the directorate for steel and non-ferrous metals, forgings and pressings, etc.; with progress in deliveries of materials; with the preparation of schedules for allocated metals, and with statistics; and with the checking of materials set free by the termination of contracts or of capital assistance schemes. Apart from these branches there was an assistant director with two charges. One was the control of the local weapon production engineers attached to the regional offices, who were responsible for the organisation and development of productive capacity locally, in liaison with the Regional Controller's staff. The other was the control of two branches of the directorate which dealt respectively with, first, general correspondence and clerical services and, secondly, progressing work organised in certain sections, the custody and issue of drawings and process manuals, and non-technical services to contractors. Finally a deputy assistant director was in charge of the general administration of the directorate, and liaison with the Army and with the Chief Inspector of Armaments about repair work and overseas production.

Yet despite this similarity of basic function and of formal organisation, different production directorates developed their own ways of doing things, their own traditions, even, it might be said, their own personalities. We have already seen how marked were the personalities of the different directorates of the Admiralty, which had histories behind them long before the Ministry of Supply was created; but even within the Ministry of Supply we can distinguish some characteristics as belonging to those directorates which had a definite embryo in the War Office organisation, and those which were very largely or entirely Ministry of Supply creations. Motor transport, signal and Royal Engineer stores, weapons and ammunition—all these basic requirements of a peace-time army designed for Imperial police duties had, as we have seen, been the responsibility of a production machine which had existed in the peace-time War Office, and the directorates to which they gave birth in the Ministry of Supply, however much they expanded, continued to enjoy a continuity of control, and of controlling personnel, which was in marked contrast to the disturbed history of armoured fighting vehicles. These directorates also resembled one another in having serving officers in key and controlling positions; the majors and captains of 1939 moved up the promotion ladder while continuing to serve in the same directorate or directorate general, until they came to control a wide field of production. The newer directorates—the directorates whose War Office parentage was distant and obscure, such as those

concerned with supply and production services, or many items of equipment and stores—were essentially civilian, and drew heavily upon trade and industry for their controlling staffs. The methods, the background, and the personnel of the directorates, then, might vary, and vary considerably. So, do doubt, did their efficiency. Yet variations in efficiency certainly did not follow the line of variations in origin, and it was in the production directorates generally, as the 'front line', that much of the ability, of the drive, and of the enthusiasm of the department were to be found.

Not all directorates coming under the general heading of 'munitions production' were production directorates in the direct sense we have been considering. An important class dealt with supply and production services. Supply services meant, in the main, storage, distribution, and transport; production services meant supply of such things as machine tools, bearings, and tools and cutters, gas, heat, and electricity, upon which industrial production generally, irrespective of what is being produced, is based. The organisation of some of these requirements had a history going back to the earliest days of the Ministry of Supply; a system of railway movement control was instituted in October and November 1939, and soon became an elaborate organisation. Production services were added during the following two years, and by 1941 were creating problems of control. In the autumn of that year a Directorate General of Production Services was created to bring the whole organisation under one hand.

So much for the production directorates. They were very closely associated with that element in the Ministry of Supply organisation which has been referred to as the Production Secretariat. It will be remembered that the transfer of the department of the Director General of Munitions Production from the War Office to the new Ministry in August 1939 included a small central office, which was headed by a Civil Assistant, and included a statistical section. This office had maintained, throughout the rearmament period, a record of all major items of munitions stores; a record which contained in a convenient form the details of requirements, orders placed, and deliveries promised, forecast and actual, and provided the Director General with up-to-date information for purposes of control of the programme and the preparation of progress reports. For three years the personnel of this small section had been in close touch with every move in the development of production and of the plan for industrial mobilisation, and it possessed a unique knowledge of the contact established with the leaders of the engineering industry and of the difficulties with which manufacturers were faced. Originally designed to provide a link with the rest of the War Office machine, it survived as a unit in the new department and, in its close conjunction with

the D.G.M.P., attained at once a powerful position, since it met certain essential needs. Upon the outbreak of war it was, in fact, the only section in sufficiently close touch with production details to handle many of the more urgent problems which arose, and within a short time it had expanded with the acquisition of fresh functions. As early as October, the Civil Assistant to D.G.M.P., Mr (later Sir George) Turner, was made Principal Assistant Secretary (Production) and the responsibilities handled by this secretariat group included not only priority questions and representation of the department on the various ministerial priority committees, but also the co-ordination of the overseas interests of the Ministry. By taking over the control of priorities and of communications with the overseas missions,¹ particularly those in North America, the Production Secretariat, as it now came to be known, became strongly established long before it was given a name or recognised clearly as a separate entity.

Priorities, overseas activities and general production problems provided the material for the Production Secretariat until May 1941, when its head was made Under Secretary (General) and labour supply was recognised as falling within his scope. In the meantime it was throwing out wings. From an early stage it had been regarded as desirable to have a small central secretariat section attached to other directors general in the same way as the Production Secretariat was attached to its director general; and eventually there were six of these each tended by an assistant secretary. This was an experimental organisation which was confined within limits only by the severe shortage of staff suitable for filling these posts. The attached officers had a dual responsibility. They were expected to work for 'their' production division and at the same time to guide its operation along the centrally planned line and to maintain contact with the main branches of the Production Secretariat. Their success in providing guidance as well as assistance was confirmed by the demand for this form of attachment. There was, of course, a parallel responsibility resting on the main secretariat branches to maintain touch with these 'detached' members, and in 1942 when the Under Secretary (General) had become the Second Secretary (Supply), steps were taken to strengthen these ties. Regular meetings were then arranged for the purpose of improving the working liaison between the outposts and the centres; and in addition the Second Secretary circulated confidential notes which provided information and guidance. The notes were comprehensive in range, and either explained the latest developments likely to affect production directorates or drew attention to decisions and procedures on which

¹ See pp. 227-228.

the attached secretariat officers could act as responsible agents of the centre in assuring that action was properly taken.

So important was the Production Secretariat, working in alliance with the D.G.M.P., and at a later stage with the Controller General, that the subjects covered by the notes may serve as a useful illustration of the range of the strong central control achieved in the Ministry by that alliance. The notes about current developments included such subjects as the 'Bolero' scheme for dealing with American requirements in this country, the purpose of the Ministry's 'Urgency List' and the method of compiling it, the Ministry's policy in the matter of bulk purchase, the scope and functions of the Ministry of Production, the situation in respect of manpower as it developed at various stages, the working of the 'reductions procedure' which governed the making of cuts in the programme, the policy about disposals, or, in the later stages of the war, the organisation of relief in liberated areas. The second class of note gave the necessary information for guiding the production division in the carrying out of specific procedures, such as means for dealing with offers of capacity, inadequate branch allocations of steel, proposed changes in production rates, transfers of capacity to other departments, or the despatch of cables to North America; while in some cases the 'detached members' were instructed to emphasise special points—the importance of placing orders in Canada to meet the shortage of labour supply at home, the growing objection to the placing of orders in difficult labour areas or the pressing need for revised schedules as a result of cuts in the production programmes.

The experiment of 'bedding out' trained and experienced civil servants to assist and guide the production division was a novel method which was generally considered in the department to have proved highly successful. Their colleagues in production branches who had served in business organisations, and were inexperienced in the ways and complexities of the Government machine, came to look to the professionals to enlighten them about Government procedure, interdepartmental tactics, and the customs of the Service, to smooth the path, and in fact to get things done. The sympathy and loyalties of the detached members were engaged in the affairs of their production division with a special intimacy; while from the point of view of central control the system ensured that the information, reports and returns which flowed to the centre from the many divisions were adequate and in uniform shape.

(ii)

Methods of Central Control

If, as has been suggested, in order to achieve a real understanding of the working of either the production directorates or Production Secretariat it is necessary in the end to have a knowledge of the methods employed in the preparation of programmes, with all that these involved in the way of relations with the user and with industry, there were also other tasks carried out by these bodies which throw light upon their history. They include the means of dealing with priorities; the means of determining the allocation of materials, capacity and labour, and the location of new capacity; the control of building as an element in capacity. We shall deal with these in order.

The evolution of the system of priority or allocation of capacity and materials is in large part an extra-departmental story; as such it has already been introduced in this volume¹ and will be fully discussed later.² Here it is proposed to consider this evolution only as it concerns the Ministry of Supply; and from the point of view now adopted it is irrelevant that until April 1941, when it became part of the secretariat of the Production Executive, the Central Priority Department, as the machine which carried out the inter-departmental task, was located in that Ministry. In effect, the Central Priority Department was an independent, inter- or supra-departmental body, and it had in fact been enclosed with the Ministry of Supply only as a matter of administrative convenience associated with the statutory powers of the Minister. The Ministry of Supply stood in the same relationship to the Central Priority Department as did the Admiralty and M.A.P. In theory, all approved items included in any department's production programme as reviewed and revised from time to time were of equal importance and urgency; but since the department's allocation, whether of materials or of manufacturing capacity, might not suffice at any given time to meet all urgent demands in full, machinery was required not only for obtaining a bulk allocation of the necessary size in competition with other departments, but also for settling internal priorities as between the needs of the many production directorates. The central point of this machinery was the Principal Priority Officer. We have already seen, in considering the history of the Admiralty, the vital part played by the Principal Priority Officer in that department. If administration were purely a science the historian would be required, in writing

¹ See p. 49 *et seq.*

² See Part V, Chapter XIX (i).

of the same office in the Ministry of Supply, to indicate only those points at which the circumstances of the Ministry of Supply differed from those of the Admiralty, and at which the functions of the P.P.O. differed correspondingly. Since administration is also an art, no such correspondence can be assumed, and it is necessary to examine the role of the Principal Priority Officer in the Ministry of Supply in some detail.

Let us take first the case of materials. Each production branch was required to estimate its requirements for a period of eight months ahead and to render this estimate at a prescribed date to the P.P.O. The estimates were co-ordinated by this officer, who obtained any necessary higher approval, and a formal application was made by the department, through the Central Priority Department, to the appropriate Cabinet sub-committee.¹ A bulk allocation (of steel, for example) was then received for the department as a whole to cover the needs of the specified period, based on broad assessments of the quantities which could reasonably be expected to be absorbed by approved programmes for the period in question and limited in total by the supply from home sources and imports together. It did not of course follow that the allocation received was as large as the assessed requirements, and, when it fell below, the shares of the several production branches were scaled down by central departmental decision. The final allocation allowed to each branch was then notified by the P.P.O. with a note which usually forbade its being exceeded without permission.

In the case where a production branch encountered difficulties in the supplies of a particular material through the need to improve a rate of production or the emergence of an urgent new service, the procedure provided for two possibilities. If the material were subject to allocation and the quantity demanded could not be found from the quota allowed to the branch for the period, the case was put to the P.P.O. and it became his business to settle the question of internal priority, obtaining any necessary decision to adjust the quotas within the department. If such an internal adjustment was not practical, an approach was made by the P.P.O. to the appropriate Raw Material Control as to whether the material could be supplied as a supplement to existing supplies or only at the expense of other programmes. The case then went to the Materials Committee who, if it was decided to be sufficiently urgent, either allowed a supplementary allocation or approved an adjustment in the bulk allocation as between departments. In the second case, which concerned the material which was not subject to formal allocation, the production

¹ Such a sub-committee existed throughout the successive periods of the Ministerial Priority Committee, Production Council and Production Executive. See Part V, Chapter XIX (i).

branch made a direct application to the relevant raw material control, and if the circumstances were such that the direct approach seemed unlikely to provide a solution the P.P.O. was consulted.

The allocation of manufacturing capacity as between the rival claims of all the departments was the second branch of the responsibility assigned to the Central Priority Department and the Cabinet sub-committee to which it was responsible. The basis of the work was the register known as '392'—an annotated alphabetical list of some 7,000 of the more important factories in the country, mainly in the engineering sphere, which showed in the case of each firm the product or products required from it and the percentage of the capacity of the firm allocated, by agreement, to each department. In some cases the whole output of the factory was allocated to a particular department; in others individual shops were allocated and in others there was a miscellaneous residue the allocation of which was left to be settled. The register as compiled before the war could not, of course, remain complete. Changes in the hypothesis about the sizes of the forces inevitably entailed its revision. At any time the introduction of new types of armament, or the modification of existing types, might necessitate the finding of fresh capacity or changes in the allocation of existing capacity. Any department might make application for the registration of a claim to capacity in works not yet included in the list, or additional capacity in works included, or the amendment or deletion of agreed entries.

A production branch advancing a claim entered the details on a special form and sent it to the P.P.O., whose duties were, first to settle any domestic conflict, secondly to try to settle any conflict with another department, and thirdly to notify the Central Priority Department.

At the outbreak of the war the Ministry of Supply, like all other interested departments, possessed copies of the register, and it formed the basis of the work of the branches concerned in the planning of capacity. After January 1943 it was not deemed necessary to maintain the system by which amendments were circulated. While views about the usefulness of Register 392 varied from department to department, it would seem on the whole to have been a useful piece of central machinery in eliminating priority questions by the agreed allocation of productive capacity.

It will be readily appreciated from what has been said that the Principal Priority Officer, whose duties have been indicated in the context of a particular department, was a key figure in the Ministry of Supply, as he was also in the Admiralty. The picture that has been drawn of his activities may not give a wholly adequate idea of his responsibilities and the means by which he discharged them. Much of his work at all times was informal; much of it was done by

telephone, by calling upon an opposite number, or by the *ad hoc* committee meeting. In the whole field of the organisation of war production there was probably no field in which it was more necessary for officers of rank below the permanent heads of departments and their deputies to throw off departmental rigidity or parochialism; the fact that the system worked as well as it did is evidence of a general ability to do so.

From the allocation of materials and the allocation of capacity, we may turn to the allocation of labour. Within the Ministry of Supply all demands for labour put forward by the production directorates were handled by the Labour Supply Branch which was brought within the ambit of the Production Secretariat in May 1941. The Labour Supply Branch represented the Ministry in all negotiations with the Ministry of Labour which handled the general policy of the bulk allocation to departments of available resources. Once the importance of a product had been established, the machinery for obtaining preferential supply was not the direct concern of the production branches. The Labour Branch, with its central view of the general picture of labour supply, was alone in a position to decide the question of whether, in a particular case, application for 'preference' was needed or not.

In the autumn of 1941 it had become clear that some effective machinery was needed for dealing with interdepartmental priorities in labour supply. It was accordingly decided, largely at the instance of the Ministry of Supply, to hold interdepartmental meetings once a fortnight to discuss the competing claims of departments. A practice of according labour preference on the basis of a given priority product very soon gave way to the consideration of the needs of individual firms, and in due course the full central 'preference procedure'¹ was developed with its machinery of the 'designated list' of items ranked as the first importance; with the Headquarters Preference Committee and the list which gave 'first' and 'second' preferences to vacancies calling for labour supply. In the meantime, within the Ministry of Supply, the shortage of labour had long been one of the chief difficulties encountered by the production directorates and the settlement of internal priorities had prepared the way for fitting in with the finally established central preference procedure. The machinery which has been described was not all that had been designed to further this development.

From an early date the control of the Ministry of Supply production programmes had included the maintenance of an 'urgency list'. The main purpose of this list was to select the most important stores for the manufacture of which labour was scarce and ensure that special

¹ See Part V, Chapter XXII (i) for a full account of this.

steps should be taken to supply it. It was a cardinal point with the Production Secretariat that a list of this kind, if it was to be effective, must be small; from October 1941 onwards a revised list was issued and was discussed and reviewed at frequent intervals by the Controller General of Munitions Production and the Second Secretary (Supply), and their planning, priority and labour advisers. The Director General of Army Requirements¹ was of course deeply concerned with these matters, for it was his particular task to compare deliveries with forecasts and to bring 'urgencies' to light. The revised list was issued also to the Regional Controllers as a guide in dealing with the claims of firms who were making demands for additional workers. At the end of the year 1943 the change in the central process of procedure necessitated its elaboration, and the fully developed internal machinery was represented by a new series of 'Ministry of Supply urgency lists'.

The lists took account of three classes of products: first, items of great urgency which had been 'designated'² by the Ministry of Production; secondly, items of operational importance with a time limit setting their date of production and notified by the Service departments; and, thirdly, any other urgent items which ranked for preferential treatment. In its final form there were separate columns showing items of general operational urgency, and items with degrees of labour urgency. The former was a guide to the priorities to be given in allocating all production facilities, including transport, fuel and so forth, other than the supply of labour; and an asterisk was used to indicate items of which supplies (or further supplies) were needed within the next few months. The second column was a guide to labour preferences, divided under four heads.

The method of composing the urgency list was for the Second Secretary (Supply) to address a minute to all the directors general of production asking for a note of all non-designated items considered to be of sufficient importance, with a brief statement of production reasons. The list, compiled from an examination of the answers, was circulated to senior officers in the department and also to all Regional Controllers, and was used by the latter as a guide when applying for regional preference in dealing not only with the supply of additional labour, but also with the replacement of waste. Arrangements were made for revising the list by formal meetings held at short intervals.

As an element in the central control of production the device of the urgency list must, however, be considered in conjunction with the general priority system and particularly with the functions of the P.P.O. within the department. The interdepartmental arrangement was largely a matter of personal contact. It was part of the scheme

¹ See Chapter XII (i).

² An account of 'designation' is given below, Part V, Chapter XXII (i).

that departmental Principal Priority Officers and their staff should keep in close contact with the production branches of their own department and with their opposite numbers in other departments; and, just as differences within the department were normally settled in discussion with the P.P.O., so controversies between departments were similarly discussed, and frequently resolved, by correspondence between the Principal Priority Officers concerned. Agreement with other departments to accord priority in a given case was often secured promptly by these means.

The working of the machinery as a whole may be illustrated by the case of the special stores which had to be provided with great urgency for the invasion of the Continent in 1944. A few months before D-Day the Ministry of Supply received from the War Office two lists of vital requirements for the 21st Army Group. The main list, which included a wide range of items from arms and ammunition to tanks specially equipped for the occasion and the waterproofing of vehicles, was discussed in a rapid succession of meetings between the Controller General of Munitions Production and the Deputy Chief of the Imperial General Staff. All the items figuring in the list were the subject of action taken by the Ministry under the direction of C.G.M.P. The placing of stores on the urgency list as items of operational importance secured for them due priority in respect of labour and such facilities as transport, and instructions circulated to the production directorates ensured that materials would be forthcoming out of their allocations when contractors were informed of the relative urgency of the product in their order books. Other ministries gave 'right of way' through the offices of their P.P.O.s. All the necessary measures had to be taken in conditions of extreme urgency and secrecy, but the organisation which had been laid down accepted and absorbed this extraordinary strain. This is indeed in keeping with a general movement of events, the putting together, during the early years of the war, of administrative machines, the testing and running in of these machines—a process which we may in general associate with the year 1943—and the efficiency and capacity which these machines developed under the pressure of 'Overlord', an efficiency and capacity which often surprised those familiar with them, who were at any rate not exuberantly confident that they would be 'all right on the night'.

One problem of the central control of production was associated mainly with the labour shortages. This was the problem of where to locate new manufacturing capacity. Apart from the difficulties created by the general problem of labour supply, shortage of labour in particular areas made it a matter of increasing importance to place capacity where it would relieve, or at least not exacerbate, the position in the most difficult districts. This need arose from the fact that

in normal times the lighter engineering and some metal industries were concentrated in the Midlands, the South and parts of North-West England; and that in war these industries were expanded vastly for the purpose of munitions production, whilst in some other areas other industries were expanded to a smaller degree or perhaps contracted. Some districts therefore became 'difficult' areas from the point of view of labour supply while others remained relatively easy. This was not of course a problem for the Ministry of Supply alone, but it may be of interest to glance at it through the eyes of that department.

No doubt each department felt, and with justice, that it had from the early days of the war done a good deal to inculcate a habit of mind in which the relative ease of labour supply should be regarded as an important factor in the placing of work in particular districts. Working in conjunction with the Ministry of Labour, who divided the country into classes and areas in accordance with the distribution of labour, the Labour Supply Branch of the Secretariat in the Ministry of Supply made it one of their main tasks to influence the location of new factories or important extensions of existing works. In 1940 and 1941 circulars were issued to production branches insisting on the needs of prior consultation of the Labour Division when expansions were being planned, issuing warnings as regards specified areas or advising that others were easier for labour. In the second half of 1941 early consultation with the Labour Division was made more certain by the set procedure laid down by the Building Executive Committee, which ensured that the labour factor was fully weighed in the discussion of schemes sponsored by the Ministry which involved new building. The new consideration of location policy was secured effectively in this way, in the case of all expansion schemes, or schemes for dispersal which involved building. Further, apart from schemes involving new buildings, the Ministry, as early as November 1941, operated informal arrangements for avoiding the placing of a further load on towns or districts already congested. Production directorates were instructed, for example, that 'no further expansion, nor dispersals, nor contracts other than such continuation contracts that cannot be placed elsewhere' should be located in Kidderminster, Droitwich or Stourbridge; and at an interdepartmental meeting held in that month other departments, at the suggestion of the Ministry, also undertook that additional work should not be placed at Kidderminster. Again in February 1942, when it was found necessary to extend the plant in that town for the manufacture of Sten gun barrels, arrangements were made¹ by the Ministry of Supply to move

¹ The Factory and Storage Control operated by the Board of Trade was the authority over the allocation of existing premises.

an equivalent amount of other production to a new factory elsewhere. At that time there existed however no central guidance which ensured that the departments should act alike.

Formal interdepartmental procedures for co-ordinating the activities of all departments in the sphere of location policy followed the setting-up of the Location of Industry Committee by the Minister of Production in August 1942.¹ On this committee the Ministry of Supply was represented by the Second Secretary (Supply), and within the department the business connected with the discussions and decisions was co-ordinated in a branch of the Production Secretariat which acted in liaison with the secretary of the committee. The administrative arrangements within the department may be illustrated by the two main organisational schemes or methods employed. The scheme for banning 'designated' areas had, as we have seen, been anticipated in a few districts by the Ministry of Supply. Under the rules of the scheme it was open to any headquarters department or regional board to recommend new areas for designation or to advise the cancellation of the designation. The decisions of the committee were put into operation within the Ministry of Supply by a circular letter from the Second Secretary (Supply) to all concerned within the department. Production directorates were required to submit to the Controller General—or the Second Secretary—any proposals for employing more than twenty-five additional workers, a figure which was later reduced to ten. Where new building was required as well the proposal had to be submitted to the Building Executive for clearance to be obtained from the Ministry of Production through the Location of Industry Committee.

We have now dealt with the means which were employed in the Ministry of Supply to ensure the most effective distribution to the various branches of production of three essential factors—materials, capacity, and labour. A fourth factor was building, whether new building or the adaptation of existing premises. Here the administrative instrument was the Building Executive Committee. The Building Executive Committee, together with a formal procedure for submitting projects for its approval, was effectively employed for determining the relative urgency of building schemes sponsored by the department and for compiling an approved construction programme. The machinery began to assume its final form in the year 1941. In March a Controller of Building Construction had been appointed with the special function of co-ordinating requirements in labour and material for building projects. This officer represented the Ministry on the Central Works Building Priority Sub-Committee which allocated priority certificates to building schemes. A system of

¹ See below, Part V, Chapter XXI (ii).

allocating construction capacity between departments was then about to be introduced, and the Controller had the responsibility of arranging the construction programme of the Ministry to comply with the Ministry's allocation. A few months later, in September, a directive issued by the Prime Minister demanded the strictest scrutiny of all proposals for new works services, and in the light of this it became clear that it was not possible for all the schemes put forward by departments to be carried out as they then stood, if only for the reason that the supply of labour was not sufficient for all the projects. Each department was required to make some sacrifice.

In the Ministry of Supply machinery already existed for compiling a list of urgent schemes and for keeping it under constant review; for as soon as building labour became scarce and called for detailed allocation it was clear that arrangements would be needed to secure suitable priority ratings for the various projects sponsored by the department. The Executive Committee of the Supply Council maintained a list of urgent building projects which indicated classes of priority. The new lead in September 1941 was for an approved list of schemes which had been examined and passed by the Executive Committee as being of first importance to the production programme, and accordingly all branches were instructed that schemes involving new buildings could proceed only if approved as vital, and that all existing or new schemes estimated to cost £5,000 or more must now be submitted to the Executive Committee and would not be allowed to go on unless passed for inclusion in the approved list.

This move was further developed and systematised. A part of the Executive Committee was segregated and became known as the Building Executive and responsibility for the approved list was assigned to a branch of the Secretariat. Production directorates (and, in the regions, regional controllers) were instructed that a scheme should not be supported unless in the first place it was required for the maintenance, improvement or expansion of essential Ministry production; secondly, building work could not be avoided by the re-allocation of existing accommodation, the use of existing buildings or the fuller use of capacity existing in the firm or elsewhere; thirdly, the operational labour, machine tools and plant would be available, and fourthly the work proposed was of an economical war-time standard of construction. The instructions required that all schemes should be referred to the Controller of Building Construction at an early stage. All schemes costing £2,500 or more required the approval of the Building Executive and submission had to be accompanied by a statement showing the case for the work, particulars of the premises required, the estimated cost of the building and services and an estimate of the labour required.

As regards the committee itself, the normal permanent composition

was the Controller General of Munitions Production in the chair, a senior officer of the Production Secretariat, the Director of Finance (Production), the Controller of Building Construction, and the Director of Planning. After April 1942 two representatives of the Ministry of Works attended the meetings as a regular arrangement. In addition the meetings were always attended by representatives of the branches which were sponsoring the project discussed.

The instructions issued in the Ministry and the regions for dealing with the various classes of case were complex in their careful precision, but it was generally considered that the results achieved justified this close control. The Building Executive judged schemes from the point of view of necessity, economy and relative urgency. In so doing it set a high standard which impelled the production directors responsible for the project to be chary of putting before the committee any but fully justified schemes. A directorate responsible for urgent production naturally looked on its own project as possessing a very special importance. The committee applied a salutary check and a guarantee of uniform standards, and its work was widely recognised as setting a pattern of that central control of production which has been the theme of this chapter.

CHAPTER XII

THE CENTRAL CONTROL OF PRODUCTION: PLANS AND PROGRAMMES

(i)

War Office Statement of Requirements

THE WHOLE MACHINERY of central control which was described in the preceding chapter depended essentially upon one process, or series of processes, to give it administrative coherence. These were the processes which may be grouped under the general heading of the making of plans or programmes. This task, important in all three supply departments, varied considerably from one to the other. No very close comparison is possible, for instance, between the planning of the output of the immense range of stores, at their extremes only distantly related to one another, which the Ministry of Supply produced for all the Services and many civil uses; and the products of M.A.P., which, however diverse, were at any rate related to the clear target of airframe production. It was not that the one process was simpler than the other—we shall see¹ that planning in M.A.P. posed the most baffling and intractable problems—but that the difficulties lay in different places. Thus while the essence of the M.A.P. task could always be expressed in such simple terms as a given number of (say) bombers in a given number of years, and the difficulties of planning started from that simple statement, the initial difficulty in the Ministry of Supply lay in obtaining a clear statement of requirements from which to start.

As early as May in the year 1939 the Director General of Munitions Production, who was at that time still in the War Office, had given consideration to this question. He had pointed out that since Army requirements are dependent upon numbers, organisation and scales of equipment in reserve, which are essentially military matters, their calculations must always be carried out within the Army organisation, and that it was of first importance that the proposed Ministry of Supply should have requirements stated to it precisely in numbers and quantities, and that these requirements should, when

¹ Part IV, Chapter XVIII.

notified, be accompanied by a clear authority for the taking of supply action. It would be of little value to the Ministry of Supply to be told that the General Staff had decided, for instance, to double the scale of machine guns in infantry battalions at home, since this information would leave undisclosed a large number of other factors which would affect the final calculations. The information which the Ministry of Supply would require would be to the effect that the total approved requirements in machine guns of a certain type had been increased from a lower to a higher figure, that this increase had received financial approval, that the numbers were required within a given time, and that supply arrangements should be made accordingly. Further, in formulating requirements of this kind it was essential that all the ancillaries, such as spare parts and ammunition, should be clearly and precisely stated. Even in the simple case of rifles, it would be impossible for the supply department to work out for itself the effect of a change in scale, since the scales would vary considerably between the several arms of the Service, and increased requirements do not necessarily involve new provision, since they can for instance be met from the repair of existing stocks. Moreover, the items of equipment which are most closely related to the number of men, for example, clothing, personal kit or gas masks, are not, except in the case of sudden and very large demands, the items which provide a major production problem. The most difficult items from the point of view of production are the heavy and complicated equipment connected with the anti-aircraft and coastal defence or the artillery and other technical units of the field forces. Accordingly, for some months before the Ministry of Supply came into being officially, the office of the Director General was already in process of agreeing with the provisioning departments of the War Office which items were to be regarded as already demanded at the effective date, and the method of securing that further demands should be received in a form which would enable the new Ministry to take prompt action.

The most important outcome of these negotiations was the appointment in the War Office of a Director General of Army Requirements. The functions of this new post were to co-ordinate all requirements of equipment, stores and material to be obtained from the Ministry of Supply, and for this purpose the holder was, from the time he first took up his post in October 1939, given a seat on the Ministry of Supply Council. It was pointed out in his terms of reference that changes of requirements, whether they were added to or taken away from requirements already approved, affected the planning of the Ministry of Supply, and he was accordingly to concern himself particularly with maintaining an effective liaison between the two departments in this matter. As a further sign of the

importance which was attached to this appointment, it was specifically stated that the Director General was entitled to make representation to either department on questions of policy connected with requirements and planning. Originally, no provision was made for any military staff to assist the Director General, but it soon emerged that almost all the information needed by him was already being collected and collated by one of the directorates working under the Master General of the Ordnance as part of its regular duties. Accordingly, from October 1939 onwards this branch became the recognised channel through which the Director General conducted his business, and although it was absorbed in the General Staff in November, yet for all practical purposes it remained part of his organisation. Then, in February 1940, this General Staff duty passed definitely to the Director General, who thus became responsible on behalf of the General Staff for liaison with the Ministry of Supply on policy and requirements, the formulation of demands for war equipment, and the progressing of demands submitted to the Ministry. It may be convenient here to give an account of the later developments of this very important post. Originally the Director General was responsible to the Quarter-Master-General. In the summer of 1940 he was given a seat on the Army Council and became directly responsible to the Secretary of State. In July 1942 Sir Robert Sinclair relinquished the post of Director General of Army Requirements in order to act as the Minister of Production's deputy in Washington. Sir Ronald Weeks, who had by this time become Deputy Chief of the Imperial General Staff and a member of the Supply Council, carried in his new post—as he had done in his previous one—a great deal of responsibility for the state of equipment of the Army and for the development of new weapons.

The basis on which requirements had been traditionally calculated did not take account of the realities of a production situation which would inevitably be unbalanced while the machine was getting into gear. It was the duty of one part of the General Staff to indicate a basis of location, extent and character of military operations; and of another section of the Staff to indicate scales of wastage. On the assumption that the units engaged were fully equipped to start with, and that they expended ammunition, used gun liners, suffered losses of weapons, transport and so forth more or less in accordance with the scales that had been calculated, the new requirements were worked out from month to month. But the basis of calculation was in fact always being undermined, and undermined in many different ways. Units were not necessarily fully equipped to begin with. Or, if the ammunition were available, the guns might not be there to fire it; yet in theory the ammunition requirements stood. The element of what came to be known as 'hypothetical wastage' in

stated requirements was fantastically large and undoubtedly tended to bedevil 'progress' statements of production when compared with requirements. It took some time before the existence of this problem was sufficiently widely appreciated—although, of course, D.G.M.P. and his staff knew of it. The nearest approach to a solution came when the officers and officials had learned how to assess the probable rate at which 'key items' would be forthcoming. This note could then be used as a general standard against which real requirements of ancillary and minor items of equipment could be calculated.

There was thus a perpetual dilemma. If, on the one hand, requirements were stated as being only just ahead of estimates of availability, the Army would never get what it needed in the right proportion, while, on the other hand, if it stated its requirements on a basis which assumed expenditure ('wastage') of items which could not conceivably be available to expend, productive effort and capacity with the wastage on the easy things—to the detriment of production of the more difficult things. The solution of this dilemma took time—indeed a perfect solution was never found, but, by the middle of 1941, a reasonably practical approach to the solution had been achieved, thanks largely to the co-operation and understanding between the Production and the Programme Divisions of the Ministry of Supply and the department of the Director General of Army Requirements in the War Office, throughout the early war years. Later in this chapter some account is given of the fluctuating bases on which official sets of requirements were sent over to the Ministry of Supply. Experience showed the importance, first of the Production Department and the Programme Division having the basis on which requirements were calculated explained to them, and secondly the War Office having a reasonable estimate of the production possibility on which they in turn could plan and which they could criticise and argue about from the point of view of operational effectiveness.

So much for the War Office side of the attempt to provide a clear and coherent statement of requirements. In the early days of the Ministry of Supply the initial demands were received and handled by the small branch whose development into the Production Secretariat has already been described. This specialist branch acted as a co-ordinating centre, and maintained up-to-date provision schedules showing how matters stood in regard to the supply of all major items for which the Director General of Munitions Production was responsible. The head of the embryo Production Secretariat was in fact, if not in name, the deputy of the Director General of Munitions Production, and it was upon his authority that the production directorates and the contracts department took action.

Thus from the outset both the War Office and the Ministry of Supply realised the importance, from the point of view of correct

planning, of establishing and maintaining a 'single line' for the despatch and receipt of demands. It was a vital requisite for co-ordinated action that the several provisioning directorates in the War Office should not distribute their demands direct to the various production branches of the Ministry of Supply but should canalise them through one channel to a central point in that department. At the early stage of which we have been speaking, when shortage of labour was not yet a limiting factor, the establishment of the single line was not accepted by all as an obvious need; but its importance was amply proved when a manpower ceiling came to be imposed. When the production programme had to be limited to conform to a fixed allocation of labour, not all requirements could be accepted. Selection of the most pressing items was the automatic result of imposing the ceiling. At that stage the central receipt of demand and their central despatch by the customer department were demonstrated to be vital. From the first, therefore, great efforts were made by the Director General of Munitions Production and the embryo Production Secretariat to establish a statistical branch which would deal initially with War Office demands. Such a branch was accordingly set up as part of the secretariat in November 1939 to act as 'the official channel through which statistical information relating on the one hand to future requirements of the Army and on the other hand the estimated future delivery of stores will be passed through the War Office and the various departments of the Ministry'.

The establishment of a single line, important as it was, was only a means of trimming the great problem of planning to something like manageable proportions. It was always taken for granted in the Ministry of Supply that War Office requirements would fluctuate in accordance with the fortunes of war, and if an account of the major fluctuations is given here, it is merely to illustrate with facts the nature of a process which in principle is well understood. In the summer of 1939, when the Ministry of Supply was founded, the requirements of the Army had been calculated on the basis of the despatch overseas of a field force of thirty-two divisions within twelve months of the outbreak of war in accordance with an agreed timetable. These requirements were for the principal 'warlike' stores only. The initial demands made on the Ministry of Supply in September were on this basis, and the balance of the programme was to follow later; but limitations in available productive capacity imposed a change almost at once, and the schedules received by the Ministry in November were based on a target of twenty divisions to be despatched overseas in the first year, together with certain home requirements. In December there were produced tentative schedules of requirements for the second year of war based on a target of fifty-five divisions, but these again had to be modified and the schedules received in April 1940 were based on a

target of thirty-six divisions with fifty-five as the ultimate goal. In the following month the reverses in France shattered the basis of all calculations, and although the fifty-five-division Army remained as the ambition, the planning of the Army was now based upon a new strategic conception of its role, and both the prospective shortage of manpower and the increase in the rearward services suggested that the ambition was an extremely elevated one.

The events of the year 1941 continued the story of constant change. Following on the agreements with Russia, and the attack by Japan in the Far East with its unpredictable consequences, the schedules of January 1942 had to take account of unknown liabilities, and were accompanied by a warning about the upward trend that future statements would probably show. The next review took place in July and presented similar problems to the War Office, since plans for a campaign in North Africa, the prospect of the opening of a second front, and the development of new equipment introduced new factors. Another important and not readily predictable factor was the changing tactical conceptions and the consequent sudden swelling of programmes for particular weapons. The most important example of this tendency was the growth of the proportion of armoured divisions.¹ The autumn of 1942 was a critical period, with the Prime Minister's concern expressed in a general warning and an order for an enquiry into wastage scales.² The schedules in November 1942 were wider in scope than the previous lists and were calculated on a different basis. They included not only all major items of equipment, ammunition and stores, but also all scarce items and all items involving lend-lease provision. The schedules of May 1943, which covered the years 1943 and 1944 and the first six months of 1945, were based on a complete reassessment of requirements. These now included some U.S. Army requirements, and so far as concerned 1945, were necessarily extremely tentative. The schedules of November 1943, which covered the whole of 1945, included an assessment of civilian requirements for liberated territories in North-West Europe.

At this stage the planned strength of the Army was cut by approximately 3 per cent. and in March 1944 amended requirements were sent to the Ministry of Supply, followed on 31st May by schedules for 1944 and 1945 representing complete provision, and an estimate on a tentative basis for the first six months of 1946. In the autumn of 1944 the fighting in Europe did not allow a reliable forecast of the probable duration of German resistance, and two sets of calculations were made in order to allow for alternative provisioning; but the progress of operations made the picture clearer as the schedules submitted in

¹ See Postan: *British War Production*, *op. cit.*, p. 345.

² See Hancock and Gowing: *British War Economy*, *op. cit.*, p. 442.

December 1944 were based on an intermediate hypothesis. The schedules provided in April 1945 represented a complete and detailed calculation of Army requirements for that year; but, as far as North-West Europe was concerned, the trend of events was now reasonably evident and the final revision of war-time requirements, which included schedules for 1946, were submitted to the Ministry on 7th June.

So the War Office demands fluctuated. Yet it was of course the task of the Ministry of Supply to give to the great section of industry for which it was responsible clear and firm guidance about what was required of it. In order to cover the lengthy cycle of production which applied to most types of war material, it was essential to plan capacity, labour and the supply of war materials well ahead. How was this necessity to be reconciled with the fluctuation of requirements?

At the beginning of the war it was only possible for the War Office to provide general targets sufficient to enable the Ministry of Supply to make a start on large-scale production; but it was necessary to press as soon as possible for a standard procedure which would not only secure uniformity in the presentation of successive demands but would ensure that these would be stated in a shape which would enable the Ministry of Supply so far as possible to meet its obligations to make sound plans stretching far into the future. Accordingly, as the war proceeded, a standard procedure was gradually evolved. For this procedure the position of the Director General of Army Requirements, holding a seat on the Supply Council, was a feature of the greatest importance. Under this procedure requirements as stated by the War Office normally covered a minimum period of twelve months and a maximum of twenty-four months; and, to provide for the inevitable fluctuation, requirements were restated normally at intervals of six months.

It was also necessary to have a clear understanding with the War Office about the extent to which its figures of requirements were 'nett'; that is, the extent to which they took account of deliveries and receipts; and also the extent to which the resources of the Commonwealth—Canada and the other countries covered by the Eastern Group Supply Council—had been taken into account. On the latter question a change in the making of calculations was made in September 1942. Up to that time the War Office schedules covered the requirements not only of the field force, training establishments at home, garrisons abroad, the Air Defence of Great Britain and the demands of other home departments, but also the needs of the Allies and that portion of Commonwealth requirements which the Dominions were unable to produce from their own resources. There was thus some uncertainty as to how much of the Commonwealth production could be regarded as an exportable surplus. From

September 1942 onwards, the War Office calculated their requirements on the basis of all forces in all British theatres of operation, and on this basis the schedules included all requirements for the Commonwealth and Allied forces which were under British operational control, the Ministry of Supply being left to take into account all Commonwealth production which could be counted as an asset against its total requirements.

The War Office schedules consisted of list stores and indicated against each the quantity required to be delivered by the Ministry over the period stated. Under the established procedure the items scheduled normally fell into five classes of important, scarce or special stores. The more important items ancillary to a major item and its associated equipment were included in the schedule or indicated by annotation. Minor items ancillary to the main equipment, and spares, were not included in the schedules; the acceptance by the Ministry of the War Office schedule was held to imply that all orders placed for main equipment carried with them complementary orders for spare parts and minor ancillary stores on agreed scales. All schedules were collated in the War Office under the authority of the Director General of Army Requirements. They were submitted to the Ministry of Supply by formal letter, and were handled in the first instance by the Central Statistics Branch. Non-scheduled items—other than spare parts—were made the subject of contracts demands which were sent by the Finance Branch of the War Office to the production division of the Ministry concerned with the particular stores. The schedules when received by the Ministry of Supply constituted their authority to take executive supply action.

(ii)

‘Programme Review’ and ‘Forecasting’

The establishment of a single line for the passage of requirements, and of a standard method of listing and classifying them, brought the problem of planning output across the threshold of the Ministry of Supply in the most presentable form possible. But it remained a formidable problem, and it rested with the Ministry of Supply to devise the machinery for solving it. In their efforts to do so we may distinguish two complementary activities and three fairly distinct phases. The two activities were known in the Ministry of Supply as ‘programme review’ and ‘forecasting’; and the three phases are associated with the period before Lord Layton’s arrival in the department, the period of his tenure of office there, and the period after his move to the Ministry of Production in 1942. We may first, perhaps, attempt to distinguish the characteristics of the three phases.

The first was brief, and was marked by a kind of planning or forecasting which was elementary and not yet ambitious. When the Ministry of Supply was first set up and the department of the Director General of Munitions Production at the War Office was transferred to it, the records of the production of all munitions during the rearmament programme of 1936-39 were held by the Director General and the embryo Production Secretariat. These officers were intimately conversant with the history of the war potential existing at the outbreak of the war, and they continued in the Ministry of Supply to compile the monthly production return for the main range of munitions stores. When, two months after the outbreak of war, the Central Statistics Branch was established with the functions of assembling the statistical information obtained from the directors general of production and for making such analysis and comparisons of the whole situation as might be necessary for a complete survey of progress, the Production Secretariat acted as critics and co-ordinators of forecasts produced by the production branches before they were sent to Central Statistics; and even when some of the responsibilities of D.G.M.P. had been dispersed by the creation of new directors general for specific ranges of munitions stores, the Production Secretariat remained in practice the agent of the production directorate for weapons and instruments in the compilation of their forecasts. An important function falling originally to the Production Secretariat, and later to the Central Statistics Branch, was to ensure that the forecasts issued were consistent with the area forecasts and any related forecasts and to see that adequate explanations of any changes were provided. Already, during this stage, some fairly ambitious ideas about planning were being expressed; the statistical branch, it was laid down, was to 'make such analysis and comparisons of the whole situation as may be necessary for a complete survey of the work of the Ministry', including, of course, the Raw Materials Department.

But it was not until May 1940, when Lord Layton was appointed Director General of Programmes, with a seat on the Supply Council, that a consistent and far-reaching attempt was made to carry into effect such ideas and even more ambitious concepts. Planning, in Lord Layton's view, was not fulfilling its function unless it concerned itself with the relationship between industrial output and military strategy—unless it opened its eyes to the longest and largest view, and its mind to the widest and most intractable problems. These ambitions were reflected in the official language of Lord Layton's terms of reference. He was not only to co-ordinate the figures introduced by the Production Division and compile statistics, but also to 'report with explanations on the production programmes and their fulfilment'; to be 'responsible for compiling the consequential demands for labour and raw materials and import shipping programmes of the

nation with a view to the necessary departmental action being taken'. In March 1941 the Minister in fact laid down that the Director General of Programmes was to be satisfied with the reasonableness of all forecasts and estimates before they were passed either to the Defence Committee or to the War Office, and that he 'wished to substitute firm programmes of production for the continually revised short-period estimates sent to the War Office'. In this formidable task the statistical branch was Lord Layton's principal instrument. In its full form the Department of Programmes comprised a Central Statistics Division organised in five branches and three other divisions for planning—defined as 'the breakdown of production programmes in terms of building, labour, materials and machine tools'—intelligence and overseas statistics.

The third phase of planning in the Ministry of Supply opened in June 1943 when the Programmes Department resumed its original status of a directorate, and was made part of the charge of the Second Secretary (Supply). The extent to which the decision to discontinue the operations of a 'planner' in the upper hierarchy of the department was due to the decision that this was not a satisfactory arrangement is not easy to determine. There were some who were opposed to the whole concept of a 'planner' who operated, as they considered, in the void, divorced from production. Such a planner, as we shall see, was appointed in M.A.P. in September 1941, and went on from strength to strength. In both the Ministry of Supply and M.A.P., however, there was a strong body of opinion that planning was essentially a task for the production authorities who were actually responsible for output. They alone, it was argued, had individual knowledge of every production unit. The capacities of the management, the precise nature of the plant and buildings, relations between employers and workers, the particular problems to be overcome, the local conditions in respect of labour supply—all the factors which made up the real production potential were best known to the production directors concerned. The discontinuance of the Director General's appointment gives grounds for saying that in the Ministry of Supply at least these arguments were accepted from the middle of 1943 onwards.

So much for the three main phases of planning in the Ministry of Supply. It remains to give some account of the two methods of 'programme review' and of 'forecasting'. We have seen that the establishment of a single line of communication with the War Office was a necessary preliminary to an attack upon the problem of planning by the Ministry of Supply. The problem was very largely that of adjusting output to the fluctuations of demand, and even in the earlier stages of the war when the task falling to each of the supply departments was to build up the maximum possible output in every part of

the field of supply, the inevitable fluctuation in the requirements of the Forces made a constant review of the programme essential. As the war proceeded this need increased, while the business of review became more complex. New sources of supply were developed overseas, but at home the gradual growth of productive capacity was accompanied by fresh limiting factors in which shortages in materials and shortages of labour were the most important. Thus in 1940 and 1941 the progress made in building up production was watched at meetings which were held every week by the Director General of Munitions Production, and at which danger spots in the production programme were selected for special and immediate attention; but by the end of 1941 this procedure required elaboration. It became necessary, in order to secure the best possible results from limited resources in labour and materials, to regulate and co-ordinate the monthly output of each of the major items in the list, to consider each main group of stores separately, to lay down authorised rates of production, and to provide for constant adjustment in these rates in the light of changes in sources of supply and in the volume and urgency of particular demands. The machinery of review, which had served its purpose in the building up of production, was given a more detailed and precise form to meet a situation which had become much more complex.

The central feature of the revised machinery was the series of programme review meetings which were started in January 1942 and held at intervals throughout the war. These meetings, which were attended regularly by the senior officers concerned with supply, were intended to take place once a quarter, but in practice they were more frequent. Thus in 1943, including *ad hoc* meetings convened to deal with major interim changes in Service requirements or with special schemes, the programme reviews of two groups of items alone—weapons and instruments—were held at almost monthly intervals. The task of providing the data for the meetings, which combined the work of many branches and involved a large-scale statistical effort, proceeded continuously throughout the year.

The starting point was the receipt in the department of fresh lists of War Office requirements. Stores common to all three Services were included in the War Office list; but the list had to be supplemented by information obtained from the Admiralty and Air Ministry as to stores special to these departments for which the Ministry of Supply acted as provider. The requirements were examined by the Central Statistics Branch which cleared doubtful points and compiled the schedules used at the meetings. The essential data in these schedules were the estimates shown against each item of supplies of what was expected to be forthcoming under the current production planning, as compared with the requirements tabled. The estimates of output

in the United Kingdom were obtained by the Central Statistics Branch from the production branches concerned with these stores. In the case of production from overseas sources the statistics branch and two specialist branches of the Production Secretariat worked together to produce the figures.

Separate meetings were convened for the purpose of dealing with each main group of stores—weapons, instruments, gun ammunition, small arms ammunition, tanks, engineer and signals stores and wheeled vehicles. The Controller General of Munitions Production normally acted as chairman of the meetings which were usually attended by the Senior Supply Officer, the Second Secretary (Supply), the Director General or other senior officers of the production division concerned with the stores, the Director of Statistics, the Principal Priority Officer, and representatives of the secretariat and of the Finance Division. The Director General of Army Requirements was also present by invitation, in order that he might explain the War Office schedule and provide further information on the background and phasing of the demands put forward. The object of the meetings was always to take decisions and to establish monthly production rates for each of the items shown on the schedules.

This, in outline, was the procedure of programme review for items ordered at home. The machinery for reviewing the programme of orders placed abroad developed under different circumstances, and differed in certain respects throughout. At the outbreak of war the munitions supplies which could be drawn from overseas amounted to little more than rifles and ammunition from India and Australia and shell bodies and small arms ammunition from Canada, although Canada eventually became the fourth largest supplier among the United Nations. In the first six months of war capacity was already in process of development for Bren guns and 25-pounder equipment, and educational orders for other stores were about to be placed when the war broke out.

The story of the development of supplies from the United States, with all its great strategical and political implications, is fully told elsewhere.¹ We need do no more here than glance at some of these developments from the point of view of the particular department with which we are at present concerned. It was in July 1940—in fact upon the 4th July, but whether with any particular sense of historical propriety is not recorded—that the Ministry of Supply sent telegrams to the British Purchasing Mission in the U.S.A. and the British Supply Board in Canada which, by setting out the first large-scale requirements of military supplies, constituted a kind of declaration of dependence upon the New World. Perhaps however it

¹ H. Duncan Hall: *North American Supply*, in this series. (H.M.S.O. 1955.)

would be more correct to look upon it as foreshadowing later events, since this first programme was designed primarily as an insurance against the loss by air attack of home production; and the task of the mission in each country was to develop capacity with all possible speed. Capacity created to cover the programme was eventually spread over both countries in accordance with the facilities which offered themselves. This was known as the 'insurance programme'.

Although requirements were expanded shortly afterwards in approaches made to the United States Government, the insurance programme of July 1940 represented one of the most important features in the early story of overseas supply of army equipment. It set a pattern for a large part of the supplies that eventually were received from Canada, and it was of items included in this programme that appreciable supplies first began to flow. As regards supplies from the United States the position was changed in March 1941 by the advent of the Lend-Lease Act and again in December 1941 by the entry of the United States into the war. But despite these great events, the general picture is one of a strongly increasing programme of supplies from North America.

In the meantime the potentialities of supply from the countries later known as the 'Eastern Supply Group' has been considered. A mission had been sent in 1940 to South Africa, India, Australia and New Zealand with the object of making arrangements about munitions production in those countries; substantial expansions were in fact initiated; and eventually the Eastern Group took its place in the programme of production. The outbreak of war in the Far East however restricted the amount of supplies which could be made available for western areas, and in the framing of production programmes at home the production of the Eastern Group was to a large extent considered as marginal.

We must now once again localise our view in the Ministry of Supply and see what machinery was devised for dealing with all these events. The 'insurance programme' was evolved in the Production Secretariat, which, working in conjunction with the Director General of Munitions Production and the Finance Branch, became the focal point for all proposals to develop or vary production overseas. Two connected branches of this secretariat dealt respectively with North America and the Eastern Group. An important part of the machinery was that all overseas telegrams passed through these branches, who could thus maintain a coherent picture of the prospects of overseas supplies and inform production directorates accordingly. They could also check the proposals made by individual production branches for the placing of orders on overseas sources, although in fact the secretariat branches initiated most of the orders as the outcome of the flow of telegraphic correspondence between

the Ministry and overseas organisation and in the light of the general supply position. This arrangement applied particularly to weapons, ammunition, instruments, signal and kindred stores, and lasted throughout the war. The Service requirements were in fact at that time examined in the light of production prospects at home. Forecasts of the proposals of deliveries from overseas, obtained from the missions in North America and also from the Eastern Group Supply Council which had been established in India, were then taken into account. In this way a comprehensive picture of the supply position as it stood in relation to listed requirements was composed and maintained by the Production Secretariat and the statistics and programme division of the Ministry, and D.G.M.P. held weekly meetings attended by the heads of all production divisions at which decisions were taken both about expansion at home and the need to make further enquiries abroad.

As the flow of supplies from abroad increased, the procedure for formulating overseas programmes was given a more definite and formal character. It was carried out under the immediate supervision of the head of the Production Secretariat. The secretariat and the statistics and programmes organisation worked together and in close concert with the War Office, the British Supply Mission at Washington, the Canadian Department of Munitions and Supply, and the Eastern Group Supply Council. In the case of the United States the War Office was associated closely with the Ministry in the preparation of a programme which was, in the Ministry of Supply terminology, to be 'laid off' in that country, since the British Army Staff in Washington played an important part in obtaining the allocation from the Combined Munitions Assignment Board.¹ What in fact happened was that the Second Secretary (Supply) held a series of meetings, with War Office representation, each covering a particular group of stores, to decide the times and the quantities for which a claim should be lodged. In practice the meetings often coincided with the programme review, and thus served to provide some at least of the overseas figures that appeared in the supply picture with which the review dealt. If the meeting preceded a programme review it was necessary to make assumptions about the production in the United Kingdom and in overseas countries other than the United States, but the fact that the presentation of the general picture was centralised in the hands of the Production Secretariat and of the Statistics Branch, and that the same officers attended both meetings, made it possible to work at either meeting on assumptions which could reasonably be expected to hold good. The programme review meetings took account of the overseas

¹ See Part V, Chapter XX (iii).

element in the total programme, and in some cases, owing to difficulties affecting home production and, later, to provide for the tapering off of orders, called for adjustment in overseas production.

The tables of requirements were prepared by the Statistics Branch, who discussed them with the Production Secretariat. The meetings were held by the Second Secretary (Supply) and were attended by representatives of these branches and of production, and by the War Office as well—usually by the Director General of Army Requirements in person. Frequently, a representative of the British Army Staff in Washington, and usually, also, an officer of the British Supply Mission were summoned from America for the occasion, since the meetings were concerned primarily with the composition of the programme to be presented to the United States. While the meeting might glance, so to speak, at other overseas production, the make-up of these sections of the total programme which related to Canada and the Eastern Supply Group was largely determined in separate domestic discussions.

This procedure was repeated at intervals of six months. The method of presenting the programmes to the United States authorities was of considerable importance. The statement had to be well-informed and to provide a realistic picture; and in order to give it maximum weight the Ministry adopted the practice of sending one or two representatives to Washington on each occasion to assist the British Supply Mission in the discussion. These representatives took with them the tables, the supporting brief, and a good deal of other data bearing mainly on the production and supply situation in the United Kingdom. The War Office similarly sent over one or two officers to help the British Army Staff in justifying the tabled requirements from the point of view of the users.

(iii)

Production Forecasts

We have seen that when the Ministry of Supply was first set up and the department of the Director General of Munitions Production at the War Office was transferred to it, the records of the production of all munitions during the rearmament programme of 1936–39 were held by the Director General and the embryo Production Secretariat. When, two months after the outbreak of war, the Central Statistics Branch was established with the functions of assembling the statistical information obtained from the directors general of production and for making such analysis and comparisons of the whole situation as might be necessary for a complete survey of

progress, the Production Secretariat acted as critics and co-ordinators of forecasts produced by the production branches before they were sent to central statistics; and even when some of the responsibilities of D.G.M.P. had been dispersed by the creation of new directors general for specific ranges of munitions stores, the Production Secretariat remained in practice the agent of the production directorate for weapons and instruments in the compilation of their forecasts.

The activity of 'forecasting' which was begun in the Ministry of Supply in this way was the complement of that 'programme review' which has already been discussed; together the two made up the totality of 'planning'.

The task of the production divisions responsible for forecasting the output from home production was complicated by many factors of uncertainty by which the demands on labour, limitations in materials and the damage done by air attack to machinery and transport were among the most important. In April 1942 it became necessary to take fresh stock of what had been done in the way of providing forecasts. The forecasts, as the Director General of Statistics and Planning pointed out to the Executive, were required by five bodies for different purposes. First, they were for the War Office. Secondly, they were for the Ministry of Production for their examination of the production programmes of all departments. Thirdly, they were passed on to the United States Government by the Ministry of Production for the general purpose of helping to integrate American output. Fourthly, they were used by the Combined Munitions Assignment Board as a basis for their work. Fifth, but hardly last in order of importance, the forecasts were used within the Ministry of Supply itself for balancing the output of components and ancillaries and ammunition against guns. The Minister, in giving instructions to the department as a result of discussion in the Executive, pointed out that the same figures must be used for all purposes. These were, he said—raising a point which was also causing a good deal of trouble and concern in M.A.P.¹—to be as realistic as possible. 'They must be a reasonable anticipation of what will be produced, nicely balanced between optimism and pessimism.' Production directorates were accordingly to make the first assessments with the most carefully-weighed assumptions about labour intake, limitations in materials, components, etc., and to pass the estimates to the Director of Statistics. The latter would examine and reconcile the figures in the light of the general situation and would be responsible for issuing the final figures after obtaining such higher approval as might be necessary. The forecasts in the case of tanks,

¹ See Part IV, Chapter XVIII.

for example, were subject to approval by the Minister himself. The critical examination in central statistics was among other things to discount undue optimism or pessimism, and would balance the picture—tank guns against tanks; ammunition components against complete rounds; filled ammunition against weapons, and so on. The agreed reservation noted in the forecast of home production was that it was subject to materials and labour being available and to the placing of continuation orders in cases where finite requirements had not been stated.

The scope of the forecast varied according to the circumstances and the purposes for which it was needed. By the time that forecasts for Washington were required, main forecasts were provided quarterly, and gave figures month by month for six months ahead and quarterly figures for the next twelve months. Any substantial variations—defined as variations of 15 per cent. or more in a quarter—were to be notified monthly. The United States authorities asked for figures covering a limited range of items, but when the matter came under discussion early in 1943, the War Office wanted figures covering all items in their schedules of main requirements—some 900 items in all. Further, in addition to the main forecast short-term forecasts were required for certain items, and these were provided monthly.

In the general discussion of forecasts which took place early in 1943, the Director General of Statistics and Planning expressed the view that new forecasts to replace those of October 1942 were almost due. The War Office now believed that forecasts for many items not covered in Ministry of Supply programmes could actually be obtained from the production branches—they later admitted that they were in fact obtaining them direct—and felt that these should be collated and made available to the War Office. Forecasts should be by months for the first six months, and by quarters for a further eighteen months. The Ministry of Supply considered that such forecasts could be supplied for major items but that for minor items a block forecast for the whole period ought to be sufficient. They agreed to look into the possibilities, but as late as June 1944 the Central Statistical Office, writing to the Ministry of Supply about the eighteen months forecasts required for the analysis of U.K. output, remarked that the Ministry had in the past had difficulty about providing figures for so long a period, and the department's reply admitted a weakness on this point. But the situation, they said, was becoming more difficult and indeterminate. A guarded promise to do their best was as much as they were willing to give.

With this the Central Statistical Office had to be satisfied although they expressed the hope that the Ministry of Supply target rates would be as realistic as possible, so that they were as likely to

be exceeded as not to be attained. The Ministry of Supply, although their undertaking had been modest, were at any rate determined to live up to it, and in August the Second Secretary (Supply) laid down fresh instructions to this end. The department was to provide, first in regard to a given list of stores of urgent operational importance, the best possible assessment of the supply prospects for the next three months, in the form, if practicable, of a detailed forecast: and in the second place, for a list covering 700 other items, monthly figures for six months ahead and quarterly figures for a further six months. In each case the figures were to be revised every month.

The problem of forecasting, however, in the Ministry of Supply—and as we shall see in M.A.P.¹—proved to be a perennial. In January 1945 the War Office returned to the fray. The '700 list' had not been by any means fully covered; indeed the War Office held long-term forecasts for only about 200 of the 700 items. The position was still 'very far from satisfactory', especially with regard to weapons and instruments; and the Ministry was once again asked to see what it could do to improve matters. This time the Ministry of Supply did not wholly accept the complaints; they did not indeed even agree that the facts were as stated by the War Office. Allowing for some disagreement on facts, however, it is clear enough that the Ministry of Supply had made a great effort in this field, and had gained a good deal of ground. They were indeed still gaining when the war came to an end; but whether any measures of forecasting could ever have given complete satisfaction to the War Office is perhaps doubtful. It is in any case a speculation which lies outside the field of history.

In the earlier stages of the war the official forecast covered production in the United Kingdom only, accompanied in some cases by notes of potential receipts elsewhere. The data required for its amplification when the volume of overseas production became considerable were obtained by somewhat different methods according to the source of supply involved. In the case of Canada the Department of Munitions Supply sent a quarterly statement showing total orders received and deliveries made for all major stores, together with a forecast of further production on the same basis as that adopted in the United Kingdom—that is to say monthly figures for six months ahead and quarterly figures for the subsequent twelve months. Important variations were noted by monthly supplements. In the case of the Eastern Supply Group, the data originally supplied were not wholly satisfactory and suffered from delay in transmission, but in course of time the Eastern Group Supply Council—later the Ministry of Supply Mission—supplied information as to production in India, Australia, New Zealand, etc., in much the same form as

¹ See Part IV, Chapter XVIII.

that obtained from Canada. In the case of the United States, copies of an 'army supply programme' issued by the United States War Department were made available in London through the British Supply Mission and the British Army Staff in Washington. This 'programme' contained a broad forecast of U.S.A. production set against requirements; and, in addition, official forecasts were supplied monthly by the United States authorities through the Central Statistical Office of the War Cabinet in London. These covered all 'assignable' items—and therefore all major stores—and were on lines similar to the United Kingdom forecasts, to wit monthly figures for six months ahead and quarterly figures for the following twelve months. Forecasts of United States production of non-assignable items were cabled each month to the War Office and the Ministry by their respective organisations in Washington.

Fluctuations of requirements, diversity of products, and the unpredictable course of design and development—these were the common problems which all the supply departments faced in their attempts to draw up phases, forecasts, and programmes. The first weighed upon the Ministry of Supply at least as heavily as upon either of the other departments; in the case of the second it bore what was clearly the heaviest burden. What it bore in the way of the third has already been hinted at in the remarks which have been made about the tendency for requirements of particular stores to swell in response to new development. This was a factor which the Ministry of Supply could itself control only to the degree to which it did not depend upon the enemy's initiative or reaction. But to a great extent this was just what it did depend upon; and to that extent there was little that the Ministry of Supply could do about it. Yet what it could and did do formed an important element in its organisation.

CHAPTER XIII

ADMINISTRATION OF RESEARCH, DESIGN, AND DEVELOPMENT

(i)

Early Difficulties, 1939-42

THE ADMINISTRATION of all the processes which were involved in providing the Army with weapons of the highest possible quality was an extremely complicated task, and its history is a chequered one. Some of the reasons why this should have been so are obvious enough. Army weapons—such as artillery and tanks—have no civilian use, and do not readily in time of peace attract the attention and effort which are devoted to ships and aircraft. There are commercial rewards open to those who improve the latter which, at any rate in the inter-war period, were not open to those who improved the former. But commercial rewards were not the only incentive. From the earliest days of aviation eminent scientists have been attracted by the problems of aerodynamics; while British shipbuilding—to give a single example—owes much to the great work initiated by Froude, in the eighteen-seventies, upon the study of resistance and propulsion problems by the use of model hulls. Outside the fields of explosives and ballistics there was little in the development of weapons that offered such attraction. Somewhat less obvious, since it is historically peculiar to Britain among the countries with great war-making potential, was the difficulty arising from the role of the British Army, its lack of what was officially described as a 'single predominant objective'. So long as army planning was governed by a Government hypothesis according to which a major European war was a distant possibility, and imperial policing duties an immediate reality, it naturally concentrated upon the equipment required for the latter purpose. Even when the hypothesis changed it was still necessary to bear in mind all the problems of the very different kinds of terrain in which the Army might be called upon to fight. These problems put a premium upon the knowledge of the experienced Service officer as against the more abstract knowledge of the scientist or engineer, and the War Office tradition, in fact, tended to discourage the scientist and the engineer by placing responsibility for the development of weapons in the

hands of officers who, with a few exceptions, were at the best gifted amateurs, and at the worst not gifted. Thus while both the Navy and the Air Force at the outbreak of war had behind them organisations for research, design and development which were comprehensive, professional and tested by the hazards presented by the sea and the air even in time of peace, this was not so and to some extent could not be so in the case of the Army.

The formal organisation which existed in the War Office in the pre-war period under the Directors of Artillery, Mechanisation, and Scientific Research, has been sketched in an earlier chapter, as has the long series of events, discussion, and plans which led to the setting up of a Ministry of Supply.¹ The recommendations concerning the creation of the Ministry which were accepted in principle by the Cabinet in April 1939 included the proposal that the new department should take over the functions of research, design and experiment in connection with the stores which it would supply, on the understanding that the user departments should remain closely associated at all stages of design. Consequently the Ministry of Supply became responsible for these functions, and also for the investigation and recording of inventions. This meant that it took over every process concerned in the improvement, not only of weapons, but of stores of all kinds, from the most abstract thought and the origination of new ideas, through the design of equipment, the development of designs through the experimental stages, passing them through trials, and ensuring that they were suitable for manufacture in quantity, until the stage was reached when they could be approved by the Services and handed over to the production authorities.

In the War Office, the Director of Scientific Research, the Director of Artillery and the Director of Mechanisation were all officers of the Munitions Production Department which was transferred to the new Ministry upon its formation. The technical and research establishments of the War Office were also transferred. These included three important bodies which worked for all three Services under the control of the War Office, and which have already been referred to—the Ordnance Board, the Research Department, and the Design Department. The Ordnance Board was different in nature from the other two bodies. It was a headquarters organisation, responsible for planning, controlling, and directing; the two ‘departments’, housed in the inter-war period at Woolwich, were in the nature of outstations or establishments carrying out the actual laboratory or drawing-office work. The bodies transferred also included three experimental establishments more or less in the nature of ranges, two establishments concerned with chemical

¹ See p. 19 *et seq.* and p. 68 *et seq.*

defence, the Mechanisation Experimental Establishment, and four other establishments for signals, air defence, bridging and demolition. We must now see how this War Office organisation fared in the Ministry of Supply.

The key position was that of the Director of Scientific Research. The post, in 1939, was not long established, being only a year old, although the creation of a civilian directorate had been recommended by the Duckham Committee as early as 1926, and both the Admiralty and the Air Ministry had created equivalent posts before that date. By this appointment, which gave the Director access to the Army Council through the Director General of Munitions Production, the War Office gave scientific method a distinct voice of its own in weapon development. The post was intended from the first to be an important one with wide responsibilities; the Director, in collaboration with the technical branches, was to be responsible for all research, to represent the War Office on interdepartmental research organisations, and to watch and report on foreign work. The difficulties which lay in his way had shown themselves before the appointment was transferred to the Ministry of Supply; they had been revealed by the Duckham Committee and more will be said about them later in this chapter. The establishments, in which the research which D.S.R. was supposed to control was actually carried out, were responsible not to him, but to his military colleagues, the Directors of Artillery and Mechanisation, who maintained control, independently of one another and of D.S.R., over their own blocks of work. This, at any rate, was the picture as it presented itself to the new director, and he deplored it freely. But although an investigation was carried out at the end of 1938 the authorities declared themselves opposed to making drastic organisational changes at so critical a time. Yet changes were badly needed. Research in weapons was cut off from the general body of public scientific work, and though D.S.R. had attempted to remedy this condition he had not met with great success. His main remedy had been the formation of an advisory committee of scientists which would be responsible directly to the Secretary of State, but although this proposal was approved, it was held up because of the transfer to the Ministry of Supply, and the Scientific Advisory Council did not begin its distinguished career until 1940. A scheme for extra-mural research was planned in the months immediately before the war, but although this also was successfully developed later, it was not more than a plan and an ambition when the Ministry of Supply came into being.

Thus the organisation which the Ministry of Supply took over presented formidable problems of principle and practice. These included the question of D.S.R.'s headquarters control of the establishments; the question of military control within the establishments;

the separation of blocks of research and development work; and the isolated situation of research in weapons as a whole. That all the problems were connected with the one big problem of the 'civilianisation' of research and development would hardly be denied now, although differing opinions about the closeness of the connection are no doubt still maintained. If the pre-war system of placing all control of research and development in weapons in the hands of serving officers now seems archaic, it can be demonstrated that in fact it achieved some remarkable successes. The Design Department had maintained competition in design with its only serious commercial rival, Vickers, and had no reason to be dissatisfied with the results; they included the 4.5-inch gun for the Navy and the Army, the 14-inch and 8-inch naval guns, and for the Army the 25-pounder, the 21-lb. Mark X tank gun, and the 4.5-inch A.A. gun. The Research Department was responsible for the celebrated explosive which bore its initials—R.D.X. Nor was the system defended only by results; it was widely although not universally accepted and did not lack defenders even among the civilian scientists within it. Yet the problems were serious, and serious as they were another emerged in the Ministry of Supply. This was what might be called the problem of supreme control. The Director of Scientific Research was placed initially under the Director General of Munitions Production; then, from May 1940, under the control of the Permanent Secretary; and in October under 'the general supervision' of Lord Weir, Director of Explosives Production. The directorate was now in itself a fairly elaborate organisation, comprising six branches, dealing with physics and engineering research, general chemical and metallurgical research, patents, inventions, the secretariat of the Advisory Council and the administration of the staff for scientific research. It also operated the extra-mural research scheme, and was made officially responsible for all imperial and foreign scientific liaison.

It is not difficult to read in the changes of supreme control the doubt and uncertainty which existed in the Ministry of Supply about the organisation of research and development. Fundamental doubts about the concept of a Ministry of Supply responsible for research and development were hard to get rid of. As late as 1942 the President of the Ordnance Board—a vice-admiral—gave these doubts their most pointed expression by saying that 'A Ministry whose principal concern is production (the antithesis of development) stands between the Board and the initiators of requirements in the field of battle'. If development were really the 'antithesis' of production, it is not surprising that the Ministry of Supply was uneasy about it. In any case its direct responsibility to the Permanent Secretary, although a noteworthy tribute to his position in the department, was an organisational abnormality which could only be temporary. But

even with the return of research and development to production control there was still no voice in the Supply Council which spoke for it exclusively. The problem was complicated by every extension of the Ministry of Supply's responsibilities. These included the acquisition from the Ministry of Home Security of responsibility for methods of dealing with unexploded bombs; the beginnings of operational research; and the formation of the Directorate of Projectiles Development to handle the work of rocket research which had been started in 1936. This new directorate had first reported direct to the Minister, but in May 1941 was transferred to the control of the Director General of Munitions Production. By July 1941 the branches under the control of the Director of Scientific Research had increased to eight, the seventh and eighth dealing respectively with imperial and foreign liaison and with unexploded bomb research, including the production of apparatus. At this stage therefore research in its general aspect was in the hands of the Director of Scientific Research, reporting to the Director of Explosives Production, while research in special fields leading to weapon development was associated with the development work in the hands of the technical directorates serving under production chiefs.

It is not surprising to find that the Minister wanted to try the experiment of a more independent and coherent organisation. In July he appointed an adviser to the Ministry on development and design, and in the following months all research, design and development branches were removed from the control of production and brought under the adviser, who was now appointed Controller General with responsibility for the whole field of research and development and the status of Council membership. The Controller General was made responsible for the initiation, conduct and progress of all research carried out in the Ministry of Supply establishments or extra-murally. This step followed very closely the strengthening of the M.A.P. organisation by the appointment of a Controller of Research and Development,¹ but the differences between the circumstances in the two departments were such that even without the differences between the kinds of persons appointed it would hardly be necessary to look for any copying by the one department of the other. The M.A.P. appointment revived the tradition of putting a senior Air Force officer in control of research and development, where he could act as a knowledgeable 'user', and also bring to bear a degree of technical knowledge. The equivalent in the Ministry of Supply would have been a high officer of the General Staff. In fact the person appointed was Mr Oliver Lucas, who, although he had some scientific background, was primarily an

¹ It should be noted, however, that Sir Henry Tizard was already a member of the Aircraft Supply Council, representing the research and development interest.

industrialist and production expert who had achieved particular success in the field of tank components. His appointment was a recognition of the need for strengthening what was weak in the Ministry's control of research and development, the autonomy of the establishments and the overlapping of their work; the whole situation of military control with the difficulties which it raised of procuring staff; and the lack both of internal and of external liaison. When completed, the new organisation consisted of eight directorates serving under the Director of Artillery for weapons and ammunition; controllers for physical research and signals development, chemical research, chemical defence development, and projectile development; a Chief Engineer for Tank Design; a Director of 'naval land equipment', a name which concealed the project for a very heavy tank; and a Director of Technical and Military Administration. This last was an organisational experiment of some interest. It dealt with the administrative questions which arose in the establishments, such as buildings, lands, machinery, stores, vehicles, finance, salaries and wages, and so on. The word 'military' was included in its title because it took over the administration of all military personnel in the Ministry, whether at headquarters or outstations. The research and experimental establishments now numbered fourteen and were all responsible to the Controller of Research and Development with the exception of the experimental bridging, demolition, tunnelling and wheeled vehicles establishments which were left responsible to the Director General of Mechanical Engineering. The wheeled vehicles experimental establishment was formed in March 1942 and the tunnelling establishment was transferred to the Ministry in the same month. The special stores experimental directorate, known by the non-committal title 'M.D.1.', reported direct to the War Cabinet.

(ii)

The Guy Committee Reforms

It was clear that the new Controller General would initiate reforms, and he had not been in office very long before he put on record his 'serious concern' about the organisation of the Research and Design Departments. There had been, he said, 'very considerable criticism of their efficiency and speed of work'. This was very true and none the less so because the criticism had been expressed over a period of at least sixteen years, since the Duckham Committee (1926) had reported adversely on many inadequacies and imperfections, including both the quality of the technical officers and the vagueness of the functions of the Ordnance Board. The Llewellyn Committee, which

had covered much the same field in 1939, still found much that was unsatisfactory, especially in that the two departments were overloaded with experimental work, that experimental demands were uncoordinated, and that there was great need for a national system of priority and for closer contact with the user. The suggestion in this report was that the Research and Design Departments, and even the Ordnance Board, had been treated as servants who were told to carry out orders, and not as colleagues to whom full information should be given upon a basis of intelligent and friendly co-operation. The criticism, then, was long standing. Yet it is probable that the Controller General was in fact referring to criticism which had been voiced more recently. It had come from various sources, most notably from a committee under the chairmanship of Lord Hankey, which had been set up by the Scientific Advisory Council and which had gone so far as to recommend the retransference of the Director of Artillery to the War Office and the re-establishment of the office of Master General of the Ordnance. As more immediate remedies for the current state of affairs, however, the Hankey Committee had recommended that the Ordnance Board and the Research and Design Departments should have more liaison with the user in the field; that the scientific staff should be given a greater position; and that whether the heads of the two departments were military or civilian, they should be chosen for their experiences in research or design. Another critic was the President of the Ordnance Board, who was also interesting himself in the organisation for research and development of weapons. In a memorandum addressed to the Controller of the Navy he remarked *inter alia* that the duties of the Research Department demanded wide scientific knowledge which serving officers could not be expected to have or to acquire. He also doubted whether conditions in the department had been such as to attract and hold the best men, and the conclusion which he drew about development as a whole was that it was 'an unwanted foster-child and has been treated as such'.

The result of these expressions of concern was the setting up of a committee, under the chairmanship of Dr H. L. Guy, which reported in August 1942.

The report of the Guy Committee was among the most important documents upon the organisation of research and development by the Government to appear in the course of the war. Its proposals were sweeping—although there were some who regretted that they were not even more sweeping—and, as we shall see, they were given effect. The committee recommended in the first place that a scientist of high standing should be appointed as head of the Research Department with the title of Chief Superintendent of Armaments Research, and status and emoluments not less than those of the Director of the

National Physical Laboratory. Service personnel were to be nominated by the Service directors in conjunction with the Chief Superintendent to be members of the latter's staff. Excessive centralisation, of which the committee found some evidence, was to be relaxed. A somewhat less definite, but none the less important, clause suggested that the Chief Superintendent should take 'such steps as seems to him necessary or desirable to foster enthusiasm or initiative. . . .' The radical nature of these recommendations may not be at once apparent. They were however summed up by one of the members of the committee who commented that they amounted in all to the replacement of military technical officers in control of the establishment by scientists. Radical as the Guy Committee's proposal was, comments within the Ministry of Supply included expressions of regret that it had not analysed the whole principle of 'military user control'. The Ministry of Supply in fact tended to take the view that the report as a whole was not radical enough, while the Service departments on their side clearly felt a good deal of uneasiness about departing from the long-established principles of military control. The case for such a departure was, however, universally admitted to be clearest in the Research Department, and the recommendations of the committee in regard to the department—henceforward called the Armament Research Establishment—were put into effect without modification.

The effects of the changed organisation were very marked. The new Chief Superintendent, Professor Lennard-Jones, F.R.S., having come direct from Cambridge, was in close touch with the academic world and was able to obtain, for the superintendencies which had been brought into being, a number of distinguished academic scientists, including four Fellows of the Royal Society. The establishment thus had the benefit of new minds and new methods, as well as of functional innovations. Of these functional innovations the most noteworthy was the setting up in September 1943 of a branch, consisting very largely of mathematicians drawn from Cambridge and the Ordnance Board, to undertake theoretical research. It was formed in the belief that a close study of fundamental principles would often suggest the most profitable line of experimental work and, further, that a systematic analysis of the results of experiments would lead to discoveries or new methods which would otherwise be missed. The branch thus formed part of the attempt, which was from the administrative point of view the most significant and interesting feature of these reforms, to introduce some elements of system into a process of scientific advance which in the short term appears to depend upon accident and to be independent of 'practical' aims. It was an attempt, in brief, to make the right sort of accidents likely to happen.

In the case of the Design Department also the recommendations of the Guy Committee went a long way to meet the other criticisms

which had been made. In the first place its formal status was raised considerably. It was affirmed that, subject to the requirements of the programmes of the appropriate directors in the supply departments, the head of the Design Establishment—as it was now designated—should be established as the authority on armament design and responsible for the conduct of the work in his department. It was recognised that there had been insufficient liaison with the user, and the report went on to say that it was desirable that the Establishment should be in closer contact with the Army and that the Ministry of Supply and the War Office should, in collaboration, take steps to achieve this object. The insufficiency of information given by the ordering authority was, as we have seen, an old grievance. But now the Establishment was empowered to initiate design projects. The Guy Report said that the technical directorates, the research departments and the Armament Design Establishment must be motive forces in initiating and pursuing the development of weapons and for that reason there should be at all stages the closest possible co-operation between the directors, the Establishment and the Service operational staff with the free exchange of information. Lack of experimental facilities for production had been another trouble. The Guy Committee enunciated the principle that the ultimate test of production must be the volume of suitable material which is produced and issued to the Services.

The experimental production requirements for a progressive armament development policy (the Report read on this point) are very small in relation to main production requirements and should and can under the direction of the Chief Production Officer of the Ministry take precedence over normal production. In order to preserve proper balance within the Ministry on such matters the heads of the Research and Armament Design Departments should be able to deal on a basis of equality of status with the Directors General responsible for production.

As was to be expected, however, the main recommendations about the Armament Design Department were concerned with staffing. There was to be a change in leadership. A highly qualified and experienced engineer was to be appointed by the Ministry of Supply in consultation with the Admiralty and the Ministry of Aircraft Production with status and emoluments identical with those of the post of Director of Naval Construction. Nor was it only at the top that there was to be a bold departure from the cheese-paring methods of the past. The staff was to be strengthened by the establishment of an engineering section of highly trained and experienced mechanical engineers headed by four to six principal design engineers, with supplementary lower-category design engineers to provide a team of about forty in all. They were to be recruited from the best men

available whether inside or outside the Establishment. This staff was to be additional to and superimposed on the existing organisation and would first concentrate on new work or special investigations then needed, and later would be infiltrated into the sections. In due time the Chief Engineer of Armament Design—as the new head was called—was either to introduce new highly qualified designers into executive posts in existing sections or confirm in or promote to such posts from existing Service or civilian staff, the choice being made on grounds of suitability alone. The number of senior design officers was to be increased. The principle of promotion primarily by seniority was to be abolished and in addition further means were to be found for rewarding merit apart from promotions. Lastly, in order to meet the difficulty in obtaining draughtsmen, design work was to be placed with industry to a greater extent than had been done in the past.

These proposals put a formidable concentration of authority into the hands of the Chief Engineer of Armament Design. Provisions were, however, made to safeguard Service interests. When a civilian engineer took over a post previously occupied by a Service officer the Chief Engineer of Armament Design would, in consultation with the Directors of Naval Ordnance, the Director of Artillery, or the Director of Armament Development, arrange to put into the section affected a Service officer or officers to supply Service knowledge and experience and to ensure that designs fulfilled Service requirements. For this purpose it was essential that some of the Service staff should have up-to-date user experience. They were therefore to be frequently changed and drawn from various sources including the maintenance and gunnery services.

There were to be various administrative improvements. The existing administrative branch of the Establishment was to be replaced by a new branch under a secretary who was to be directly responsible to the Chief Engineer of Armament Design for the administration of the headquarters and outstation branches of the Establishment. He was to be responsible for providing efficient administrative service to the technical staff and relieving them as far as possible of routine correspondence and returns, while exercising no technical control over the work of the Establishment. Each section and outstation was to have its own administrative and clerical staff, posted to it by the secretary and forming part of his department, but responsible to the local head of the section.

Finally, the authority of the Controller General of Research and Development over the Design and Research Establishments was confirmed. As the Establishments were under the Ministry of Supply the committee considered that the Controller General of Research and Development should be responsible for their general administration and for ensuring that they were adequately staffed and properly

equipped to fulfil the functions required of them by all the ministries concerned. The heads of the Research and Armament Design Establishments and the President of the Ordnance Board should, they considered, be directly responsible to the Controller General of Research and Development in so far as their establishments were properly and efficiently organised. But the ordering authorities, the Director of Naval Ordnance, the Director of Artillery and the Director of Armaments Development should continue to be responsible for formulating the programmes of work and for approval of the work when performed as satisfying the requirements of their respective services.

In the main, any changes in the status and functions of the Ordnance Board were to flow naturally from the changes expressly and specifically made in the Design and Research Establishments. The committee made it clear in their report that they regarded the functions of the Ordnance Board as advisory and that it should be executive only in so far as was necessary to stage and carry out trials. The duties of the Ordnance Board were to advise the technical armament directorates of the three Services on such armament matters as were referred to it by those directorates. Its advice could be sought when required by the ordering authorities, the Research Department and the Design Department. The Board's function as the disseminator of knowledge of armaments development between the three Services and authorities was emphasised. It was to continue to report its opinions and recommendations on these matters together with the results of tests and trials it carried out and also the views and comments of the responsible technical establishments and officials associated with the investigations. In order to carry out its function of disseminating information about armaments certain of its powers were confirmed. It could ask the Design and Research Departments for any advice in designs, investigations and trials. It could consult any other official body or persons associated with scientific and technical development including advisory committees. It could stage and order trials and order the material required for those trials.

The recommendations of the Guy Committee have been recounted at some length because they were accepted and put into effect almost without exception, and because it is not too much to say that this inaugurated a new era in the whole of the field with which we are concerned. If it is an exaggeration to say that they professionalised and civilianised research and development in armaments, they at least took a great and liberating step in this direction. Among the valuable effects of the open field now provided was that it enabled the Service expert to emerge at the top uncompromised by lack of competition: the first head of the Design Establishment under the new regime was a retired naval officer.

These very important reforms were carried out during the period when research and development in the Ministry of Supply were organised separately and independently under a controller general. This period, as we have seen, was initiated in August 1941; it came to an end in October 1942. It came to an end because of the formation of a new armoured fighting vehicles division, a step which reflected the great difficulties into which the tank had been running. If the next stage of organisation is to be understood something must be said here about the way in which the Ministry of Supply had administered the development of armoured fighting vehicles.

(iii)

Armoured Fighting Vehicles

In the inter-war period tank development had been one of the responsibilities of the Director of Mechanisation, acting with the advice of the Mechanisation Board; of the two committees of which the Board was composed one was responsible solely for tanks. The official instrument for the design of tanks was the Superintendent of Design at Woolwich. The Mechanisation Experimental Establishment, despite its name, was no more than a proving establishment. Apart from the official design organisation the design of tanks was the responsibility of industry, of which Vickers-Armstrongs was the only representative with serious claims to design honours. The procedure was, in outline, that the Director of Mechanisation, in collaboration with the Mechanisation Board, drew up a specification in accordance with a staff requirement; this specification was passed either to the Superintendent of Design or to Vickers-Armstrongs; and the result, when ready, was tested by the establishment. Since the finance allocated for development in the inter-war years did not allow the production of more than about one pilot model tank per annum, the possibility of a highly experimental tank proving a complete failure was an exceedingly grave risk. Everything was against the genuine research project. It was a system which provided some very fine pieces of mechanical engineering, but it did not provide, and hardly pretended to provide, any considerable body of theoretical knowledge about the tank as a weapon. The system, indeed, was associated with the tendency to regard the tank as a composite of gun and vehicle, and not as a unique entity with complex engineering qualities of its own. Designers were in general men who knew either about guns or about transport, and tanks were frequently excellent in the one respect and extremely bad in the other. And while eminent engineers were consulted about particular problems, they were not consulted

about the one really fundamental problem of combining good guns with good vehicles.

The outbreak of war did not change the essential features of the system. Firms other than Vickers-Armstrongs entered the design field, but Ministry of Supply policy in the early years of the war was that the design of tanks was a function of firms which could also undertake their production, while the Department of Tank Design within the Ministry was restricted to modifications of existing types. Meagre as this responsibility was, moreover, the department was not always able to fulfil it. The case of the Crusader was outstanding in this respect. The firm, Nuffield Mechanisation, were given a free hand in meeting the specification, and did not consult the Department of Tank Design, who had no say until they saw the prototype. Their report on this, made in the autumn of 1940, was unfavourable, but was little regarded, and the Crusader was, in fact, as late as 1942, practically unaltered in the points in which it had been criticised. It was only very gradually that the Department of Tank Design was able to emerge from this humiliating position. It was some time before it was able to exert even so much influence over design as had been exercised by the Director of Mechanisation and the Mechanisation Board. In due course, however, the firms themselves began to seek its advice and it was accepted after a time as the authority for approving new types and finally as an actual source of designs. Thus by the middle of the war the Department of Tank Design and a number of firms were all capable of design work.

There had come into existence also a co-ordinating body, the Tank Board, which was supposed to bridge any gap that might have appeared between the War Office and the Ministry of Supply. The Tank Board had been set up originally, in May 1940, to investigate the organisation of tank design and production with special reference to the Churchill, and it had acted as an adviser to the Ministry of Supply. It was the Tank Board which had brought into being the Director General of Tanks and Transport and constructed the Department of Tank Design out of the Mechanisation Board. When it was reconstituted in January 1941, however, it was to play a more continuous role and to assume executive responsibilities, it was to 'take decisions' upon both design and production, and its main responsibility now lay in the direction of satisfying War Office demands. It consisted of the heads of design and production in the Ministry of Supply on the one side and on the other of representatives of the General Staff. It was also now expanded by the addition of representatives of the main tank firms.

But to the supra-departmental authorities, to Parliament, the press, and the general public, the improvements in liaison between the two departments, or within the Ministry of Supply's internal organisation

for tank design and development, were at the end of 1942 merely one point of anxiety among many. The whole subject of the tank was surrounded by the liveliest agitation and the gravest anxiety. No knowledgeable critic had the slightest difficulty in producing a daunting array of organisational anomalies and design failures; the development career of *Covenanter*, *Crusader* and *Churchill*, with the almost endless story of modifications, made it clear enough that something was wrong. There is, indeed, no doubt that more than one thing was wrong, and that some of the faults lay outside the Ministry of Supply and outside the scope of this account. They must be sought, by those who are concerned, principally in the failure of the General Staff to produce a forward policy for tanks up to the end of 1942. Within the Ministry the trouble lay in the organisational gap between design and production. User criticism—which arrived in a plentiful stream—had to be used by the design authorities in arguments with the production side, over which, however, they had no authority. The production side, on the other hand, although under continuous pressure to improve quality at the expense of output, were unprovided with reliable information about design trends. In the summer of 1942 the situation had become so serious that the head of tank production felt constrained to warn the chairman of the Tank Board of the possibility of ‘a complete breakdown in the supply of tanks to the Army’. In the following month three leading manufacturers also made a statement deploring the clash of interests within the Ministry. It was clear that some drastic step must be taken.

(iv)

The Final Organisation: 1943-45

Accordingly, in October 1942, responsibility for research and development in armaments as a whole in the Ministry of Supply was divided between three high officers, of whom two also had production responsibilities. One was the Chairman of the Armoured Fighting Vehicles Division, who was given a director general for armoured fighting vehicle research and development as well as a director general responsible for production. The second was the Controller General of Munitions Production, who was served by the Director of Artillery (promoted to director general in the following January) responsible for the design of all weapons and ammunition for the Army except rockets; the Director General of Mechanical Equipment, and the Director of Scientific Research (promoted to Director General in March). The third was the new appointment of Senior Supply Officer, held by Admiral Sir Harold Brown, to whom was assigned

the co-ordination of work done for the ordering and approving authority by the Research and Design Departments and the Ordnance Board, and who carried out this work as chairman of an inter-Services committee, the Armament Development Board, created for inter-Service conference of research, design and development in the field of armaments. The Director General of Scientific Research and Development now had charge of the work of various controllers who have already been referred to and who were responsible for chemical defence, chemical research and development, physical research and signals development, projectile development, and the advisory service on welding and the technical application of metals. In addition to having these direct controlling responsibilities he was recognised as the chief scientific officer in the Ministry, the executive officer of the Scientific Advisory Council and chief officer for scientific research staff. Thus the experiment of 'independent' control of research, design and development came to an end. It came to an end not because it had been a failure in itself but fundamentally because it was no longer necessary to protect development interests against production. The phase of the war in which such protection had been necessary was now over. Before Dunkirk the user knowledge necessary to achieve a balance between development and production had been lacking; after Dunkirk production had been all-important; then had come a time when it was necessary to restore development to its proper place. By October 1942 that object had been achieved. In regard to tanks there was no longer any voice to decry development; in Parliament and the press the importance of quality was constantly being emphasised. Over the rest of the field there reigned the influence of the new heads of the Research and Design Establishments, respectively an eminent scientist and an eminent engineer. By means of the Scientific Advisory Council and the extra-mural research scheme the Ministry of Supply was able to draw upon the resources of academic and industrial scientific effort. In December 1942, for example, 186 research and development contracts were in operation with 114 different firms; 60 teams were working in 16 universities; there were 30 research contracts with 14 research associations, 11 research agreements with 6 other institutions and 67 investigations were being carried out by the Department of Scientific and Industrial Research on behalf of the Ministry of Supply.

There was now, in any case, a new interdepartmental scientific organisation which was already undergoing a process of co-ordination. In October 1942 the Minister of Production had appointed scientific advisers, and at that time the Director of Scientific Research in the Ministry of Supply was the sole channel of communication between these scientific advisers and his own department; but under the new departmental organisation there were three channels—the

Chairman of the Armoured Fighting Vehicles Division, in regard to fighting vehicles, the Senior Supply Officer in regard to armaments, and the Director General of Scientific Research and Development in regard to other research questions. The responsibility of the work of the technical establishments followed the division of responsibility as a whole between these three high officers. The existence of an inter-departmental organisation—even of a fairly rudimentary kind—tended to give coherence to scientific endeavour as a whole and worked against any tendency towards divergence of aim on the part of the three controllers.

With minor changes, this was the shape which the Ministry of Supply organisation for research and development bore until the end of the war. In December 1943 the two directors general for fighting vehicle production and research were combined in one post, and in December 1944 the post of Chairman of the Armoured Fighting Vehicles Division lapsed and the directors general emerged with the responsibility for the whole of the division. The changes announced after the end of the European war did not affect the Armoured Fighting Vehicles Division, but altered both the responsibility and the title of the Director General of Scientific Research and Development and, incidentally, the responsibility of the Senior Supply Officer. The object was stated to be 'the closest possible integration at the director general level under the Controller General of Munitions Production of research and development with the related production'. Under the new organisation the designation of the Director General of Research and Development was to be altered to Chief Scientific Officer and he was to be relieved of day-to-day executive responsibility for research and development and placed a little above the battle so that he might see the more clearly how to dispose of his forces. The Directorate of Projectiles Development was made responsible to the Senior Supply Officer, and chemical defence development, signals and radar development were to be transferred to the appropriate directorate general of production. The main responsibility of the Chief Scientific Officer was described as the co-ordination of the programme of general research and development activities in the Ministry, and the general oversight throughout the Ministry of methods employed in scientific research. His direct charge, after making the transfers mentioned, would cover, as before, general physical and chemical research, metallurgy, the allocation and use of the staff for scientific research, and various common services. This was the new organisation announced in June, but the major changes had not been carried out when the war in the East ended in August.

This 1945 organisation has nevertheless considerable importance because it shows that the tendencies which were at work in the mid-way reorganisation of 1942-43 were unexhausted at the end of the war.

The organisation of 1943-45, although it placed research and development under production chiefs, did not, as we have seen, involve a return to earlier conditions. It continued to throw the science of weapon development open to outside influences rather than to isolate it as the preserve of specialists. The Director General of Scientific Research and Development of the period defined the duty of research and development as that of ensuring that every item of military equipment for which it was responsible did actually represent the latest and most complete embodiment of all that science and technology, design and the modern production method could individually and collectively offer, and he listed among its objectives first the abundant use of external resources of scientific advice and assistance throughout the Commonwealth; secondly, close-working partnership between military and civilian; and thirdly, close relationship with production and users. The setting up of the Scientific Advisory Council and the scheme for extra-mural research had been the initial steps; and in the matter of imperial and foreign liaison a special branch was formed in the Directorate of Scientific Research devoted entirely to this work, to be followed in January 1941 by the institution of a British Central Scientific Office in Washington in which the Commonwealth countries participated. Every month high-level meetings were held to review the programme of research and development in each major field—field weapons, rockets, signals, radar, chemical warfare, metallurgy, chemistry, and so on; and at these meetings civilian scientists were present as well as the War Office directorate concerned and the directors general of production.

Liaison with the user in the sense of the user's being associated with design is a subject which has already been touched upon. Its successful development belongs mainly to the period 1943-45. In March 1942 it was agreed with the War Office that formal notification of General Staff requirements in the field of design specification and development of warlike stores should be made to the Ministry of Supply in the form of an official letter originating from the Assistant Chief of the Imperial General Staff; but the department was reminded at the same time that the fullest co-operation between the two departments must continue both before and after the formal acceptance of requirements. Apart from the inclusion of military officers on the staffs of the technical establishment, the technical directorates at headquarters maintained continuous touch with the War Office in joint discussions and reviews of progress. But the Ministry of Supply also maintained direct touch with the users in the field. The Director General of Artillery, for example, had representatives in theatres of war attached to the headquarters of the General Staff, and these representatives made reports to the Ministry which were also passed, through the Commander-in-Chief, to the

War Office. Further, the Army Operational Research Groups, originally confined to anti-aircraft weapons, expanded their work to wider fields, and were controlled by the Director General of Scientific Research and Development in liaison with the Scientific Adviser to the War Office. There were also formal bodies for joint consultation. For the general direction of research there was the Scientific Advisory Council, and for design and development there were joint committees—of which the Tank Board was the most important—dealing with specific fields. Also important among these was the Armament Development Board of which the Senior Supply Officer was chairman and which was created to confer on armament research, design and development, with particular reference to the work carried out by the Ordnance Board and the Armaments Research and Design Establishment for the three Service departments. It included the heads of the three establishments together with representatives of the user services. For chemical defence there was the Chemical Defence Board, a direct successor in the Ministry to the Chemical Warfare Committee set up by the War Office in 1921. On this, too, the Service departments were represented. Outside the Ministry the department was represented by four senior officers of a Weapons Development Committee, formed by the War Office in July 1942, for the purpose of deciding and pressing forward the weapon development in correct priority. In December 1942 the Minister of Supply, answering a questionnaire from the Minister of Production and the Secretary of State for War, stated categorically that he was satisfied with the liaison between his department and the user, both in regard to armoured fighting vehicles and other weapons. It was also specifically stated that the Director General of Artillery and the Director of Scientific Research were 'in continuous touch and effective liaison' with the Scientific Adviser at the War Office. Finally, from June 1944 onwards there was a Joint Committee of Research and Development Priority set up by the Chiefs of Staff Committee of the War Cabinet, on which senior representatives of the user and supply departments considered questions of priority between projects for which different ministries were responsible.

What may be considered as a parallel development was, meanwhile, taking place within the War Office itself. The Deputy Chief of the Imperial General Staff, by creating the post of Scientific Adviser to the Army Council with the object of formulating programmes for research and development, was an architect of the new regime. D.C.I.G.S. was indeed more or less intimately concerned in all the developments which have just been described.

The temptation to look upon the history of the administration of scientific research, and of design and development, in the Ministry of Supply, as the history of a contest between reactionary soldiers and

progressive civilian scientists and technicians, with victory going to the latter by 1943 and being consolidated during the last two years of the war, is a temptation to which the historian must not too readily succumb. The military were by no means all reactionary; the President of the Ordnance Board, at the time of the Guy Committee, expressed himself more strongly against the *status quo* than did any civilian; the second head of the Design Department under the new regime was a naval officer, and other serving and retired officers were pressing for reforms when some scientists were confounding them both by doing admirable work and by expressing no discontent with their conditions. Nor did the issue rest simply between scientist and soldier. In the discussions which followed the publication of the Guy Report, it was the senior administrators who expressed most freely their sense of disappointment that the proposals were not more radical; they had always been opposed to the principle of 'military user control'. Yet when one compares the freedom and authority enjoyed by the civilian scientists and technicians, both at headquarters and in the establishments, in the period 1943-45, with the isolation and subjection of pre-war days, the change is among the most striking features of the organisation of British war production, and it would be obscuring the issue not to represent the process as essentially one of liberation.

PART IV

Administration of Departments:
Ministry of
Aircraft Production

CHAPTER XIV

THE ORGANISATION OF M.A.P., 1940-45

(i)

The Transfer of Responsibilities from Air Ministry to M.A.P., May 1940

WE NOW RETURN to the history of the organisation of aircraft production, which we left at a critical point.¹ The Ministry of Aircraft Production, which was created by Order in Council dated 17th May 1940,² was very much a child of crisis. It came into being, at least so far as the public was concerned, almost entirely unheralded, and its creation was one of the sensations of a sensational period. The manner of its advent gave it the appearance of having been conjured out of nothing. In fact, however, the mere creation of the Ministry was not in itself a particularly drastic administrative step, as could easily be judged by the functions which were laid down for the new department in a further Order in Council dated 20th May.³

The Ministry of Aircraft Production was to be responsible for the supply, inspection and repair of aircraft and all their armament and equipment; for design and development, and for storage up to the stage of issue to operational squadrons. These were, of course, the functions of the existing Air Ministry department of the Air Member for Development and Production, and at the beginning of its existence the new ministry was simply A.M.D.P.'s department carrying out its usual tasks under a new name. This department, even apart from the creation of M.A.P., was undergoing a rapid development at this period, and in order to follow the changes brought about by Lord Beaverbrook it is desirable to give an outline of the organisation as it was when it came into his hands.

An important change had occurred in the month preceding the foundation of M.A.P. This was the departure of Sir Ernest Lemon from the post of Director General of Production and the appointment

¹ See p. 33.

² S.R. and O. 1940, No. 747.

³ S.R. and O. 1940, No. 762.

of Sir Charles Craven as Civil Member for Development and Production to share the ever-growing responsibility which was falling upon A.M.D.P. The Air Member and the Civil Member were jointly responsible for the same functions of research and development. Sir Charles Craven, who had been in the Navy before taking up a business career, had been managing director of Vickers-Armstrongs, and thus brought a great weight of authority and experience to the new post which had been created for him. The post of Director General of Production was thus actually vacant in May 1940, and it was never revived. D.G.P. had, however, in the months preceding 1940, been provided with deputies, and at the time of the transfer there were four deputy directors general of production. The department which they controlled consisted of eleven directorates, seven 'production' directorates pure and simple, concerned with aircraft, engines, armaments and so forth; and five others dealing with sub-contracting, statistics, labour and priorities, and Air Ministry factories.

The second element in the new M.A.P. was the department of the Director General of Research and Development. This had undergone no major change since the creation of a Directorate of Communications Development in July 1938, and in May 1940 consisted of the Directorates of Scientific Research, Technical Development, Armament Development and Communications Development, with—an important addition—the Directorate of Aeronautical Inspection. These directorates, together with the eleven production directorates referred to in the preceding paragraph—that is to say, all the sixteen directorates which made up A.M.D.P.'s department—were transferred *en bloc* to M.A.P., where for the time being they carried on exactly as before.

The transfer of the administrative structure could not be carried out altogether in the same way. Two administrative divisions were specifically associated with A.M.D.P.'s department, and they, like the production and research and development directorates, were transferred *en bloc*. These divisions were the general-purpose secretariat division for the department and a new division working for the Supply Committee and the Director General of Research and Development. Secondly, there were the four capital-finance divisions, whose duties related entirely to the provision of assets for the expansion of production. In the case of the establishment and general finance divisions the Air Ministry had to continue its functions as before for its own purposes and accordingly provided a nucleus, which by promotion and expansion became a complete division in the new department. This process was also applied to the Directorate of Contracts and the Chief Accountant's division. The same process may indeed be said to have been reproduced at the top of the

administrative tree. Thus the Second Deputy Under Secretary in the Air Ministry became the first Permanent Secretary of the new department. With the Permanent Secretary and his deputy there came two principal assistant secretaries and also Mr (later Sir) Archibald Forbes, a chartered accountant who had recently come from an important business appointment to become the Air Ministry's Director of Capital Finance.

The new Minister of Aircraft Production, Lord Beaverbrook, was thus provided, in May 1940, with a department which was already organised and which for most purposes was a going concern. It was organised in two principal divisions concerned respectively with production and development and secretariat and finance matters, and it provided the Minister with three principal lieutenants—the Air Member for Development and Production, the Civil Member and the Permanent Secretary. This was an adequate skeleton, or even something more, for the organisation of the new Ministry, but Lord Beaverbrook had ideas about his task, and about the organisation required to carry it out, to which no Civil Service arrangements could possibly have corresponded. The circumstances in which Lord Beaverbrook took up the new responsibilities were in any case unprecedented and called for unprecedented methods.

The programme of aircraft production, which M.A.P. inherited from the Air Ministry, was an 'interim' programme for building up output to a figure of 2,450 aircraft per month. Properly speaking, this was still only a proposal or statement of requirements; it had been made following upon an investigation of German air strength, actual and potential, and on 17th May there had not yet been time to work it out in the form of a programme. Nevertheless, it was accepted by M.A.P. as the best estimate that existed of the requirements of the Royal Air Force. Even so it was not the most important statement or definition of its task which M.A.P. inherited. It was already only too clear before 17th May that Britain was facing an unprecedented military crisis, and on the 15th, two days before Lord Beaverbrook was officially appointed, but following upon discussions with him, Sir Charles Craven had agreed with the Air Staff that the production and development effort should be concentrated on the five types of aircraft capable of making the most immediate contribution to saving the situation—Wellington, Blenheim, Whitley, Hurricane and Spitfire. Nothing—and the point was most emphatically driven home—was to be allowed to stand in the way of the maximum production of these types in the shortest possible period. Considerations of finance, long-term planning, the balance and distribution of labour—all these were to be sacrificed. Thus it was already realised even before M.A.P. was formed that the habits and methods of normal production would have to be discarded.

The crisis in aircraft production was of course only a reflection of the general military crisis. The formation of Mr Churchill's Government, and the sense that M.A.P. under its new Minister was its special creation, contributed as surely as did the specific production crisis to an attitude of mind which was prepared for new ideas and new methods. The very name of Lord Beaverbrook contained the suggestion that tradition and orthodoxy would be at a discount. The prestige of the new ministry was stimulating. The hopes of the public had fastened upon it and wide sections of industry looked towards it for guidance and leadership. It seemed to be almost in the nature of things that the new department should be run very differently from the Air Ministry.

(ii)

Lord Beaverbrook's Organisation of M.A.P., 1940

Confronted with a profound crisis, it is not surprising that Lord Beaverbrook should have wished to have around him men whom he already knew and trusted. He brought with him, or quickly recruited, several such men, one of whom in particular was to play a dominating role in M.A.P. from the time of its origin. This was Mr (later Sir) Patrick Hennessy, of the Ford Motor Company, who was brought in to share with Sir Charles Craven the control of the production side of the Ministry. Mr Hennessy was not given any title or designation, and as Sir Charles Craven's appointment as Civil Member for Development and Production was no longer appropriate in the new department, his designation was altered to Industrial Adviser to the Minister. Sir Charles also became chairman of the Air Supply Board, as the Air Council Committee on Supply was now renamed. Titles and designations, however, meant very little to Lord Beaverbrook; he was inclined to distrust them, believing that the definition of functions limited activity and tended to destroy initiative. They might be necessary in the lower ranks, but as regards his own immediate advisers he considered a general understanding to be quite adequate. It was upon the basis of such an understanding that Mr Hennessy and Sir Charles Craven were to share the responsibility for production which Sir Wilfrid Freeman, the Air Member for Development and Production, now relinquished.

Sir Charles Craven's sphere was, broadly speaking, the production of equipment and the control of the various elements of industrial potential—building construction, labour and machine tools. He also assumed responsibility for the emergency services organisation which,

when the German bombing attack developed, began to play a leading part in maintaining production. He had also, however, some direct production responsibilities, such as instruments and radio, mostly under the control of a deputy director general. Factories and emergency services were each the province of a full director general.

Mr Hennessy had as his lieutenants three deputy directors general, one concerned mainly with airframe production, one with engines, and one combining statistics, planning and raw materials. In addition to these three lieutenants Mr Hennessy had reporting to him direct the Light Alloy and Aluminium Controllers.

What field of authority was left to Sir Wilfrid Freeman and the Permanent Secretary? This was a question of the highest interest and importance. Between them the Air Marshal and the Administrator represented the old order, the period when the planning of aircraft production had been settled between the Air Staff and 'Finance'. Was the old order finished? Was a wholly new order possible? The position of the Secretary was not, and indeed could not, be affected beyond a certain point. He retained control over the finance and secretariat divisions, and of the Directorate of Contracts and Chief Accountant's department. While his functions were in no way enlarged and he was only one of several among the Minister's chief advisers, he was in this respect in the same position as the Permanent Under Secretary of State for Air, his opposite number in the Air Ministry. At a later stage of M.A.P. history the Permanent Secretary's field was not so limited, but in the summer of 1940 even the new Directorate of Labour was a production and not an administrative responsibility.

Sir Wilfrid Freeman, on the other hand, had his field of operations cut in half. He no longer had any responsibility for production, except in so far as he continued to exercise control over radio matters and over the Chief Overseer. On the other hand, the organisational structure of the research and development side of the department had been somewhat elaborated by the appointment of Sir Frank Smith, F.R.S., as Controller of Telecommunications Equipment. The appointment of a scientist of Sir Frank Smith's eminence to control research and development in radio and radar was mainly a reflection of the rapidity of advance and the ever-growing importance of the latter. The Controller was supported not only by a Director of Communications Development but also by a Scientific Adviser on Telecommunications, a new post of directorial status. The organisation of research and development in aircraft remained for some time unchanged in the new Ministry, namely the joint Directorate of Research and Development controlled by Air Vice-Marshal Tedder as Director General. Sir Wilfrid Freeman was also responsible for repair and maintenance, factory defence and ferry pools.

During the late summer of 1940 this much decreased field of action was still further reduced. The Air Marshal ceased to exercise any control over the Controller of Telecommunications Equipment, who now reported directly to the Minister. Responsibility for repair and maintenance also passed out of his hands into those of Mr T. C. L. Westbrook. Mr Westbrook, one of Lord Beaverbrook's earliest appointments from the business world, had been general manager of the aviation section of Vickers-Armstrongs. He was appointed in May 1940 to take charge of the civilian repair organisation, but had in fact turned his attention to the purchase of aircraft from Canada and America, where difficult and urgent problems were then arising daily owing, among other things, to the diversion of French orders after the fall of France. By October 1940, however, he had not only taken over control of repair and maintenance but also ferry pools, and was concerned in the salvage and storage and distribution organisation which had been set up under Mr (later Sir) Eric Bowater. The Minister had then, by October, five principal lieutenants, including Mr Westbrook, whose field had been expanded at Sir Wilfrid Freeman's expense.

So much may be said by way of an attempt to describe and define the organisation of M.A.P. under Lord Beaverbrook in 1940. But it must again be emphasised that the very essence of Lord Beaverbrook's administration was its lack of definition of function. This, it is true, was not a universal characteristic: the removal of production responsibilities from Sir Wilfrid Freeman was a very much more definite matter than the division of responsibility between Mr Hennessy and Sir Charles Craven or the administrative relationship between Mr Bowater and Mr Westbrook in regard to the storage and distribution of aircraft. The appropriate secretariat division, it is true, grappled with the problem of producing an organisation chart, and such a chart was in fact produced.¹ It was a brave attempt, but it could not take account of the fact that Mr Hennessy and Sir Charles Craven were in fact sharing many functions rather than dividing them, or that Mr Westbrook was taking as big a hand in production as in repair and maintenance, or that Mr Bowater seldom troubled Mr Westbrook for instructions on storage and distribution problems. The establishment divisions even found themselves in the extraordinary position of not being fully and accurately briefed in regard to the authority which they were to seek from the Treasury for new posts and promotions; this and other departures from orthodox procedure during the Beaverbrook regime will however be discussed later in this volume.

¹ See Appendix III, showing plans of M.A.P. organisation in May, August and October 1940.

In November Sir Wilfrid Freeman left M.A.P.¹ to take up the appointment of Vice-Chief of the Air Staff. His place in M.A.P. was taken by Sir Henry Tizard, who, however, could not take over the Air Force side of the Air Marshal's duties. But research and development had not in any case, at this period, that central place in M.A.P. activities which they had in the Air Ministry, and were later to have once again in the new department. The corollary of the agreement to concentrate upon the five types was a pause in development, or, to be more exact, a pause in all development which could not be directly related to the immediate needs of the Battle of Britain. Many important advances were in fact achieved during the summer and autumn of 1940, but as development in the wider fields was at a standstill, the importance of research and development *vis-à-vis* production, and thus of the post occupied by Sir Henry Tizard *vis-à-vis* those occupied by Sir Charles Craven and Mr Hennessy, tended to decline.

Sir Charles Craven left M.A.P. to return to Vickers, where his presence was urgently desired, at the same time as Sir Wilfrid Freeman returned to the Air Ministry, with the result that by the end of 1940 Mr Hennessy was the sole controller of production, subject only to the Minister. He continued, however, without any official designation or adequate definition of function until March 1941, when he was given the title of Assistant to the Minister, together with a formal commission to exercise supervision over the whole programme. Mr Westbrook was appointed to take charge of airframe production under Mr Hennessy. We may see in these appointments evidence that the department was in fact returning to a more unified and orthodox form of control, even before Lord Beaverbrook ceased to be Minister in May 1941.

A second tendency in administration and organisation was also manifesting itself very noticeably during the winter of 1940-41. From May to October 1940 there had really been no aircraft programme; the production effort was entirely concentrated upon the maximum immediate output of the 'five types'. It was on the 2nd of October that Mr Hennessy issued the first comprehensive M.A.P. programme, which called for an output of 2,555 aircraft per month by June 1941 and was more ambitious than any previously approved. M.A.P. was thus getting to grips with the real long-term problems of aircraft production. It is not surprising that this led to a general enlargement of the work of the department and to a consequential expansion, with the creation of new posts and the upgrading of existing ones. A number of new directorates had been brought into being even before October 1940. The growing importance of engine

¹ He was, however, to return in October 1942 as Chief Executive. See this chapter, Section (iv), p. 305.

production, for example, had led to the breaking off from the main task of the production and development of engine accessories such as magnetos, fuel pumps, sparking plugs and carburettors, and a directorate charged with this task had come into being in August 1940. Another directorate had been created at the same time to co-ordinate the planning and progressing of equipment purchased by airframe contractors. This was the Directorate of Contractors' Purchases, and the items which it dealt with were those which were neither made nor designed by the airframe firms and not supplied on embodiment loan. This process of expansion and upgrading was in fact being carried on continuously through 1940. A more substantial adjustment to the new era of long-term planning and long-term problems was made in January 1941 by the elevation to directorate general status of the production functions for aircraft and engines. The Director General of Aircraft Production was made responsible for aircraft production and for production duties in connection with ground equipment for handling and servicing aircraft. As regards the Director General of Engine Production a combined Directorate of Engine Development and Production had already been set up in December 1940 and the new directorate general was the production section of this directorate enlarged and upgraded. Expansion and upgrading of appointments was in fact a way of bracing M.A.P. for the tasks which lay ahead of it.

(iii)

Colonel Moore-Brabazon's Reorganisation and the Aircraft Supply Council

Colonel Moore-Brabazon (later Lord Brabazon of Tara), who succeeded Lord Beaverbrook on 1st May 1941, did not share his predecessor's distrust of defined functions and designations. On the contrary, he was anxious that everyone in the department should know exactly his field of responsibility, and should have an official designation indicating what this field was. Mr Hennessy left the department at the same time as Lord Beaverbrook, and Sir Charles Craven acceded to the urgent request of the Prime Minister that he should return to M.A.P. to succeed Mr Hennessy as supervisor of the whole production side of the Ministry. This he did in June 1941 with the title of Controller General.

The organisation of the Ministry of Aircraft Production in July 1941 was accordingly very different from what it had been six months

earlier.¹ The Controller General and the Permanent Secretary now shared between them almost the entire field of activity, the most important exception being research and development. The Controller General was assisted by three directors general in the production field. First there was the Director General of Aircraft Production, who was responsible for the directorates of aircraft production and sub-contracting and also for a new organisation which had been brought into being in May to undertake responsibility for the fitting of radio equipment in aircraft. Secondly there was the Director General of Materials Production, who was responsible for the materials production directorate and the materials controls. Thirdly there was the Director General of Production of Aircraft Equipment, whose main responsibility was aircraft equipment, instruments and balloons.

The sphere of action of the Permanent Secretary had, in July 1941, increased very markedly. In addition to the secretariat and finance divisions (of which there were now fifteen) and the Directorate of Contracts, the Permanent Secretary's department had now absorbed responsibility for labour matters, and also exercised a general control over two very much larger sections of M.A.P. The larger of the two was a body which had been created in the June reorganisation and which was controlled by Sir Allan Gordon-Smith, who had a wide field of responsibility for factory construction—in itself an organisation of five directorates—emergency services, the area organisation, and factory defence. In the second place the Permanent Secretary exercised a general supervision over the complex task of aircraft distribution.²

There remained research and development. After the departure of Sir Wilfrid Freeman the research and development directorates had been temporarily taken over by Sir Henry Tizard. In the June 1941 reorganisation, however, a new post, that of Controller of Research and Development, had been created and filled by Air Marshal F. J. Linnell. This was an M.A.P. post, but it carried a seat on the Air Council, and the officer who filled it was in fact filling very much the same position as the Air Member for Research and Development had done during the period 1934–38. Sir Henry Tizard, who had become an additional member of the Air Council, did not relinquish his M.A.P. interests, but retained something in the nature of a roving commission in regard to scientific research. A second new post on the same level as that of the Controller of Research and Development which was created at this time was that of Controller of North American Aircraft Supplies. Another section

¹ See Appendix IIID showing plan of M.A.P. organisation in July 1941.

² Chapter XVI (iv).

of the department which remained a little way outside the general structure was that ruled over by the Chief Naval Representative, a post which had been created in January 1941, and carried responsibility for the development and production of naval aircraft.

The creation of new posts and the rearrangement of duties was not the only—perhaps not even the most—important innovation that occurred in the summer of 1941. There was also created at this time the Aircraft Supply Council. This body consisted of the Minister's principal advisers, that is to say, at the time of its foundation, of the Parliamentary Secretary, the Controller General, the Permanent Secretary, Sir Henry Tizard, Mr T. C. L. Westbrook and Sir Peter Bennett. The last two had dropped out by the fifth meeting and their places were taken by the Controller of Research and Development and Mr W. C. Devereux. The appointments of Air Marshal Linnell to the Aircraft Supply Council and of Sir Henry Tizard to the Air Council were both announced on 8th June 1941. Shortly after these changes had been made the function of the Council, under the Minister, was officially declared to be the direction of the policy of the department.

The Aircraft Supply Council was an advisory and not an executive body, although all its members except Sir Henry Tizard were executive heads of M.A.P. departments. For the first eighteen months of its existence there were no specific rules governing questions which should be referred to the Council, but generally speaking all the major problems of the department provided material. It was to the Council that the Minister brought news of all proposed changes in the programmes emanating from the Defence Committee (Supply) or the Prime Minister. For example in September 1941 the Council was engaged in considering the possibility of meeting the Prime Minister's request for an additional 3,500 bombers in two years. On the basis of these discussions and a memorandum prepared by the Controller General the Minister reported to the Lord President that it would not be possible to meet the Prime Minister's objective in the time specified. The fact that both the Aircraft Supply Council and the Air Council had joint members made it possible to anticipate, and thus to avoid, many clashes of opinion on the aircraft programmes, and when such differences did arise it enabled them to be settled promptly. The Council was also much used as a means of putting the department's problems before the Minister, often in the hope that he might be able to secure discussion of serious difficulties, with regard to labour for instance, at Cabinet level.

At the end of 1942, at the request of the Minister, an attempt was made to define the types of subject which were regarded as meriting discussion in the Council. Although this classification was primarily

designed to reduce the time previously spent in discussing questions of detail, it did to a considerable extent ratify what had come to be current practice. The matters with which the Council was concerned were, first, important changes in the aircraft programme in respect of type, rate of delivery or allocation to firms, as well as changes of major significance in other production programmes and in the research and development programmes; secondly, major questions in the co-ordination of the British and American production programmes; thirdly, major questions of repair policy; and fourthly, the more important proposals for the creation of capacity. The Council also considered questions of labour policy, the managerial organisation of industry and industrial organisation generally. In addition, the Council took within its purview major issues of organisation in the Ministry and its relations with other Government departments.

In August 1941 the practice of making a regular weekly review of production was instituted. The position of output in relation to programmes was considered and it was the task of the Controller General to account for lapses, whether over the whole industry, due perhaps to holidays, or in particular firms. Also in August 1941 there arose the custom of putting the minutes of the Supply Board before the Council every week for its approval. Although the decisions of the Board were seldom questioned, action was occasionally delayed to permit further discussion, while priorities might be indicated or suggestions put forward for future guidance. For example, in November the Minister noted the objection taken by the Supply Board on a number of occasions to expenditure on canteens. While he was anxious to secure economy on the scale of construction and equipment of canteens, he asked that the attention of the Board should be drawn to the importance attached by the Ministry of Labour to adequate canteen facilities. This was typical of a class of Air Supply Board case which raised issues of wide general policy appropriate to Council settlement.

The Council was frequently concerned with the co-ordination of the British and American aircraft programmes. An important occasion of this kind occurred in January 1942, when the new production programme announced by President Roosevelt was considered. The Minister spoke of the risk that the programme might be hampered by lack of materials to fill the corresponding supply of bombs, and Sir Henry Tizard pointed out that this raised even wider issues regarding the planning of production in Britain. For example, if it was certain that America would produce bombers to the limit of the Allied capacity for filling bombs, it might be advantageous generally to turn over capacity in this country to other types. There was furthermore a risk that American requirements under the new

programme might interfere with the deliveries to Britain of aluminium, magnesium, Merlin engines, 20 mm. guns and machine tools. The Council, having discussed these aspects of the position, decided to recommend them for attention in Washington.

The problem of labour supply, which was often a cause of inter-departmental friction, was frequently discussed and naturally called for many decisions at Council level. At the seventy-second meeting, for example, Sir Henry Tizard raised the question of draughtsmen in the aircraft industry. The Society of British Aircraft Constructors had protested against the withdrawal of young engineers and draughtsmen for technical commissions in the Forces or for the supply departments, and had asked that the aircraft industry should be screened. The Permanent Secretary, however, pointed out that the policy in the matter had been decided in a conference of ministers, and he did not think that there was any chance of securing a class reservation for draughtsmen, and each case would still have to be considered on its merits.

The review of the topics for discussion which took place in December 1942, and the insistence that, in general, members who wished to raise matters falling within one of the categories listed should have their questions placed on the agenda, and should circulate an explanatory memorandum before the meeting took place, made it possible to change from weekly to fortnightly meetings in January 1943. This tightening up of the procedure was particularly necessary, for the membership of the Council was gradually increasing. The Controller of Communications Equipment had been made a member in October 1942. In January 1943 the appointment to the Council of Sir Allan Gordon-Smith, Sir Archibald Forbes and the Second Secretary was announced, and these were soon followed by further additions. It would certainly have been difficult in a council of thirteen to discuss matters in the same general and occasionally roving way in which they had been discussed in the original council of seven.

In fact the amount of business coming before the Council was considerably reduced during 1943. The general review of production and the minutes of the Supply Board still appeared regularly. Other matters discussed during the first six months of the year included the technical mission to Russia and the disclosure of information to the Russian Government; the status of the Air Transport Auxiliary; steps taken by the M.A.P. to reorganise the management of aircraft firms; and the serious shortage of labour. This latter problem was causing particular concern, and at the eighty-eighth meeting on 13th May the Council decided to urge on the proposed review of the manpower allocations made in the previous December. Meanwhile they considered that the call-up of men in the aircraft industry

should be suspended and that the drafting of women into the Services should cease. The Minister agreed to write to the Lord President and to the Minister of Labour in that sense, and at the next meeting he was able to report that the Prime Minister had asked that a review of the labour situation with a special reference to M.A.P. should be undertaken forthwith.

The Aircraft Supply Council was the opposite number of the Supply Council in the Ministry of Supply. The suggestion has already been made¹ that the latter was at least to some extent a 'prestige' body rather than an actual directing power. Was the same true of the Aircraft Supply Council? Certainly it did not 'run' M.A.P. in the sense that the Board of Admiralty runs the Admiralty. It was not intended to do so. It guided; it gave cohesion; it was a staff upon which the Minister (or any other of its members) might lean when they wanted to. In fulfilling these functions it probably did what was realistically expected of it, no more and no less.

(iv)

The Higher Organisation from 1942

We have seen that, by the summer of 1941, M.A.P. had been organised into major departments, each presided over by an official who had the right of access to the Minister. The Controller General and the Permanent Secretary were, however, at this period, in a predominant position, as they were recognised to be the two senior advisers of the Minister, and between them exercised something in the nature of general supervision over the department as a whole. The existence of the Aircraft Supply Council, however, and the presumed equality of its members, tended towards an organisation according to which the Minister's other advisers would act with a greater degree of independence than was the case when two of them exercised a more or less definite predominance. A council of equals (subordinate of course to political direction) was moreover the Air Ministry system of control, and the Aircraft Supply Council was in fact often considered to be the analogue of the Air Council. Thus during the second part of 1941 and the first part of 1942, the tendency was towards a greater measure of equality among the principal advisers and towards the creation within M.A.P. of a system of departments, the heads of which met as equals in Council.

By the summer of 1942 an organisation along those lines had emerged. The Council at this period consisted of the Controller

¹ See p. 232.

General, the Permanent Secretary, the Controller of Research and Development, the Controller of Communications Equipment, the Controller of Supplies and Repair, and Sir Henry Tizard. Sir Charles Craven left M.A.P. finally in July 1942 on grounds of ill-health, and was succeeded by Sir Alexander Dunbar, who had been his deputy since September 1941. Sir Charles Craven's long connection with M.A.P., together with his reputation as an industrialist, had given him a position in the department which it was not to be expected that any successor could altogether fill, and this fact alone did a good deal to strengthen the tendency towards a council of equals. The Controller General of course retained his responsibility for production, and he now exercised this through a Deputy Controller of Production, a Civil Assistant, two directors general and four deputy directors general. The Permanent Secretary, apart from his inalienable control of finance and secretariat functions, continued to control factory construction and regional services through the Deputy Controller of Construction and Regional Services and all labour questions through the Second Secretary.

The task of the Controller of Research and Development had changed very little since 1941. He was now assisted by a deputy, and the Directorate of Aeronautical Inspection had been upgraded to a Deputy Directorate General. Both the Chief Overseer and the Director of the Royal Aircraft Establishment were now of directorial status, and the Controller of Research and Development continued to be responsible for the Directorates of Scientific Research, Technical Development, Engine Development and Armament Development. The Controller of American Supplies and Repair (Lord Burleigh) controlled the storage and distribution of aircraft through the Director General of Aircraft Distribution, as well as the Directorate of Repair and Maintenance and the Directorate of Canadian and American Purchases. The duties of Sir Henry Tizard as Scientific Adviser were more or less unchanged.

Probably the most interesting development in M.A.P. administration at Council level during this period was the creation of the post of Controller of Communications Equipment. Radio, that is to say both the development and the production of both radio and radar, had become increasingly, during rearmament, and still more after the outbreak of war, an interdepartmental activity. The network of agency services undertaken by each supply department for its colleagues was immensely complex, but already in 1942 M.A.P. had emerged as being the natural centre of this network, and when in that year an interdepartmental Radio Board was set up to co-ordinate radio development and production, it was M.A.P. which housed some of its most important agencies and indeed wove them into its own administrative fabric. This was the position of the

organisation responsible for the production of radio components, an organisation which 'belonged' to the Radio Board, but which functioned pretty much as an M.A.P. directorate. Control of the radio activities of M.A.P. was accordingly a task of particular importance. This post was filled by Sir Robert Renwick, who, having carried out a number of important tasks in connection with aircraft production and signals installation for Air Ministry and M.A.P. since 1941, had been asked, in October 1942, to become Director General of Signals in the former department. Almost immediately, while he was still considering this proposal, Sir Robert was invited by the Minister of Aircraft Production to succeed Sir Frank Smith as Controller of Telecommunications in M.A.P. The offer of the two posts at the same time appears to have been a coincidence, but it occurred to Sir Robert that advantage could be taken of it by uniting the two appointments in one pair of hands. His proposal that this should be done was accepted by both departments, and an arrangement was made whereby he became Controller of Communications in the Air Ministry and Controller of Communications Equipment in M.A.P. In this dual role Sir Robert was responsible to the Chief of the Air Staff for the Signals Department of the Air Ministry, and as such for determining quantities of equipment required in accordance with operational needs, and also, within M.A.P., for the supply department function of producing these equipments. From the functional point of view, the interest of the dual appointment lay in the fact that it was, in one of its aspects, an experiment in contravention of the principles upon which the existence of a supply department was based.

The appointment of Sir Wilfrid Freeman as Chief Executive in October 1942—a month after Colonel Moore-Brabazon had been succeeded by Colonel Llewellyn as Minister—may be taken as a half-way mark in the history of M.A.P. The post was a new one, with an unprecedented accumulation of authority. The Chief Executive was to control all aspects of research, development and production, and was to share with the Permanent Secretary the control of all other activities not secretariat or financial. Upon the appointment of the Chief Executive, therefore, the Permanent Secretary's department became the only part of M.A.P. not directly subordinate to him. This development of course changed fairly completely the Council organisation which had existed up to that time. The Council remained in being and the controllers who reported to the Chief Executive remained members of it, but the Chief Executive and the Permanent Secretary were the only two members of it who could now argue a point on equal terms.

Scientific research and the technical development of aircraft were controlled by the Chief Executive through the Controller of Research

and Development. Research and development in radio and radar were combined with responsibility for production and were in the hands of the Controller of Communications Equipment. The origins of the offices of Controller of Research and Development and Controller of Communications Equipment have already been described and their functions indicated. The third officer of controller rank was the Controller of American Supplies and Repair, responsible not only for American supplies and repair, but also for maintenance, salvage and associated functions. Fourthly, at this date, there was the Deputy Controller of Production, who was responsible to the Chief Executive for the work of six directorates general; four purely 'production' (aircraft, engines, equipment and materials) and two others, the Directorate General of Planning Programming and Statistics and the Director General of Aeronautical Inspection. Through these officers, the Chief Executive was thus directly and solely responsible for all research, development and production, and for repair and inspection, and was provided with a directorate general to help him with the planning and statistical measurements which these responsibilities involved.

In addition to these exclusive responsibilities he had other responsibilities which he shared with the Permanent Secretary. These responsibilities reflected important developments which were then taking place in the conduct of the war. The call-up and the absorption of men and women in the munitions industries were now raising labour supply to its position as the dominating factor in war production. The supply and allocation of labour, which had been a task for a single directorate, accordingly increased in difficulty during the first months of the Chief Executive's regime, and by the spring of 1943 was one of the most vital and difficult tasks in the department. In May a post of Controller of Labour Allocation and Supply was created and filled by Sir Charles Bruce-Gardner, who was given a seat on the Council. The Controller of Labour Allocation and Supply, according to the announcement of his appointment, was to report to the Chief Executive. His functions, however, had always, up to this time, been carried out by the secretariat, and the Permanent Secretary retained an interest in them. The organisation, in its mature form, consisted of two directorates of labour and associated administrative staff. The second organisation under joint control was Construction and Regional Services, comprising the directorates concerned with the various aspects of regional organisation—production and capacity, passive air defence, emergency services and factory organisation.

A development in the higher organisation, involving further joint control by the Chief Executive and the Permanent Secretary, occurred in October 1943. On this date Sir Archibald Forbes, the

Deputy Secretary, succeeded Lord Burleigh in the control of American supplies and repair; and also took under his supervision the Principal Officer of Aircraft Equipment.¹ Sir Archibald, who was given the title of Controller of Repair, Equipment and Overseas Supplies, was to be 'generally responsible to the Chief Executive' but responsible to the Permanent Secretary for the financial control of the Principal Officer for Aircraft Equipment.

The emergence of an organisation for dealing with overseas supply, which has been referred to once or twice in these pages,² was of considerable interest. When M.A.P. was set up there was at first no official organisation within the department for the purchase of aircraft in North America and Canada, and throughout the Beaverbrook era the tendency was to rely upon personal contact. Then, as we have seen, Mr Westbrook was appointed to be in charge of liaison with the British Air Commission. In the early summer of 1941 the directorate which was formed for this purpose was more elaborately organised and its function within M.A.P. was more carefully defined. It became the centre of all M.A.P. activity in connection with obtaining aircraft from North America. This is not to say that all equipment and materials embodied in aircraft were procured by the new directorate. Raw materials, of course, fell under the Ministry of Supply control. Radio and armaments were distributed over other directorates in M.A.P. But the rest of the airborne equipment required by Britain was procured by the organisation set up for the purpose.

From the autumn of 1943 until the beginning of 1945 there were no further major developments in the organisation of M.A.P. at Council level, and it may thus be said that during the course of 1943 the higher organisation reached maturity.³ It may certainly be said that the department, at the time of Sir Stafford Cripps's accession in December 1943, was a fully developed organisation. There is indeed only one matter which calls for further comment. The burden of responsibility laid upon the Chief Executive was such that it became necessary to delegate some of his authority, and it was some time before a satisfactory arrangement was made. Until June 1943 the post of Controller General continued to exist, but at that time the Minister agreed to Sir Alexander Dunbar's request that he should return to industry, and from then onwards there were no fewer than eleven officers who reported directly to the Chief Executive, although the post of Deputy Controller of Production

¹ See Chapter XVI (iii).

² See p. 296.

³ See Appendix III F for plan of M.A.P. organisation in December 1943.

involved a certain amount of co-ordination of the four production directors general. Six months later, in December 1943, a post of Assistant Chief Executive was created and filled by Sir John Buchanan, who had many years of experience in important posts both on the development and upon the production sides. In January 1945 Sir Wilfrid Freeman retired and was succeeded by Mr (now Sir) Edwin Plowden, the Director General of Materials and Engine Production, one of the younger men in the department who had come into the production side from the business world in a comparatively junior capacity early in the war.

Co-ordination of the secretariat and the production side of the department was secured in a number of ways, among them that of supplying production heads with administrative assistants.

The Controller General had always had a secretariat division to assist him, and had drawn heavily upon the services of a second assistant secretary, while the Chief Executive had attached to him from May 1943 two principal assistant secretaries. In November these two posts were combined, and the officer in whom they were combined was given the assistance of an assistant secretary. In addition an assistant secretary was posted to the Directorate General of Aircraft Production for administrative duties. The Chief Executive was thus quite strongly supported by senior administrators in key positions. He had also a principal as his private secretary.

Within the Permanent Secretary's department itself the most noteworthy development during 1943 was the creation of an organisation devoted to post-war questions. At first, in June 1943, this consisted of a single secretariat division, but in January 1944 a principal assistant secretary was appointed to supervise the work. Such long-term interest in post-war problems was of course peculiarly a responsibility of the Permanent Secretary's department, yet when Sir John Buchanan was appointed Assistant Chief Executive he was, *inter alia*, to act for the Chief Executive in the consideration of post-war reconstruction problems affecting the aircraft industry.

Of the two principal organisational developments in the department of the Controller of Research and Development during the last two years of the war, one was concerned with a war project, and one with post-war planning. The war project was the internal combustion turbine, the 'jet engine', which in August 1943 had reached a stage of development at which it became desirable to create a separate directorate to undertake research and development work. This was known as the Directorate of Special Projects, and while it existed as a separate directorate it of course co-operated very closely with the Directorates of Scientific Research and Technical Development and the production authorities. Post-war research in aeronautics came under discussion between the Aeronautical Research

Committee¹ and M.A.P. in 1943, and plans were made for new research facilities. In January 1944 a post of Director of Construction, Research Facilities was created in order to carry out these plans and also the plans for any further schemes which might be proposed.

If there were comparatively few developments in the higher organisation of M.A.P. after the return of Sir Wilfrid Freeman and the changes consequent thereon, this was because the organisation which then came into being was, on the whole, satisfactory to those who were charged with the responsibilities of aircraft production. For many months before D-Day the sense of critical urgency, and the concentration upon production problems, was such that organisational changes were contemplated with distaste and apprehension. Nor did this sense of special urgency disappear with D-Day itself; it continued for an indefinite number of months thereafter. During this period—from the end of 1943 until the end of 1944—M.A.P. was 'in tune' as it never had been before. It was a period of maximum effort, and the records illustrate in numerous incidents the general sense that it was too late to experiment. The answer to the question as to whether the organisational experiments carried out at an earlier date were successful must be sought where it can be found, in the achievements of the aircraft industry.

If, by the term 'organisation' there is understood the creation and development of a hierarchy, the setting up and continuous adaptation to circumstances of offices, directorates, and branches, and, in general, the distribution of authority, we have now come to the end of our outline of the history of M.A.P. and its pre-history in the Air Ministry. But this, of course, is far from being the whole story. Authority must not only be created and distributed; it must be operated. It is to the operation of authority both within the M.A.P. and its true impact upon the outside world that the remainder of this study of the department will be devoted. To some extent this study will be carried out analytically, by examining particular fields such as the administration of research or of 'programming'. There were, however, factors which influenced the nature of M.A.P. authority as a whole. Among such factors were the relations of M.A.P. with the Treasury, and, within the department, the relations between the administrative and production sides of the department. More generally, it is clear that the authority exercised within and without M.A.P. depended mainly upon the nature and quality of the staffs which exercised it. It is to these more general aspects of administration that we must now turn.

¹ See Part IV, Chapter XVII, below.

CHAPTER XV

THE EVOLUTION OF A SUPPLY DEPARTMENT: SOME ASPECTS OF ADMINISTRATION

(i)

Treasury Authority and its Relaxation

AMONG THE MANY problems which faced M.A.P. at the time of its foundation was that of adapting the Civil Service machinery of peacetime to the exigencies of war. This problem was not of course peculiar to M.A.P., nor even to the supply departments. It was common to all departments, but it is doubtful whether it presented itself anywhere in a more acute form than at M.A.P. Formed during a crisis, thrust at once into the front line of production planning and administration, and required to expand rapidly as a mere incidental of its existence, M.A.P. may, so to speak, be taken as a laboratory sample of the war-time department. And it is as a sample, or specimen, that it will be considered here. Much of what is said about the administration of M.A.P. is also true of the Ministry of Supply; and some of what is said is true of the Admiralty, although that great and comparatively ancient department, for many reasons, stood apart from the two purely supply departments.

The Civil Service machinery of peacetime is based on a number of features of, and assumptions about, the form of government of the United Kingdom; these features and assumptions, in their turn, are deeply rooted in constitutional and economic history. One of the features of the British form of government which most affects the machinery of the Civil Service is the immediate and intimate accountability of departments to Parliament for the expenditure of public funds. The whole machinery of government is based upon the preparation of annual estimates of expenditure, while the investigations of the Public Accounts Committee are a fairly searching *ex post facto* survey. But the intimacy and immediacy of the relationship between the Civil Service and Parliament depend to a considerable extent upon the Parliamentary Question. Any expenditure incurred by a department may be the subject of a question, not in the distant

future, but at once. Many questions are 'hostile', framed, if possible' to imply criticism; while even a friendly question may provide an opportunity for hostile supplementary questions. These the department must attempt to foresee, in order that the minister may be briefed to answer them. It is of course better still to foresee every possible line of criticism before the expenditure is authorised at all, and this the accounting officer and his staff endeavour to do. The Parliamentary Question thus emphasises the need for extreme caution, attention to detail, multifold consultation, and the keeping of accurate and voluminous records. These are in fact leading characteristics of peace-time Civil Service procedure.

While procedure within individual departments is to a considerable extent determined by the relationship of the departments to Parliament, the machinery of the Civil Service as a whole depends to an important extent upon the special position of the Treasury as the central authority in matters of finance. With the major aspect of Treasury authority, that of authority over the actual finance of production, we are not here concerned: that is the subject of a separate study.¹ There were other important fields in which departures from peace-time practice occurred: they included the delegation of Treasury control of establishments; the recruitment of temporary civil servants; and the delegation of authority within the department.

Commenting upon relaxations of establishment procedure, one of the senior M.A.P. officials concerned remarked that 'the dividing line in our department (i.e. the Air Ministry) between what might be called normal and accelerated procedure is somewhere about the middle of 1934 when expansion first commenced. The effect of the expansion was to create in increasing degree a state which anticipated war, and the features of accelerated procedure were already evident long before the war, although in lesser degree'. Here, therefore, as in all other fields, it is necessary, in order to follow processes which were occurring in M.A.P. in the period 1940-45, to return to the Air Ministry in 1934. In this connection the writer already quoted made a further point: '. . . prior to the expansion period the procedure was not normal peace-time procedure, but went even a stage farther in the direction of elaboration. The economy period had undoubtedly the effect of intensifying peace-time methods, for example, minutes went backwards and forwards arguing over quite small increases, often under the signature of high officials'. During the nineteen-twenties, proposals to create posts of any importance in the Air Ministry were invariably referred to the Treasury in a formal letter, and if the post was not filled immediately authority was sought in a further letter for the actual appointment. These negotiations generally

¹ See W. Ashworth: *Contracts and Finance*, *op. cit.*

took place at a high level both within the department and in correspondence with the Treasury. For example, in 1928 a proposal to fill two posts of principal scientific officer and senior scientific officer was discussed at length between the Director of Scientific Research, the Air Member for Supply and Research, and the Principal Establishment Officer before reference to the Treasury brought a letter of approval from the Controller of Establishments. These were posts which had already been authorised; the creation of a *new* post was an even more formidable undertaking. The addition of a single scientific officer at the Royal Aircraft Establishment in the same year, although balanced by an offer to give up one technical officer, was not at all speedily approved. The Air Ministry was required to produce full details of the staffing of the Directorate of Technical Development before the official letter of authority from the Controller of Establishments arrived.

The change which began in 1934 manifested itself in various ways. The expansion of the Royal Air Force involved an increase in staff in the Air Ministry; the creation of new appointments became comparatively frequent, and in order not to trouble the Treasury too frequently it became usual to deal with several new appointments in one letter. It also followed from an increase in the volume of establishment work that it could not all be done at so high a level as had formerly been the case. Before 1934 it was exceptional for any Air Ministry officer other than the Principal Establishment Officer to write to the Treasury, but from 1934 onwards establishment letters began to be signed by assistant secretaries, the level of principal assistant secretary being reserved for policy issues. A third development must be noted. The semi-official correspondence which had always been the vehicle of interim explanations now became the habitual vehicle of Treasury approvals, at first always subject to a formal authority issued shortly afterwards, but soon subject only to letters of formal approval issued at rare intervals. A notable example of this procedure was the major reorganisation of the production side of the department which took place in 1938 when the eight directorates were brought into being.¹ The Air Ministry did not seek formal Treasury approval until January 1939, although, of course, semi-official Treasury approval was obtained before the reorganisation was announced in November 1938.

The process continued throughout the expansion period. It is true that progress was somewhat arbitrary; in June 1935, for example, the full formal procedure, including a Treasury letter signed by an under secretary, was invoked for the creation of two junior posts in the Directorate of Technical Development. The relationship between the Treasury and the Air Ministry depended, not upon written rules,

¹ See p. 39.

but upon a mutual understanding based upon the fact that both sides had the same training and experience, and the surprising feature is not that there should have been occasional departures from practice which appeared to be established, a return to formality where informality seemed to have become the rule, but rather that the two departments should have adapted their procedure to circumstances with so little fuss. By the outbreak of war, at any rate, formality, high-level negotiation, and delay, had all been finally banished. One example will suffice. During the long vacations of 1938 and 1939 a considerable number of university scientists were invited by the Air Ministry to acquaint themselves with the recent scientific advances in the field of defence. Many of these men spent weeks on radar stations; others worked at the Royal Aircraft Establishment and the Aircraft and Armament Experimental Establishment. When war broke out a considerable number of university scientists were actually working in one scientific establishment or another. The Air Ministry promptly recruited thirteen of the younger men as scientific officers and junior scientific officers under a blanket war-time authority given by the Treasury. The recruitment of principal and senior scientific officers was not covered by this authority, but the Treasury agreed without delay to proposals involving the recruitment of eleven principal and twenty-two senior officers. This was done, with the minimum of correspondence, at assistant secretary level.

By November 1939 delegation of Treasury authority in establishment matters had clearly proceeded as far as the Air Ministry and, later, M.A.P., found to be necessary for the expeditious carrying on of business. The relationship at any rate changed very little during the war and appears to have been satisfactory to both parties. We may choose a few from many instances. The creation of a new post of deputy director general in July 1940 was promptly approved by the Treasury; the reorganisation of the Secretary's department (including the creation of a new division and other new posts and promotions) was agreed orally by an under secretary at the Treasury after discussion with the Deputy Secretary of M.A.P., and afterwards confirmed in a semi-official letter; the appointment of Professor Jewkes as Deputy Director General of Statistics and Programmes in September 1941 and the appointment of staff to assist him were both agreed orally at assistant secretary level subject to confirmation. If on occasion the Treasury objected to the creation of new posts and put forward counter-proposals, M.A.P. was ready with a rejoinder which, in the circumstances, was very difficult to answer; it was stated in its bluntest form as follows: ' . . . we are quite satisfied that the adoption of your proposals would hamper developments vital to the prosecution of the war'. This, however, was a gun which did not have to be fired very frequently. The Treasury maintained a somewhat

stricter control over the upgrading of existing posts and over increases in salaries and allowances. 'Every civil servant', their representative wrote on one occasion, 'has had a large increase in his work since the war', and the fact that a particular officer had had such an increase would not in itself justify an allowance. The Treasury were also anxious to ensure that the department offered the same salary and conditions for the same jobs and did not unnecessarily set bad precedents which might be quoted in peacetime. On points of this kind—particularly when they affected the administrative class—both the eye and the voice of the Treasury were as sharp as ever. Comparisons with other departments, however, were comparatively seldom made.

However far the relations of the Air Ministry with the Treasury might have departed from the rigidity of 'inter-war' procedure, the distance of the departure was at least under the joint control of the establishment divisions of the two departments. When M.A.P. was founded this ceased to be the case. We have already referred to the fact that the M.A.P. establishment divisions were from time to time instructed by the Minister to obtain Treasury approval for appointments without full or accurate knowledge of what was involved. Thus on one occasion in 1940 M.A.P. represented to the Treasury that a certain new appointment was to be subject only to the authority of the Minister, and it was approved on this basis. But the department, as the Treasury acidly commented, was later 'placed in the unfortunate position' of having to explain that, after all, the officer in question was to report to Mr Westbrook. The position may have been unfortunate, but it was on this and other occasions inevitable. It was Lord Beaverbrook's practice simply to notify the Permanent Secretary of his wishes in regard to new appointments and promotions in the higher ranks of the Ministry, and also in regard to the salaries to be paid; and in one case at least, although with 'a great deal of disquiet', the Treasury agreed to salary proposals which were apparently justified only by the Minister's dictum. Cases of this kind, however, were not at all common, and ceased with Lord Beaverbrook's departure.

What conclusions may be reached about Treasury control over the establishment of M.A.P.—our laboratory example of a supply department? In the first place it is clear that the processes with which we have been concerned began, not when M.A.P. was set up in the great crisis of 1940, but six years earlier when the Air Ministry first entered upon the task of re-creating the Air Force. Secondly, it must be recognised that the progressive relaxation of Treasury control which occurred from 1934 to 1940 was not something which was won by a bold Air Ministry from a reluctant Treasury. It did not amount to an abrogation, but rather represented a greater willingness upon the part of the Treasury to match the speed of events by allowing a greater latitude within the family of the administrative Civil Service

to those younger brothers, the establishment staffs of the supply departments.

The subject we have just been discussing, that of the relations which existed between M.A.P. and the Treasury, is hardly complete without extension to another relationship, that between the administrative civil servants and their production and other colleagues within the department. The administrative civil servants in any Government department, apart from their general task of advising their minister on policy, have two primary functions: those of controlling expenditure and of providing for the minister advice on administration which, while it is non-specialist, is professional. The permanent secretary of a department is also the accounting officer, and the staff of the accounting officer man the outposts of parliamentary control of public expenditure. The Treasury is the headquarters to which they look for a framework of orders within which to carry out their functions. It is clear, therefore, that the status and authority of the administrative civil servants within a particular department must be considerably influenced by the nature of the financial control which they exercise from time to time. When financial control is stringent the staff of the Accounting Officer acquire great authority from that circumstance; when departments are permitted to spend vast sums of money and scrutiny is less exacting, other authorities will tend to rival the administrators, who will either have to relinquish some part of their authority and prestige or else maintain it upon a different basis.

In the Air Ministry the Permanent Under Secretary was only one among several principal advisers of the Minister, but in the years of financial depression his authority was very great. It was, in the nature of things, mainly a negative authority, derived from the power to criticise or veto expenditure. Few proposals which involved expenditure were considered trivial enough to escape what the Secretary described as 'repeated and microscopic review'. As almost all proposals of any consequence involved adjustments in personnel, the control of establishments was perhaps the main responsibility and almost certainly the principal source of administrative authority. All increases in establishments, whether civilian or Air Force, had to run the gauntlet of administrative criticism before they could be submitted to the Treasury, and it was here perhaps that review was at its most microscopic. In December 1932 the Secretary, in the course of a detailed examination of establishment proposals made by A.M.S.R., suggested the substitution of a technical assistant, grade II, for a technical officer, grade II. 'The difference between the maximum basic salaries of these two grades', he pointed out, 'is £60 per annum, which is far from negligible in these times, since many a mickle makes a muckle.'

But establishments were far from being the only field in which the administrators exercised this meticulous control. Expenditure upon matériel went through the same sieve. Numbers of aircraft ordered each year during the 'twenties and early 'thirties were very small, and as late as 1934 the Air Force was still ten squadrons short of the fifty-two squadron establishment which had been approved in 1923. This was of course in keeping with the Government ruling that no major war was to be expected within ten years, and Air Ministry finance officers, in scrutinising and pruning expenditure upon matériel, were merely forestalling Treasury action. Nevertheless their authority in this sphere, as in that of establishments, led to their being informed of all proposals at the earliest possible stage and in taking a prominent, if not a dominating, part in all discussions.

When, in 1934, the expansion of the Air Force—somewhat tentatively—began, the administrators continued to play a leading role. In December a committee was set up at the request of the Permanent Secretary in order that, as its chairman, the Director of Operations, explained at the first meeting, 'Finance Branches and Secretariat should be kept fully in touch in their early stages with the proposals of the expansion scheme'. At the first meeting of this committee the Director of Operations surveyed, for the benefit of the heads of four of the Secretariat and Finance Divisions, all the organisation changes which would be necessary in regard to stations and units. Many of these required no specific financial sanction, and the Director's account was for general information. The shadow of financial stringency, however, still loomed over the proceedings, and at the second meeting of the committee the Deputy Secretary attended to emphasise that 'the limitation of armaments was really a practical part of the Government's policy and that in consequence the possibility of a reduction in the programme must constantly be borne in mind'. The meeting accordingly decided to approve accommodation of a nature inferior to the standard permanent accommodation, although the Director of Medical Services had stated that this would involve facing 'a higher sick list'. Another important activity which the administrators undertook during the expansion period was that of planning the output of aircraft. As long as finance was the limiting factor upon output (that is to say, until the introduction of Scheme L in April 1938) the function of 'programming' fell naturally to the senior finance officers.

Even in the field of finance there was an expansion and adjustment. To the normal finance function, that is to say all the activity associated with parliamentary accounting, there was added, as we have seen,¹ the capital-finance activity arising from the McLintock

¹ See pp. 44-46.

Agreement. This activity was an integral part of the expansion and assisted in maintaining the place of finance in the centre of the expansion picture.

What was the effect of the creation of M.A.P. upon the relationship between administrative civil servants and their colleagues? In appearance it was very considerable. The first official organisation chart of the new department, it is true, showed the Permanent Secretary 'above the line'—that is to say in a unique position as the Minister's principal adviser. A second chart, however, issued a little later when M.A.P. was a going concern, showed the Permanent Secretary as being merely one of a number of chief advisers and as being in direct charge only of those functions which were, so to speak, inalienable; that is to say the accounting function generally, including establishments.¹ It might, indeed, have been expected that Lord Beaverbrook's methods of running the department—his distrust of defined functions and disregard of 'channels of responsibility'—would put the special training and abilities of administrative civil servants at a discount.

There is evidence that both appearances and expectations were deceptive. Whatever might be the functions of the Permanent Secretary, as shown on paper, he was in fact playing a full part in framing the policy of the department, and had as big a say in discussions of production or development as ever his predecessor in the Air Ministry had had. Two further points are worth emphasising. First, the period during which the authority of the administrative civil servants in M.A.P. was apparently diminished was not a long one. In the second place, the residue of authority left in the hands of the administrators was a very important residue. Although parliamentary accounting had been reduced to a minimum by reliance upon votes of credit, Capital Finance has never played a more vital role than it did during the dispersal period of 1940-41. Moreover, while, as we have seen, establishment procedure was often upset in regard to such of the higher posts as come within the Minister's field of interest, such posts were comparatively few, and normal procedure continued almost unaffected for all other posts. Thus the establishments divisions, the principal assistant secretary who supervised their work, and the Second Secretary who was responsible to the Permanent Secretary for establishment matters, were enabled to maintain a general oversight of the organisation of the department.²

Capital-finance procedure depended upon projects being approved in principle by the Air Supply Board, but this approval was always

¹ See Appendix IIIB.

² An example of the ubiquitous nature of secretariat activity is given in Part IV, Chapter XVI (iii) where the Second Secretary took the initiative in a matter of equipment provisioning.

conditional not only upon subsequent detailed agreement between the production director concerned and his opposite number in the Capital Finance Division but, also, in practice, prior agreement upon principle between these two officers. Failing this, the Finance Division would brief the Finance member of the Board to oppose the project. Since disputes at Board level took up time and were uncertain in outcome, production directors generally consulted the Finance Division at an early stage, before it had become too awkward to vary the scheme in response to financial criticism. As, during 1940, the creation of new capacity was being pressed forward with energy in every field of production, the scrutiny of proposals kept finance officers in the centre of the picture.

The control of establishments by administrative civil servants within the department gives them a much closer and more penetrating influence than is enjoyed by the Treasury in the same field. In normal peace-time conditions the Principal Establishments Officer would expect to be personally acquainted with the officers whose promotion required his approval and would have formed his own idea of their capabilities and personality. If, in the M.A.P. of 1940, the principal assistant secretary responsible for establishments could not acquaint himself with, say, all the assistant directors in the production and development branches, the Second Secretary could, and did, acquire first, or at least reliable, secondhand knowledge of all the deputy directors. This knowledge was added to the records which he had before him of education, training and experience, and when it was brought together with a very exact appreciation of the distribution of duties within the department it meant that the Second Secretary maintained at the assistant director to director levels the same kind of guidance as had been undertaken in the Air Ministry.

By the time when the Aircraft Supply Council was formed the Permanent Secretary had recovered the position which had been held by the Permanent Under Secretary of State for Air. The appointment of Sir Wilfrid Freeman as Chief Executive, by isolating his office at the top of the production pyramid, also increased the status of the only department of M.A.P. which was not subordinate to him. From this time forward the Minister had only two principal lieutenants within the department, and the position of the Permanent Secretary was thus greater, if anything, than that of his opposite number in the Air Ministry.

We have so far been discussing the relationship of the Air Ministry and M.A.P. to the Treasury, and within the department the relationship of the administrative civil servants to their production and other colleagues. The importance of establishments as a key to authority emerged clearly from this picture. The control of establishments, however, must be seen as merging into the larger subject. This is the

general subject of the staffing of the M.A.P. Who composed the staff? Upon what sources did M.A.P. draw for its temporary civil servants? Under what conditions did it recruit business men and industrialists? Was it, by and large, markedly different in composition from the peace-time Air Ministry? These are some of the questions which we shall endeavour to answer in the following paragraphs.

(ii)

The Staffing of M.A.P.

In the early years of the expansion of the Air Force (1935-37) all vacancies for administrative staff in the Air Ministry were filled by Civil Service examinations. It was only in the two to three years preceding the outbreak of war that the administrative staff coming in through Civil Service examinations was found to be insufficient and officials were therefore transferred to the Air Ministry from other Government departments. On one particular occasion—in 1937—when the Air Ministry came to the conclusion that no further promotions to the rank of principal were possible at that moment, they obtained three Inland Revenue officers to fill vacancies in that rank. That this was a particularly useful accession of strength was shown by the subsequent highly successful careers of the three officers in question. Officers retiring from other departments were also re-engaged and a few administrative posts were filled by the promotion of officers from lower grades. Higher scientific and technical posts were normally filled by promotion, but this practice became less rigid in the immediate pre-war years and a number were recruited from the outside world by means of interviews at selection boards presided over by a representative of the Civil Service Commission. In regard to the lower grades, that is, the executive and clerical classes and typing staff, Civil Service examinations ceased to be the sole method of entry, for there developed in the years that immediately preceded the war the practice of recruiting temporary staff at out-stations. At headquarters in Whitehall, in addition to recruits from examinations, a number of established staff were obtained from other Government departments in order to provide the leavening of more senior clerical grade officials. The numbers from the examinations and from other Government departments were not, however, sufficient to supply all the needs of the expanded clerical work and there was some recruitment of temporary staff to the headquarters' offices in the years immediately before the war.

Apart from these general needs particular deficiencies began to show themselves. There was, for instance, an acute shortage of staff

for drawing-office appointments. In order to remedy this the Ministry of Labour, about two years before the war, instituted special training schemes for draughtsmen and a very large proportion of the vacancies in the department's drawing offices were filled from this source. The growth of the inspection establishment also led to the setting-up of a training school in which all new entrants to the Inspection Department underwent a course of training which was subsequently supplemented by further training at the contractors' works.

All the steps already described were taken to meet current demands during the expansion period, but it was recognised that when war broke out the demands of the Service and production departments would once again rise sharply. In order to meet these anticipated demands the Treasury drew up plans for assigning to expanding departments staff who, in the event of hostilities, were expected to become redundant owing to the curtailment or cessation of the activities of the department in which they were serving. The surplus staff of those departments which were expected to undergo a reduction in numbers were allotted to the defence and supply departments, which made known their estimated requirements. The departments selected to feed the Air Ministry were—ironically enough in the light of later developments—the Ministry of Health and the Ministry of Labour. The Government anticipated that some social services would be curtailed during the war period and that numbers of clerks engaged in the Ministry of Labour on work relating to unemployment would become redundant. In fact these anticipations were not altogether justified, as the extent to which war-time problems were to affect the two departments in question was not fully appreciated. In the result the Ministry of Health and the Ministry of Labour were unable to meet the full needs of the Air Ministry from their redundant staff. The situation was still further complicated by the fact that the Air Ministry's estimate of its war-time needs proved to be very greatly below actual requirements. Redundant staff from other departments accordingly did not go nearly so far as had been hoped towards meeting Air Ministry requirements. Fortunately there were other resources.

The Government, anticipating that on the outbreak of war many professional, technical and business men would be seeking employment, had set up in the Ministry of Labour a Central Register Department whose task it was to obtain such information as they could of candidates who were ready to offer themselves for national service and to classify them in order that they could make suitable nominations to Government departments which stood in need of recruits of this character. To aid them in creating the Register the Ministry of Labour enlisted the help of the universities and of various professional and scientific bodies. The Air Ministry relied considerably upon the

Central Register, although some friction occurred because of the refusal of the authorities to consider unregistered candidates nominated by departments. It was inevitable, in the absence of any compulsory scheme, that particular departments should be approached directly by people who believed themselves to have specialised qualifications. Many good recruits came to notice in this way and the Air Ministry found it irksome and slow to have to consider alternative candidates from the Register. Many of the registered candidates had not been seen by any interviewing panel, and as the Central Register authorities had only the record prepared by the candidate on which to base their nomination, these, particularly at the outset, were not always suitable. It also happened that their selections of candidates often failed to include persons who were registered and who, having subsequently made a direct approach to the department, were found to be more suitable than the candidates submitted by the Register. These troubles, however, very largely ceased to exist as the war progressed and competition for manpower increased. The advantages of a central allocating body were then generally recognised.

When, upon the outbreak of war, Civil Service examinations were abandoned and the Government imposed a ban on public advertisement for staff, the Central Register became the main channel of recruitment from the outside world of the classes of staff which it covered. Within the Civil Service the arrangements which had been made for the transfer of staff from one department to another proved to be inadequate, and the Treasury introduced a more general scheme under which cases of redundant staff were reported to the Treasury, which allocated them according to known requirements. Among higher grades of the Civil Service this scheme brought about an unprecedented freedom of interchange between departments. In addition, many retired civil servants were brought back into employment and the normal rule calling on officers to retire at the age of sixty was applied much less rigidly; later it was suspended and retirement was postponed until sixty-five.

While the recruitment of professional men created no particular problems, there was another source of supply of recruits to the higher Civil Service which called for the adaptation of peace-time principles to war-time demands. The Ministry of Aircraft Production, like the Ministry of Supply, received a large influx of industrialists and business men, especially during the Beaverbrook regime.¹ The Treasury had foreseen this situation and had foreseen also that they would be

¹ Thus Lord Beaverbrook appointed Mr G. C. Usher, managing director of International Combustion Ltd., to be Controller of Light Alloys in July 1940. In the same month he appointed Mr W. L. Stephenson, chairman of F. W. Woolworth & Co. Ltd., to be Director General of Equipment, and Mr A. J. Newman, chairman of Newman Industries Ltd., to take charge of machine tools. These are typical instances of the appointments that were made during Lord Beaverbrook's term of office.

confronted with the problem of conflicting interests. Their ruling at the beginning of the war was as follows:

Three main types of case are likely to arise:

(a) Persons (e.g. members of Advisory Committees) with no executive functions. There is no objection to such persons continuing to participate in their private activities.

(b) Persons brought in to undertake direct executive functions, who nevertheless do not wish to sever all connection with their commercial interests, though willing to be in the nature of sleeping partners only during an emergency. Provided such persons take no direct or active part in the control of their private business no objection need be taken if some income is derived therefrom.

(c) Persons who, while holding an executive post (e.g. in a Control organisation) wish also to participate actively in their private businesses. An arrangement of this sort cannot be contemplated, and if such persons are not prepared to give up such active participations during an emergency the department concerned must find a substitute.

(d) The above are the broad principles which should be applied. There will no doubt be border-line cases which will have to be settled on merits.

Some six months later, on 24th February 1940, another Treasury circular dealt with the same question. To the first two cases the same ruling was given, but in the third case—persons who wished to participate actively in their private business while holding important Government executive posts—it was affirmed that:

An arrangement of this sort is open to grave objection in principle and the engagement of individuals who will only accept employment on this condition should be avoided whenever an alternative is possible. The arrangement is open to two main objections. In the first place anyone holding a Government appointment should be free to devote his full services to the work of his department. In the second place it is highly important that he should not be placed in a position where his official duties conflict, or appear to conflict, with his private interests, or where information acquired in his official capacity might be utilised to the benefit of such interests. In peacetime these objections would be conclusive against employment in a dual capacity, but in wartime there are cases in which the public interest requires that they must be qualified or waived. . . . Every individual with active business interests to whom it is proposed to offer an official appointment should be required to state fully and precisely the extent of his business interests and the degree to which he proposes to retain them after appointment. . . . In all cases the arrangements entered into must be such as, in the last resort, the Minister is prepared to defend, whether the criticism comes from the House of Commons, its Public Accounts Committee or from the public generally. The arrangements on the one hand must commend

themselves to the general body of public opinion and on the other hand must depend upon the personal honour and integrity of the individual concerned.

Commenting on the practical application of these Treasury instructions the Public Accounts Committee declared in 1941¹ that:

Practice has varied as between the different Ministries, but your Committee have been assured by all the Accounting Officers whom they questioned on the subject that the rules have been brought clearly to the notice of all concerned and that in the few cases in which difficulty has arisen a satisfactory arrangement has been reached and approved by their Ministers. The practical working-out of the system must obviously depend, in the words of one witness, very largely on the discretion and honesty of the individuals concerned. Your Committee realise that these gentlemen have been specially selected for their important work and that the public are indebted to them for their services, which in a number of cases are unpaid, but they think it is important that the position should be carefully watched by all concerned.

Besides placing a number of leading industrialists in important posts, Lord Beaverbrook, as we have seen, adopted the policy of appointing a number of personal advisers who had neither a definite title nor closely defined duties. Reference has already been made to the cases of Mr Hennessy and Mr Westbrook. A number of other appointments of the same kind were made. To give two examples, in June 1940 Lord Beaverbrook appointed Mr R. H. Coverley, of Rotol Airscrews Ltd., 'to advise the Minister generally on all matters in connection with the production of aero-engines and airscrews', and in the same month he appointed Mr Handley Page 'to assist and advise him on accelerating production of trainer aircraft'. These personal adviser appointments very largely ceased to exist when Lord Beaverbrook left M.A.P. in the summer of 1941, as the succeeding Minister, Colonel Moore-Brabazon, was insistent that every member of the staff should have a clearly defined function.

The scientific and technical staffs of the Air Ministry and, later, M.A.P., were considerably strengthened by the transfer of professorial and tutorial staff from the universities. The outbreak of war led to an immediate increase in suitable candidates for appointment, and we have already noted the appointments which were made in the early months of the war. The need for radio engineers led to the institution under the Ministry of Labour of a special training scheme for this class of employee. The scheme was drawn up under the auspices of Lord Hankey and enabled young men and women with suitable educational qualifications to study at universities or elsewhere in

¹ *Report of Public Accounts Committee, 1941.*

order to qualify as radio engineers and so forth. It was decided that civil servants should not be exempted from the provisions of the Military Service Acts, but the ages of reservations were fixed at twenty-five for administrative and executive officers and at thirty for clerical officers. These ages were raised in December 1941 to thirty and thirty-five respectively.¹ The age distribution of the Air Ministry staff was such that the department had a high proportion of very young men in its employment, and as these were withdrawn their places were taken by older officers from other departments and by women civil servants or by temporary entrants. In the years before the war the Air Ministry had made it their policy to employ ex-R.A.F. personnel, particularly at out-stations, and as a result employed comparatively few women. It was in any case argued, with some reason, that on many of the duties of the department (e.g. those involving contact with Service officers and airmen and those involving travelling duty and visits to R.A.F. stations) women should not be used. They were not admitted to the executive class on the ground that officers of that class were liable for service overseas. Several officers of the establishment divisions took the longer view and urged that it was essential to recruit women in the pre-war years in order to provide against the loss of men to military service. These views prevailed to some extent, but rather late in the day, with the result that the outbreak of war found the Air Ministry with comparatively few women of any length of service and these mostly in the lower grades. The age of reservation for professional and technical Civil Servants was thirty, but until December 1941 the vast majority of scientific, technical and drawing-office staff were covered by occupational classifications who were reserved at twenty-one. From January 1942 onwards these ages of reservation were raised by one year each month and individual applications for deferment were submitted to the Treasury in respect of men becoming liable to military service. Very few women were employed before the war in the technical and professional grade for the simple reason that very few were available with the necessary qualifications. Such women as were employed generally held appointments in the lower grades, although in a few instances women secured appointments to the more senior grades. Only a very small number of staff were released to the Forces and there was no question of extensive substitution of women to replace men for release. On the other hand, the Aeronautical Inspection Directorate recruited a large number of women. These women were trained by the department at the Directorate's training school at Bristol. There was also an increase in the number of women

¹ The Schedule of Reserved Occupations was, of course, later abolished and replaced by a system of individual deferments.

employed in the scientific and technical staffs, but the number was not great.¹

We have now indicated the principal means by which M.A.P., despite loss of staff to the armed forces, continued to expand to the dimensions called for by its war-time task. By borrowing staff from other departments, by promotion, and by the recruitment of lawyers, chartered accountants and dons, the department contrived to keep its administrative strength more or less up to the mark; industrialists and business men came in to take a hand in controlling production and in the more specialised fields of organisation; employees of business firms strengthened the department at the executive and higher clerical level; and large numbers of women took over the mass of clerical work thrown up by the intensive organisation of a great proportion of the total industrial resources of the country.

Broadly speaking, it may be said that none of these classes made any very striking changes in the procedure and traditions of the Civil Service. The professional men and dons fell into place with the minimum of friction and in any case almost all the senior and key posts (e.g. in Establishments) remained in the hands of permanent administrators. The executive and clerical newcomers, despite their weight of numbers, lacked individual authority and were likewise readily absorbed. Many of the business men and industrialists, on the other hand, took up their duties with a sense of suspicion, if not of hostility. In the case of some classes of business men the suspicion was quickly vanquished. Employees of the largest type of industrial concern soon learned that life in a department of State was not very different; the manifold nature of the responsibility, and the mere size of the organisation, made for strong general resemblance. Least at home in the Civil Service were the more or less self-made men who owned the whole or a part of the businesses in which they worked and were accustomed to autonomy within and competition without. It was among such men that the traditional belief that the Civil Service was mean, dilatory and fussy was strongest. Serious or chronic delay, however, was a function of a system of financial control which had already very largely vanished from the Air Ministry before M.A.P. was founded; fussiness about detail was, at any given time, a direct reflection of the general tone of parliamentary control and was at a minimum in M.A.P. in 1940. Complaints were made, but they tended more and more to concentrate on minor matters. The hostility of the Treasury to any kind of entertainments allowance was a fairly frequent cause of irritation, and business men who were accustomed to a more or less absolute authority over their employees sometimes resented the need for continual reference to establishment divisions.

¹ A clearer appreciation of the various staffing problems depends upon some knowledge of the numbers of staff involved. These are given in Appendix VB.

In fact many of them disliked the whole system of centralised establishment divisions.

'It is this policy', one of them wrote in the course of a lengthy memorandum to his Establishments assistant secretary, 'of centralisation of authority which breeds inefficiency. With every respect for your long experience . . . you do not know, and cannot possibly know, all the work that is being undertaken by [various officers of the writer's directorate general] and it is impossible for you to secure that understanding, and yet the system requires you to render a decision on the recommendations of those who do understand the work.'

Establishments, in replying to the Director General, said that he had now had a good deal of experience of their methods and they did not think he had ever found them to be far out in their estimate of what was required. Whatever may be thought about the validity of this defence, it is the case that the department was very seldom called upon to produce answers to such sustained and reasoned attacks as the one which has just been quoted. A few of what may without disrespect be called stock answers were found to go a long way in silencing protests if not in dispelling impatience. It was, for instance, characteristic of the 'business' element in M.A.P. that they wanted on occasion to hand out increases in salary as rewards for good work; the Treasury's view, however, as stated in the case of one particular officer, was that 'the fact that he has shown great energy, ability and efficiency was not an argument—he was appointed presumably because he was expected to show those qualities'.

Apart from these, which were occasional rather than chronic difficulties, at least so far as determined argument went, there was a small group of points, associated with one another in the Civil Service, which for many business men summed up much of what was incomprehensible or irritating, of what was, in short, 'red tape'. One of these was the Civil Service practice of initiating action at the lowest practicable level in the hierarchy, so that a letter from a firm raising a difficult point combining production, capital finance, and contracts interests, would reach the director general of production most closely concerned only after (say) a principal and an assistant director of contracts had given their views. Even if the letter were addressed to the Director General personally, he would be expected to seek advice before giving his own view, so that almost all correspondence was public property within the department. The tendency to pursue all discussion upon registered papers, so that a record should be available of every move, was perhaps less marked in the pre-war Air Ministry than in some other departments and may have appeared to permanent civil servants to have been non-existent in M.A.P.; to business men, however, permanent officials sometimes appeared preoccupied with 'the record' at the expense of action. The

business man who owed his success to commercial or other flair found, in short, that the Civil Service machinery, designed to be operated by the teamwork of individuals of a high average of intelligence, sagacity and industry, offered little place for his own special quality. As the years of war passed, however, there was a very marked *rapprochement* between business men and permanent officials, and if some of the former never altogether lost a sense of being frequently rubbed the wrong way, the alternatives were to resign from the department or to adapt themselves.

This indeed was the general rule for all classes of recruits with one important exception. The university scientists, and particularly those who worked at the Telecommunications Research Establishment, contrived to make their own very decided impression. There are two questions which may be asked. First, what departures from peace-time methods and procedure did the scientists impose upon the Civil Service? Secondly, what were the reasons why they were able to impose such departures? Peace-time Civil Service procedure is based upon a pyramid of responsibility, in which every officer has an immediate superior who supervises his work. An assistant principal is responsible to a principal; a senior scientific officer to a principal scientific officer, and so on. Occasionally a rung in the ladder will be missed and an assistant principal will report direct to an assistant secretary, but, generally, considerable importance is attached to the concept of levels of responsibility. According to this concept the Chief Superintendent of the Telecommunications Research Establishment was responsible to the Director of Communications Development. So long as the latter office was filled by Mr (later Sir) Robert Watson-Watt (for whom it had been created) the practice corresponded fairly well with the theory. Succeeding directors, however, had not had Mr Watson-Watt's special authority and experience in the radar field and the senior university scientists who joined the Telecommunications Research Establishment on the outbreak of war almost invariably dealt directly with the Controller of Telecommunications Equipment and later the Controller of Communications Equipment,¹ and also with senior R.A.F. officers in the Air Ministry and Commands. The famous 'Sunday Soviets', in which scientific officers and air marshals argued points of radar policy on equal terms, were probably the most spectacular departure from peace-time methods which occurred in any supply department, but they were not in themselves exceptional. They were, rather, characteristic of the administrative unorthodoxy of the Telecommunications Research Establishment. The scientists, moreover, insisted upon a degree of initiation into operational policy which was absolutely unprecedented.

¹ See p. 304 *et seq.*

Finally, the organisation of the Telecommunication Research Establishment was conditioned by the belief, noted upon as a matter of policy, that a small number of imperfect radar equipments provided quickly was worth any number of perfect equipments that came too late. This insistence upon urgency excused, and indeed called for, all kinds of expedients which by peace-time standards were grossly irregular.

The scientists were able to flout these standards mainly because they had to give to M.A.P., and so to the Air Force, something of unique value. Radar was a war-winning weapon, and it was so novel, so technical and so replete with potentialities that only the scientists could determine what was the best way in which to use it. As monopolists they could impose their own conditions. This was true even before the war when the development of radar was in the hands of members of the permanent scientific Civil Service. Mr Watson-Watt and Mr Rowe had not developed the Home Chain in an atmosphere of administrative orthodoxy. The congregation of a large number of university scientists in one research establishment where they dominated the permanent staff (most of whom were in any case junior newcomers of the 1934-39 period) was quite unlike the permeation of a headquarters department by temporary civil servants. There was no one to instruct the scientists in procedure even if their position had been such as to make such instruction acceptable.

So much for the various classes of temporary civil servants who composed so large a proportion of the staff of M.A.P. Their presence was in itself a departure from peace-time practice; perhaps the most important departure of all. Yet there remain, even within the field of establishments, other aspects of administration to be surveyed before we can make any claim to have described the main differences between M.A.P. and a peace-time department. One of these is promotion procedure.

Generally speaking, promotion procedure did not undergo any revolutionary changes, but the incidence of promotion was considerable. In the early days of expansion selection for promotion, particularly in the lower grades, was largely determined by seniority and general fitness for promotion. In wartime, although seniority was not overlooked, the main factor became an officer's fitness to perform the duties of a particular post. At the outbreak of war the expansion of the Air Ministry had been such that the bulk of the ablest officers had already been promoted in order to fill the key posts in new branches and directorates, with the result that the promotion fields left consisted, to some extent, of the officers who either on the grounds of inexperience or lack of quality were not adequately fitted to perform a wide range of the duties of their class. Many of them, however, proved to be more suitable for advancement for particular duties than officers less experienced in the ways of the department obtained

either by direct recruitment or by loan from other Government departments, and many of these officers were given geographical promotions. Promotion procedure became less formal than in peacetime, when a promotion was rarely made until the officer had appeared before a selection board consisting of four or five senior officers of the department, and all promotions except in the junior ranks were approved by the head of the department or by his deputy. By 1942, promotions in M.A.P. were frequently made by administrative action on the part of the establishment divisions. Promotions by administrative action were in fact the rule on the production side of the department, where almost all the officers concerned were temporary civil servants. Promotion boards were, however, retained for the scientists, among whom there were many permanent officers. The Scientific Research Promotion Board met regularly throughout the war and kept in being the constant reviewing of the staff which had been a noteworthy feature of their administration before the war.

Promotion board procedure, sometimes felt to be irksome by those who were called upon to give up time to sitting on the boards, was nevertheless recognised in the higher administrative circles to be an important safeguard of staff interests. The Second Secretary, who exercised a general responsibility for establishment questions, was a consistent advocate of its advantages from this point of view. He was anxious to avoid the danger of haphazard promotions made in accordance with unequal standards, and while it was difficult during the early years when M.A.P. was staffed so largely by newcomers to do more than urge the responsible authorities to keep staff under constant review, more settled conditions enabled the Second Secretary to lay down definite lines of procedure. In November 1943 he called a meeting at which it was decided that for vacancies for director and deputy director on the production side all officers of suitable grades in all the production directorates would be considered. From December onwards all such promotions were considered by a board presided over by the Permanent Secretary. Strictly speaking, this was not a promotion board as the Civil Service rule limited promotion board procedure to posts with salaries of less than £900; in fact, however, it acted as a board. In the autumn of 1944 this procedure was extended to the equivalent appointments in the scientific and technical directorates. The Second Secretary was anxious that the procedure of these boards should be used whenever it was applicable; their regular operation, he remarked in the course of giving a ruling on one case, being 'important to the maintenance of confidence'.

Maintenance of confidence was particularly desirable in view of the war-time position of the Civil Service staff associations. These had acquired the right to be consulted by the department on promotion matters affecting their members, and in peacetime were very

active in defending their members' interests. They carried out their duty of arguing every debatable point to its fullest extent. In wartime they felt able to take a different view of what their members' interests required of them and were prepared to give M.A.P. and other departments a freer hand. For that matter many of their whole-time professional officers had been called up (some were serving in Government departments), while their part-time honorary officers were frequently too heavily overworked to give adequate time to staff association problems.

The greater incidence of promotion inevitably affected quality; on the other hand, the growth of responsibilities, the urgency and the volume of war work all tended to develop innate ability. In efforts to keep up the standard, senior officers were imported from other departments, but this was not wholly successful; this lack of success was due partly to the fact that other departments had already been drained by the central lending arrangements and had not enough senior staff to meet all needs; nor were departments suffering from losses to military service eager to part with their best officers to growing departments. As the war went on the staff in the more sheltered departments tended to become less suitable as compared with staff who had gained experience in the busier departments most directly affected by the war.

(iii)

Delegation of Authority Within the Department

One means by which M.A.P. could partly overcome shortage of staff was to delegate authority for particular sections or classes of work to a lower level. To some extent this was a process which could be carried out without the issue of specific directions, and during the expansion period there was, in the Air Ministry, a tendency for officers at all levels to accept for themselves, and entrust to their subordinates, a greater weight of general responsibility. The process was, however, limited not only by the actual lack of experience or width of outlook of junior officers, but also by the well-established practice which governed the kind of work which each should do. As a general rule only specific instructions could bring about major departures.

As an example of such a specific delegation we may take the case of authority to contractors to dispense with competitive tenders in capitally assisted schemes. Competitive tender was a principle of such importance in pre-war days that authority to dispense with it had to

be given by the Secretary of State himself. This authority was inherited by the Minister of Aircraft Production and continued to be vested in him exclusively until March 1942 when it was decided to carry out a measure of delegation. The Secretary then directed that power to dispense with competition should be exercised in contracts up to £50,000 by assistant secretaries, from £50,000 to £500,000 at the principal assistant secretary level and over £500,000 by the Deputy Secretary. Even then the instruction which was issued proceeded to say that if a decision to dispense with competition had to be taken at a meeting held away from headquarters no restriction was placed upon the discretion of the finance officer to whom it was referred. A further example of delegation was the decision, taken in November 1943, to allow administrative officers of the rank of assistant secretary and above to authenticate the official seal of the department upon larger agreements, etc., and also to sign formal documents (e.g. directions issued under Defence Regulations) which were not under seal but which had hitherto been signed by the Secretary.

None of these steps could, however, be expected to relieve senior officers of any really considerable proportion of their ordinary day-to-day load of work. In the Secretary's department it is probable that only a substantial measure of delegation of authority to approve expenditure could have done this. In the important field of capital finance the German bombing attacks of 1940, and the emergency dispersals which they caused, undoubtedly caused such a delegation to take place. Finance officers acted on their own initiative, often on the spot, frequently in response to urgent telephone calls. Authority to approve expenditure was rigidly withheld from officers on the production side of the department, and this laid on finance officers a peculiar responsibility in times of acute crisis to avoid any possible delay. Accordingly during the first eighteen months or so of the life of M.A.P. procedure in the capital-finance divisions allowed a great measure of discretion, particularly at the principal level.

As emergency dispersal came to an end, the disadvantages of this became apparent. Some contractors had obtained better terms than others; unorthodox settlements, good enough in themselves, had raised awkward precedents. From the end of 1941 onwards, the history of capital-finance procedure is the history of an attempt to impose uniformity of treatment upon all contractors. The initiative of finance officers was naturally limited as their powers were defined. By May 1942 the powers of financial agreement of various grades of staff had been strictly laid down. Subject to Supply Board approval in principle, a higher clerical officer might approve expenditure up to £10,000, a staff officer up to £50,000, a principal up to £250,000, while the authority of an assistant secretary was required for expenditure above that level. Standardisation of procedure (for example,

standardised letters of approval, approval forms, code numbers, etc.) was in fact relied upon in place of direct delegation of authority as a means of what may be called 'de-skilling' capital finance and enabling senior officers to concentrate on policy issues.

It will be evident from this account that the most important departures from peace-time practice—the principal differences between M.A.P. and a peace-time department—lay in the establishments field. By a relaxation of Treasury control in the pre-war era the Air Ministry was able to increase its permanent staff, and to recruit temporary staff expeditiously and easily. In wartime M.A.P. was enabled very largely to make its own determination of the numbers of staff it required, and it was by recruiting temporary staff in large numbers rather than by adopting any radically new methods that it was able to surmount the vast difficulties which confronted it. The exceptional case was that of the university scientists who developed radar; for special reasons they were able to behave in a highly unorthodox manner and to jettison old methods and ideas. At every stage of the account its most impressive feature has been the ability of civil servants to adapt themselves to changing conditions without fuss; there was astonishingly little written regulation of the change in outlook from the depression and economy of 1933 to the lavish spending of 1940–41. The difference between the Air Ministry of 1933 and the M.A.P. of 1941 was very great indeed, but the M.A.P. of 1941 was, to a much greater extent than is probably realised, the creation of senior administrative civil servants who were already in positions of authority at the earlier date. And if this account of the M.A.P. may be taken, as was suggested at its outset, as being representative of the other two departments with which we are concerned, it is probably nowhere more representative than in this general conclusion.

(iv)

Finance: An Interdepartmental Essay

The role of finance in the history of war production is the subject of a separate volume¹ in this series. Those who seek a full analysis and discussion will find it there. Only an abbreviated treatment is possible here. Such a treatment may take as its text the statement on the subject made by the Select Committee on National Expenditure in 1941:

It is the duty of Supply to provide what the consuming departments require; of Finance to provide and account for the necessary funds;

¹ See Ashworth: *Contracts and Finance*, *op. cit.* The following pages are in the main summarised from this work.

and of Contracts to secure that supplies are bought on the most favourable terms. . . . Finance is charged with criticising demands for expenditure and with defending them when they have been sanctioned. . . .¹

The tasks of finance were not, either before or during the war, carried out in quite the same way in the three defence departments, nor did the system go unchanged through the inter-war years. Yet there was a sufficient homogeneity for a description in general terms. Let us take the contract directorates first. These were divided into branches, each dealing with a particular charge of stores, and their task was to buy these stores in accordance with the requirements of the supply branches. The business—a highly technical one—of negotiating advantageous prices on each contract was theirs exclusively; the total expenditure on the programme, on the other hand, was not their sole responsibility, but had to receive the approval of Finance, and it was for the Supply branch to obtain this.

The work of Contracts in purchasing stores continued throughout the war in much the same way as it had gone on during the rearmament period and, indeed, it was only the end of the war which, for a time, radically amended it. Arranging the sale of stores which was normally a very minor part of contracts work then became a formidable task, especially for the Ministry of Supply, who had to dispose of enormous quantities of surplus material and stores. For a time selling became as important as buying.

So much for Contracts. The main task of Finance was to examine and criticise all proposed programmes of production and purchase in order to see that the department was getting value for money. They thus administered and accounted for the sums voted by Parliament. In war, these traditional peace-time functions were modified. The primary—indeed all-important—reason for modification was the relaxation of parliamentary control over expenditure; but a secondary reason was simply that in the haste and hurly-burly of war it became impossible to give the same detailed attention to financial scrutiny. So the traditional functions were depressed; but they never disappeared.

The peace-time system of financial control, which was rooted in the necessity of obtaining parliamentary sanction in advance of departmental expenditure and of accounting retrospectively to Parliament, involved extensive scrutiny at several different levels and elaborate recording. The picture is familiar. Normally after the Cabinet had reached a decision, the Chancellor of the Exchequer agreed with the departments concerned on the totals of their financial allocation. The departments then allocated these sums amongst

¹ Select Committee on National Expenditure, 1940-41, 4th Report (18th Report of Series), Part I, para. 95.

various 'Votes', which were submitted to the Treasury for approval. According to established doctrine the Treasury had the right to reserve any part for further consideration and the departments could not proceed with any service until the Treasury had approved the Vote. Once it had given that approval the departments had the responsibility of seeing that expenditure remained within the authorised limits. This duty was always meticulously carried out.

The decision in 1935 to undertake a rearmament programme, involving greatly increased defence expenditure and a rapid expansion of the productive capacity for munitions, created new circumstances which called for new methods. The difficulties imposed by the existing system of control were realised from the outset and both legislative and administrative changes were made in an attempt to avoid delay in carrying out the programme without sacrificing the essentials of financial control.

The legislative change was that made by the Defence Loans Act 1937¹ which authorised the issue to the Defence Services of £400 million from the Consolidated Fund as appropriations in aid during the five years ending 31st March 1942. In 1939, before the outbreak of war, the sum was increased to £800 million.² This measure was hardly a powerful lever in securing speedy action; and it did not in any case make the administration of financial control any easier. The Government was not disposed to throw caution to the winds; on the contrary, the Chancellor of the Exchequer, Mr Chamberlain, declared that at no time had it been more important that the control of the House of Commons and of the Treasury over expenditure should be maintained unimpaired and in its traditional form.³ In order to secure this object the Act laid down that the whole of the proposed expenditure on defence would continue to be shown in estimates laid before the House of Commons. The sums to be issued each year from the Consolidated Fund under the new powers would appear in the Estimates as appropriations in aid of Votes for the Navy, Army and Air Force and the Royal Ordnance Factories.

As no effective change was made in the arrangements for parliamentary control, decision and action could be accelerated only by changing the administrative procedure directly. Already, before the Defence Loans Bill was presented, there had been set up the Treasury Inter-Service Committee, which consisted of representatives of the Treasury and of the three Defence departments. The first task of the T.I.S.C.—as it was called—was to consider urgent proposals for expenditure which needed Treasury approval in advance: the committee was empowered to authorise such expenditure where it thought

¹ 1 Edw. 8 and 1 Geo. 6. Ch. 13.

² By the Defence Loans Act 1939 (2 & 3 Geo. 6. Ch. 8).

³ H. of C. Deb., 5th Series, Vol. 320, Cols. 596-597, 11th February 1937.

fit, formal Treasury sanction being conveyed subsequently to the department concerned, in confirmation of the committee's authority. Secondly, the T.I.S.C. was able to authorise departure from ordinary Contracts procedure, and even principle.

It was the policy of the Government at this time, as we know, that the normal industry of the country must not be disturbed by rearmament. Financial methods were sometimes used to ensure this; for example, authority was often refused if a department sought to incur expenditure on schemes or in places where there would be competition with private industry for labour and materials. More in keeping with the traditional role of finance was the preoccupation with the cost of rearmament and the attempt to keep down Government expenditure on munitions. As long as this preoccupation influenced the policy of the Government finance was bound to limit the scale and the pace of rearmament.

Even after 1938, when the general financial limitations had gone or were going, some financial obstacles to rearmament still remained. Thus in 1938 and 1939 the Government was becoming anxious lest rearmament should make excessive demands for foreign exchange. Financial considerations, in short, still played a part in keeping down the volume of rearmament and the amount of new productive capacity, and the detailed financial scrutiny occasionally caused delay in the execution even of the limited programmes that had been authorised. Nevertheless, it is true to say that the creation of the Treasury Inter-Service Committee changed not only the formal method but also the atmosphere of financial control.

We have seen already in an earlier part of this volume that when the Air Council Committee on Supply¹ was set up its early meetings included a Treasury representative, but apart from such exceptional modifications as this the formal arrangements for financial control within the departments continued with little change through the rearmament period. The finance branches of the defence departments continued right up to the outbreak of war to exercise close control over the execution of policy at all stages, both in general and in detail. Failures to prevent excessive expenditure were heavily visited upon the offenders by the Public Accounts Committee.

But the policy of limited expenditure and very close control could not be long maintained in war. The need to expand production fought against the restraints of financial control in a long but winning battle. The scale of expenditure had also increased so much that items which normally would have been subject to full investigation became scarcely worth troubling about, especially as the volume of business had grown too great for the available staff to be able to

¹ See p. 40.

exercise the usual detailed checks in every case. So in one way and another it became impossible for financial control to be maintained in the same detailed form as in peacetime.

Its effectiveness, moreover, was potentially somewhat weakened by the arrangements for payments to firms for work done for Government departments. It was an important rule that no firm must incur commitments on behalf of a Government department without that department's prior approval. Yet if a firm broke this rule it was not easy to take action against it since an actual refusal to pay might have damaged production. If firms had exploited it this could have been a serious weakness; in fact they did not do so. Another possible weakness lay in the manner in which claims for expenditure were met in the case of work which had actually been carried out. In 1940 all the supply departments arranged to speed up progress payments, and this in many cases meant the paying of almost any claim that looked reasonable. At the same time detailed examination of the costs of contractors and agency factories was substantially reduced in some departments. It was recognised that this relaxation of control threatened to remove the financial incentive to avoid extravagant waste, and that it ought, therefore, to be regarded as a temporary measure. It was pointed out in M.A.P. that, though in many cases subsequent investigation might be of little use, this should not be noised abroad, since a future investigation was the only weapon in the department's hands. In fact at this period financial control depended very much on the willing co-operation of agent and contracting firms, since there was neither time nor staff to spare for the supervision of detailed expenditure on small items.

In summing up it might be said that while the administrative arrangements for financial control were formally preserved, there was brought into them a flexibility and a discretionary element which would never have been contemplated in peacetime. Indeed, they could never have been effected without a great reduction in the extent of parliamentary control over expenditure. Yet if this control was relaxed, it was not abandoned, since, although departments were freed from the necessity of announcing a programme in advance and sticking to it, every item of expenditure had to be capable of justification retrospectively. The details were not published in the usual form until after the end of hostilities, but they were available to the Public Accounts Committee. This body pursued its enquiries just as in peacetime and had a real, if remote, effect on departmental financial policy. Its extreme sensitivity to possible cases of high rates of profit was particularly influential. The House of Commons also attempted to provide some counterpoise to the loss of control over the Estimates by appointing in each session a select committee to 'examine the current expenditure defrayed out of moneys provided by Parliament

for the Defence Services, for Civil Defence, and for other services directly connected with the war, and to report what, if any, economies consistent with the execution of the policy decided by the Government may be effected therein'. The Select Committee on National Expenditure was, however, an instrument less of control than of influence. Unfortunately, the scope of its enquiries made great demands on already overworked departments and occasionally led to friction, which may have reduced its influence. It interpreted its powers so widely as to lead to a general protest to the War Cabinet in 1943 by the departments affected and a subsequent agreement that its enquiries should in future be pursued with more restraint and consideration.

In the last three years of the war the system of financial control changed much more in fact than in appearance. The Treasury was still responsible for central control over the expenditure of the other departments and its authority was still expressed in financial terms, but that authority was in several ways more restricted than formally. In the first place the Treasury was sometimes only concurring in the decisions of other authorities, which were not primarily made on financial grounds. In the second place, in order to ensure that its approval would lead to effective action, it had to ascertain in advance that complementary decisions to provide the necessary resources would be made by the Ministry of Labour and the supply departments. The Treasury recognised the limitations of its position both in these respects and its relations with the supply departments. At the end of hostilities in Europe these departments joined in a discussion on the subject of Treasury control over their expenditure and the Treasury readily admitted that its direct control had to a great extent lapsed and that, as far as expenditure directly devoted to the Far Eastern war was concerned, there was little scope for its re-introduction.

Indeed, the position reached during the war was that the volume of work and the urgency of decision were such that any form of central control could be exercised only in the most general way. Nor could the control which was still retained continue to be entirely financial in form. What had happened was that the margin of unemployed resources had disappeared and it was, therefore, less possible to regulate the volume and distribution of production by offering the payment necessary to call out something from this reserve.

CHAPTER XVI

USER-SUPPLIER RELATIONS

IMPORTANT FROM the administrative point of view as were the relationships described in the last chapter, the function of M.A.P. raised another relationship to an even higher order of importance. This was the relationship with the Air Ministry, representing the Air Force, the satisfaction of whose demands for matériel was the whole object of M.A.P.'s existence. This relationship did not come into being with M.A.P. The general theory of administration in the pre-war Air Ministry envisaged, in regard both to the development and to the production of aircraft, an organisation representing the views of the 'user', namely the Air Force, and an organisation representing the views of the 'supplier', namely all those interested in production, from the finance divisions to the scientists and the experts on design, development and production. User and supplier, in the pre-war Air Ministry, were thus represented by the Air Staff and the department of the Air Member for Supply and Research, and were united in the Air Council in the person of their respective chiefs. We have already outlined the evolution of the supplier organisation from the department of the Air Member for Supply and Research as it was in 1934, through the creation of M.A.P. and so on until the end of the war. The relations which existed between this organisation and the user organisation which remained in the Air Ministry were of vital importance to the organisation and administration of M.A.P. In so far, indeed, as the provision of aircraft to the Air Force was the principal reason for the existence of M.A.P., almost the whole of its activity could be brought within this scope. It would not be possible, within the scope of a single volume, to explore all of this great territory. Fortunately there are parts of it which are both representative and important, and from which a knowledge of particular aspects, as well as a conspectus of the theory of relations between the M.A.P. and the Air Ministry may be gained.

(i)

Design, Development and Production

At the highest level of Air Ministry organisation the user was represented by the Chief of the Air Staff, acting as head of the Air Staff as a whole. In the more specific field of determining operational requirements as a day-to-day routine an important step was taken in

1934. In April of that year the branch of the Air Staff which covered this field was separated from the flying operations branches of which it had up to then formed a part, and became a separate organisation with the title Operational Requirements. During the expansion period, that organisation increased rapidly in size and importance. In January 1936 it became a deputy directorate under the control of a group captain; in 1937 it expanded into two parts; it was expanded again in 1938 and later in the year was upgraded to a full directorate. By the outbreak of war the office of Director of Operational Requirements had in fact become one of the most influential in the Air Staff.

The basic function of the Directorate of Operational Requirements was the preparation of Air Staff requirements for new types of aircraft and aircraft equipment. These requirements were drafted by the directorate in consultation with the planning and operational directorates of the Air Staff, the headquarters of the operational command concerned, and possibly the department responsible for training, and when drafted they eventually became part of the aircraft specification. During the drafting stage, the Directorate of Operational Requirements also consulted the design and production branches of the Air Ministry (and later of M.A.P.). The directorate was thus required to keep in close touch with the general, tactical and strategic policy of the Air Staff, to formulate a policy in regard to requirements, to consult the 'supplier' side about the practicability of these requirements, and finally to transmit the requirements to that side in an acceptable form. Every aircraft specification issued by M.A.P. incorporated the Air Staff 'requirement'. It was usually given in some detail. It covered not only such matters as speed, bomb-load and range, but also crew stations, emergency and parachute exits, fuel jettisoning, and even design questions such as stability, control characteristics and aircraft trim. Air Staff requirements were of course stated with reference to tactics or strategy, and had to be elucidated by M.A.P. in terms of design. In view of the magnitude of the task it is not surprising that—for example—by November 1942 the section of the Directorate of Operational Requirements which handled the comparatively narrow field of guns, armour and self-sealing tanks, comprised a wing commander and a squadron leader with appropriate assistance, and that the fourteen or fifteen other branches were staffed accordingly.

When M.A.P. was founded, the Directorate of Operational Requirements had, subject to one later development of some importance, reached its mature war-time form. This later development was the creation, in May 1942, of a group captain post in the directorate to deal exclusively with long-term planning of requirements. It was of course only to be expected that increasing pressure of work should bring about an expansion of the directorate, as it had done in the

case of almost every other Air Ministry organisation, and in fact such a normal expansion took place in 1942 when a deputy directorate responsible for navigational instruments, and in 1943 when a new directorate for armament requirements, were formed. The creation of the long-term planning branch had a special interest, as it emphasised the essentially Air Staff nature of the duties of the Directorate of Operational Requirements, since clearly the functions of this branch formed a central part of the functions of the Staff as a whole. Despite this important later development, however, it is fair to say that the nature and position of the directorate were firmly established by 1940.

It may be asked why, if the relationship between Air Ministry and M.A.P. at the routine level in the Directorate of Operational Requirements and the Directorate of Technical Development was satisfactory, developments occurred at the higher levels. Even before the foundation of M.A.P. in 1940, events occurred which accounted for some such developments. First, there was the growing complexity and volume of the expansion effort. We have already seen how, in the Air Ministry, this led to the multiplication of new posts, particularly from 1938 onwards. In some cases not only was the post itself a new creation, but the man who filled it was a newcomer to the Air Ministry. On the development side of the Air Ministry, the appearance of 'new men' was something of a phenomenon. There had been, in this field, a remarkable continuity of personnel, and the senior positions, both on the research and development and on the operational requirements side, were filled by men whose years of close contact and personal friendship enabled them to dispense with administrative formality. Then, in 1939, came the evacuation to Harrogate of the department of the Air Member for Development and Production and a geographical gulf suddenly appeared between the Directorates of Operational Requirements and Technical Development, who had long been accustomed to work side by side. Finally the Air Force was in action from the very first days of the war, and operational experience called for methods of digestion for which no peace-time exercises could perfectly prepare.

The first important reaction to these circumstances was the arrangements which were made for fortnightly meetings between the Assistant Chief of the Air Staff (Operational Requirements and Tactics) and the Director General of Research and Development. The first meeting took place in January 1939, and inaugurated a series which was to continue as an important institution for a considerable period. The meetings transacted business of the same general nature as was transacted between the Directorates of Operational Requirements and Technical Development, but they were of course able to bring to bear a greater weight of authority, and so to settle

questions of wider general importance. The chief questions to which they addressed themselves were proposals for new types of aircraft or of equipment of modifications thereto; the progress of Air Staff projects and proposals already referred to in the Directorate General of Research and Development; and the determination of what proposals were or were not ripe for discussion with the industry, and through what channels.

The meetings, which were held monthly or fortnightly, were under the chairmanship of the Director General of Research and Development (Air Vice-Marshal Tedder) who was supported by the Directors of Technical Development, Armaments Development, Engine Development and Production, and Communications Development. The Assistant Chief of the Air Staff (Operational Requirements and Tactics) on his side usually had the assistance of the Director of Operational Requirements, the Director of Signals and other Air Staff officers. The committee had no executive powers and was therefore an advisory body only; the executive authority of its members, however, meant that measures agreed upon in committee were invariably put into effect. All the major questions of development policy which arose during its lifetime were settled by the committee, in many cases by an immediate decision, in some cases by reference to higher authority 'for approval'. Among the projects guided by the committee were the jet-propulsion aircraft, the 20-mm. turret for heavy bombers, self-sealing tanks and armour plating; decisions of considerable importance were also taken about individual types. It was, for instance, a decision of the committee which eliminated the Botha.

The foundation of M.A.P. in May 1940 did not, surprisingly enough, bring the series of meetings to an end. From one point of view of course it was natural that they should continue, as the separation of the Directorate General of Research and Development and the Assistant Chief of the Air Staff (Operational Requirements and Tactics) into different departments made effective liaison all the more desirable. But Lord Beaverbrook disliked committees and regarded all long-standing Air Ministry institutions as being *ipso facto* in need of overhaul, and not less so if they were run by air marshals. The committee did in fact continue to meet until October, although its authority was weakened by a number of restrictions. In September, for instance, the Minister instructed the Director General of Research and Development to take 'special steps . . . to ensure that the findings of these meetings are not read by anyone as authoritative in the sense that modification or extra work is introduced without full consultation with, and approval of, the production authority concerned'. In any case the work of the committee was being duplicated elsewhere, and it was ceasing to be the most important channel of

communication between the two departments. When, in the autumn, Sir Wilfrid Freeman left the department and Air Vice-Marshal Tedder went to the Middle East, their departure meant not only the end of the committee, but the interruption of an important tradition in user-supplier relations.

This tradition, which had existed in the Air Ministry ever since its foundation, was, broadly speaking, that the 'users' should not merely be in close touch with the 'suppliers', but should actually provide some of the suppliers. We have seen that, until September 1940, the Director of Technical Development was always a serving Air Force officer. When in 1938 the post of Director General of Research and Development was created the new post also went to a serving officer. His chief, in turn, was yet another serving officer, the Air Member for Development and Production. When the first civilian D.T.D. was appointed the Service influence was maintained by providing him with a group captain as deputy. The department of the Director of Technical Development moreover always contained at least one or two serving officers in reasonably senior positions, and serving officers were also to be found in the important task of flight-testing at the scientific research establishments, and even, though in small numbers, on the technical staff of the establishments. Below director level, it is true, these officers were usually specialists whose representation of the user, if by user is understood operational personnel, was secondhand. The Directorate of Technical Development and the Directorate General of Research and Development were, however, general-duties posts and the officers who filled them represented the user in the strictest sense of the term. The minutes of the Director General of Research and Development and the Assistant Chief of the Air Staff (Operational Requirements and Tactics), while they reveal the frequent differences of opinion which must always arise between a buyer and a seller, have a special interest in one subject showing how often the two air vice-marshals were representing, not user and supplier in any sense of opposition, but rather both viewing the whole field very much from the same standpoint.

The cessation of the meetings in October 1940 left the new Director General of Research and Development, Air Vice-Marshal Hill, as the sole representative of the user in the higher councils of M.A.P., but his advice in this capacity was not very frequently sought. Sir Henry Tizard, who succeeded Sir Wilfrid Freeman in control of research and development at the highest level, was not at this period a member of the Air Council, and during the period when Lord Beaverbrook relied for advice and assistance almost exclusively upon men whom he had himself appointed, was not a member of the inner circle. Contact with the Air Ministry was maintained by Mr Hennessy, who corresponded and had informal meetings either

with the Assistant Chief of the Air Staff (Operational Requirements and Tactics) direct or with the Air Staff at lower levels through a member of the M.A.P. secretariat. Some of the projects under discussion were of great importance, and vital decisions had to be taken. The projects included the high-altitude bomber, night fighters, the role of the Mosquito, the Beaubomber, and the twin-engine Gloster jet fighter. The Air Staff, on their side, were not happy about the new relationship which had developed. They were accustomed to have development very much under their own authority and regarded an independent development authority with distrust. *Ad hoc* meetings with Mr Hennessy and occasional correspondence with an assistant secretary were, in their view, an inadequate substitute for the former close and intimate system of contact.

Yet, in the event, it was not the Air Staff, nor even the development authorities in M.A.P., who gave vent to the prevailing sense that the Air Ministry and M.A.P. were out of touch. The move came from the Director General of Engine Production. In January 1941 he told the Minister that he considered that 'the whole matter of development of future engines and aircraft was a mess because there did not seem to be adequate co-operation and cohesion between the Air Ministry and ourselves'. This was a statement which could hardly be ignored and which, when examined, could hardly be controverted. The Director General's further remarks cogently expressed the current anxieties:

If we are to get the best out of the productive capacity of this country we ought to have a fully considered and settled policy of development of aircraft, including engines, based on the Service requirements primarily. But the programme should not only be based on an independent, i.e. M.A.P., valuation of machines and engines but also on the possibilities of production and standardisation. What, for example, is the use of spending labour and machine hours on making all three Centaurus-Tornados and Vulture-Tornados and Sabre Typhoons, if it can be shown that one of them is all round the best? There should be no need for lobbying the Minister about engines for this and that purpose—I don't know what goes on in the airframe side—if on the very best data and experience available, a wise and informed decision has been reached by the Ministry. The cost of unnecessary development work in energy and man-hours must be tremendous and it ought to be cut down so that production may get the benefit of the labour and machines so freed.

At this same date another aspect of user-supplier relations began to cause perturbation in M.A.P. A proposal to meet Air Staff Specification B.7/40 by an adaptation of the Beaufighter had revealed that both departments were uncertain about the administrative machinery for initiating design work involving a new prototype aircraft. In an

exchange of minutes between M.A.P. and the Air Ministry the latter suggested that a formal Air Ministry letter was necessary. Even so there was another Air Ministry view which held that 'it was not the practice to conduct business between the two Ministries by official letter, but by contact, minutes and the passing of files as necessary'. This, it was thought in M.A.P., was satisfactory for 'ordinary business', but not for the ordering of new prototypes. Formerly the Air Member for Development and Production could do this after discussion with the Air Staff, by virtue of his control of both production and development; there was now no similar focal point of authority.

The solution of the two kinds of difficulty was linked. For dealing with those with which he himself was chiefly concerned, the Director General of Engine Production proposed that there should be set up a small co-ordinating committee, and such a committee was set up later in the same month—although, as was characteristic of M.A.P. at that time, it was introduced somewhat apologetically by Mr Hennessy not as a committee but as 'a little group'. The 'little group', which met for the first time in February 1941, comprised two representatives each of production and research and development, and while Mr Hennessy's original proposal had been limited to 'possibly a representative from the Service', in the event the Assistant Chief of the Air Staff (Operational Requirements and Tactics), the Director of Operational Requirements and the Deputy Director of Operations (Planning), attended regularly. Under the title of the Joint Development and Production Committee the new series of meetings practically replaced, after an interval of three months, the Air Vice-Marshal's meetings. The fact that it had been envisaged, at least on the M.A.P. side, mainly as a means of liaison with the industry, makes the role which the committee actually played more significant and lends colour to the Air Ministry view that the weak link in the chain had really been between the Air Ministry and M.A.P. and not between M.A.P. and the industry. The committee was certainly satisfied with the role which it played, as it placed on record that 'it provided a valuable means of co-ordinating development and production and ensuring that both proceeded in accordance with Air Staff requirements'.

One of the first tasks of the new committee was to consider the difficulty about the ordering of prototypes. They inclined to the view that proposals to order prototypes should first be considered by themselves and that, assuming agreement was reached, the Air Staff representative should then arrange for a formal request to be put to M.A.P. by the Air Ministry in an official letter. This proposal by the Joint Development and Production Committee initiated a lengthy discussion between the two departments which, in August 1941, resulted in the issue of instructions covering the whole field. It was laid

down, in considerable detail, exactly who should consult who in each department about each class of matériel, and how decisions should be taken. The new arrangements permitted branches of the Directorate of Operational Requirements to continue to communicate direct with research and development branches on the detail work within the agreed policy.

Meanwhile, the Joint Planning and Development Committee, which had initiated the discussions, had been eliminated in the reorganisation of M.A.P. which occurred in June 1941. This elimination did not, however, represent a setback in user-supplier relations. On the contrary, it was possible to dispense with the committee because this new organisation provided more satisfactory channels. Even so, as we shall see, the committee was soon replaced in a slightly different form. The most important of the new channels was brought into being by the creation of the post of Controller of Research and Development, and the appointment to it of the Assistant Chief of Air Staff (Technical Requirements), who had of course in this capacity been the principal 'user' representative on the Joint Planning and Development Committee. His appointment as Controller of Research and Development thus revived the old principle of having a 'user' actually in charge of the 'suppliers' on the development side. The Controller was a member of the Air Council and also of the Aircraft Supply Council of M.A.P. He was thus in point of the 'level' at which he operated a successor to the Air Member for Development and Production. His concentration on development, on the other hand, made his office analogous in effect rather to the lower of the two extinct Service posts—the Directorate General of Research and Development. More important than his exact function was the fact that he was bringing the old system with its close personal relations into operation again.

The winter of 1941–42 provided the Air Ministry with a number of important development problems; it was indeed a vital period in the transforming of the Air Force from its essential defensive role of 1940 to the heavy bomber force required for the air campaign against Germany. This was the situation when, in December 1941, there began a new fortnightly series of meetings between the two departments. In purpose and composition the new meetings were very like the old series held by the Director General of Research and Development and the Assistant Chief of the Air Staff (Operational Requirements and Tactics). They began very informally, and only as introducing an element of routine into a relationship which was already well established. It was at these meetings that the most important development decisions were taken; they included the fate of the Super-Stirling (B.8/41) the Hawker high-speed bomber (B.11/41), the Buckingham, the Super-Mosquito, the Griffon

Typhoon, and the Merlin 61 Mustang. The consequences of these decisions were not limited to development, but impinged upon production, and production questions were frequently discussed. Thus at the first meeting the Air Member for Supply and Organisation referred to his 'impression that M.A.P. were most reluctant to undertake any new production projects, especially if this will reduce their output of operational aircraft'. This indicated that discussion was to range candidly and informally over the most important policy issues, and it was clear that the new series of meetings was to be a sounding-board for Air Ministry-M.A.P. opinion. The importance of this aspect of their functions was proclaimed when the Permanent Under Secretary of the Air Ministry and the Permanent Secretary of M.A.P. began at their own request to attend from the second meeting onwards. Their attendance at meetings at which general policy was discussed was of course natural, but it did tend to divert the meetings more and more from the technicalities of development. The tendency for the meetings to discuss general policy matters was illustrated again when on one occasion the Minister himself attended and discussed, among other things, the Air Ministry requirements for advanced trainers. Possibly arrangements would have been made to split the meetings into two different kinds, but before any such step was discussed the situation was once again completely altered by the appointment of Sir Wilfrid Freeman as Chief Executive.

Sir Wilfrid Freeman, although he had in fact retired from the R.A.F. in taking up the new appointment, came direct from his post as Vice Chief of the Air Staff and thus represented the user directly in his own person. He was in any case in constant touch with the Chief of the Air Staff, and his appointment as Chief Executive rendered any other channel of contact at the highest level unnecessary. Sir Wilfrid Freeman attended only one fortnightly meeting, after which the series appears to have been terminated. The Controller of Research and Development and A.C.A.S.(T.R.) continued to meet frequently throughout the war, but at this level also the informal personal type of contact became increasingly important. In April 1943 Air Marshal Linnell was succeeded by Air Vice-Marshal Sorley who, like his predecessor, came to M.A.P. from the 'opposite number' post of Assistant Chief of Air Staff (Technical Requirements). Air Vice-Marshal Sorley brought unique qualifications to M.A.P. As a junior officer he had had a large hand in drawing up the operational requirements of the Air Staff in the vital early years of the expansion period. No one was more familiar with the obstacles which had had to be overcome in re-equipping the Air Force with eight-gun fighters. He was thus even from the outset almost as much at home in the Aircraft Supply Council of M.A.P. as in the Air Council itself.

The very closeness of the relationship between the Air Ministry and

M.A.P. during Sir Wilfrid Freeman's regime had, however, some repercussions in the field of organisation. As the old informal relationship was restored, so was some of the old vagueness about proper channels of communication, which, as we have seen, had been so clearly and strictly laid down in August 1941. This became a serious difficulty after the abolition of the post of Controller General in June 1943¹ and in August the M.A.P. wrote to the Air Ministry designating a principal assistant secretary at M.A.P. as the 'terminal' for 'all discussions with the Air Ministry involving changes in the Aircraft Production Programme'. The Air Ministry, as before, appeared to regard any suggestion of increased formality with some suspicion, and M.A.P. wrote to reassure them on the point. If matters were arranged informally at a low level, this letter pointed out, 'the matter becomes a sort of rumour in the Production Directorates here and nobody is quite certain whether it is authoritative and whether to take action on it'. The Air Ministry accepted these arguments and in September 1943 named the Deputy Director of Operations (Armament) as their 'terminal'.

The history of user-supplier relations during the last eighteen months of the war is quite straightforward; it may indeed be said that the happy position existed of there being no history. In questions of design and development, communication of requirements of any importance may have tended to fall somewhat more decidedly in the hands of the Assistant Chief of the Air Staff (Technical Requirements) and the Controller of Research and Development rather than in those of Director of Operational Requirements and the Director of Technical Development, but the informality of the proceedings, and the high proportion of decisions which were taken in conversation and only briefly recorded, make it difficult to judge such points. Communications about production continued to pass between the designated officers until 1945 when some of the load was placed upon their deputies. This time, however, it was the Air Ministry which tended to deprecate a move away from the regular or formal arrangement.

(ii)

Modifications

Closely associated with the story of relations between the M.A.P. suppliers and the Air Ministry users in the sphere of research and development is the story of the organisation for dealing with modifications. The continuous adaptation of existing types of aircraft so as

¹ See p. 307.

to be ready for all the turns and twists of air warfare was one of the greatest achievements—as it was certainly one of the greatest burdens—both of industry and of these departmental administrators with whom we are here concerned. The definition of a modification which was in use during the war was that it was a change in the drawings for an aeroplane which would involve reconsideration of cost, date of delivery, operational characteristics, airworthiness, or any other point specifically laid down in the specification. Other changes in drawings were not ‘modifications’ but merely ‘amendments’ and were dealt with between the Resident Technical Officer and the firm. It will at once be evident from this definition that the range of modifications was very wide and that both the user and the supplier had many interests involved. The Service was interested not only in evolving modifications directed towards the production of a better fighting machine, but also modifications aimed at easier repair or maintenance, and the prevention of accidents. The majority of all modifications were of Service origin, but a substantial minority originated with the suppliers. The suppliers’ interest had at least two aspects. The design firm was interested in the design as an aerodynamic problem, and in the aircraft as a production item, and was continually seeking modifications to further these two interests. M.A.P. proposed modifications for production reasons of a more general nature, for example, a shortage of particular materials or classes of skilled labour, or in the interests of standardisation.

With the advent of the first expansion programme the Air Ministry decided to revive a measure of the control over modifications which had been exercised during the first World War but which, in the post-war period, had been abandoned. The Director of Technical Development accordingly set up a Modifications Committee, presided over by one of his own officers, and comprising representatives of the Air Staff, the Director of Repair and Maintenance, the Director General of Equipment and the Finance Division. The committee met once a fortnight for two or three hours and this, at that time, enabled it to deal in detail with every request for a modification. After the Munich crisis the work of the committee increased and the chairmanship became a whole-time task for an assistant director. It became evident that a single committee could not continue to investigate every individual case and it was thought that much of this work could be done locally. As an experiment local modification committees were formed at certain of the busier designing firms and these grew into the Local Technical Committees. In the first place they were committees of local investigation and presented their case to headquarters to adjudicate. It became necessary to grant them financial powers and to begin with they were given permission to go up to £10 per aeroplane. When war was declared the limit on their

financial powers was removed and the committees were recommended to settle whatever they could for themselves; even if the decision was reversed later the local committees were not to be blamed and any expense incurred prior to the reversal would be covered. Local committees were also established at every firm making airframes.

The Airframe Modifications Committee and its local counterparts have an impressive record in the field of user-supplier relations. From the time when it was remodelled in 1938, through the formation of M.A.P. and on until the end of the war the committee met regularly under the chairmanship of an assistant director of research and development, and with representatives of the production and repair and maintenance directorates, and the finance division from M.A.P., and of the Director of Operational Requirements, the Director General of Equipment and the finance division from the Air Ministry, and dealt expeditiously but thoroughly with the enormous mass of modifications of all kinds. That the machinery set up in 1938 was well suited to the work, and satisfactory to both user and supplier, is shown by the fact that no changes of any importance occurred throughout the war. When we recall the divergence of interest, and consider the importance of the part played by the modification of existing aircraft (as opposed to new types) in maintaining the technical quality of the Air Force, the absence of any record of complaints against this organisation is worth recording. The history of modifications may stand as the representative of other aspects of user-supplier relations which ran an even course. But there were other aspects still. In the field of the provisioning of equipment a satisfactory relationship and division of responsibility between the two departments was not so quickly attained.

(iii)

Equipment Provisioning

The importance of equipment provisioning was very obvious and very great. The monthly average output of aircraft in 1939 was 691; in 1942 it was 1,274; in 1944 it was 3,273. The amount of equipment involved was vast, the industrial effort prodigious. Possibly the output of as much as one-third of the total M.A.P. labour force was involved from the summer of 1940 onwards, and the correct provisioning of equipment was the most important contribution which the two departments concerned could make to ensuring that the efforts of this great body of workers were not thrown away. To the statistically minded, this was a challenging and fascinating task; to others it seemed complex, obscure and tedious. It was certainly, as a

sphere of administration, specialised and technical, and an historical account of it must necessarily bear this mark.

The system by which Air Ministry requirements of aircraft equipment was calculated and transmitted to the department of the Air Member for Development and Production at the time of the outbreak of war was, by the standards later evolved, a crude one. A scheme had been prepared before the war under which war requirements, already lodged with the production directorates, became effective upon the outbreak of war. These 'war requirements' were calculated in terms of 'war periods', that is to say of phases of the war as envisaged in strategical planning. The production directorates accordingly found that they had to plan for the production of very large quantities of equipment to be produced over a period which was based not upon the calendar but upon strategical assumptions which might or might not be fulfilled. As this system gave no idea of the minimum acceptable output month by month, nor any criterion by which the production authorities could decide the cases in which it was necessary to create new capacity, it was soon seen to be unsatisfactory. If the second of these two difficulties was likely to be the more serious in the long run, the first was the more harassing. It involved incessant arguments with production and equipment branches over demands which it was impossible to meet and which imposed upon the production branches a heavy task in dealing with 'diversions'. The inadequacy of stocks in maintenance units meant that R.A.F. units (for example, repair depots) and aircraft firms were in competition for equipment leaving the factories. This in turn meant frequent and urgent variations of delivery orders with numerous *ad hoc* decisions affecting priorities, and the need to follow up instructions to ensure their being carried out. It was clear that these difficulties could be overcome only by some means which would enable production directorates to determine the *rates* of output which were required.

Accordingly in the spring of 1940 M.A.P. decided to set up a Planning Section which, using the aircraft programme as a basis, was able to give the production branches the basic minimum quantity of equipments required each month. At the same time the Air Ministry, which was also alive to the disadvantages of the existing system of requisitions, brought the provisioning of spares under a new system, which abandoned the 'war periods' and related the requisitions to a calendar date. The new procedure was known as Scheme A, and while it marked a considerable advance upon the 'war period' procedure it still left a good deal of estimating work to the production directorates, which were of course transferred to M.A.P. just at this time. The demands were still bulk demands, the characteristic form of which was to call for a total delivery to be undertaken within a

period—for example, 20,000 air speed indicators within twelve months. There was no system, but only *ad hoc* question and answer, for determining whether the Air Ministry would be satisfied to receive the great bulk of the air speed indicators in the course of the last three months of the given year. Still more unsatisfactory, from the M.A.P. point of view, were the requisitions calling for large deliveries of equipment 'as soon as possible'. Such requisitions perpetuated the difficulty of deciding in which cases it was necessary to create new capacity.

The search for a better system of provisioning equipment other than spares resulted in the introduction in May 1941 of Scheme B. Scheme B, although it was discussed and its introduction agreed with M.A.P., was an Air Ministry system, designed:

to ensure that for every item of equipment, the total needs of the Royal Air Force for consumption, maintenance, wastage, replacement and repair, including local reserves and supply lines, the needs of the Ministry of Aircraft Production for incorporation in new aircraft and other equipment and for repair, and the needs of the Air Ministry for incorporation in certain new ground equipment, are correctly estimated in advance, and together with the stated requirements of other Government Departments, Services, Dominions, Allies, etc., are consolidated into the form of a simple request to the supply authority, in most cases the Ministry of Aircraft Production, to arrange production of the item at a total rate of so much a month.

The statement of a monthly requirement over a considerable period was in fact the essence of Scheme B, and for a long time the period almost invariably adopted was eighteen months.

Scheme B was a great advance upon anything which had preceded it. It gave the production directorates a target of production for each item of equipment for each month, as well as an indication of requirements for a long way ahead. But Scheme B requisitions were of course subject to revision, and were often changed, sometimes radically. In the eyes of the Air Ministry, flexibility was one of the main attractions of Scheme B, and an Air Ministry representative expressed satisfaction at the manner in which, under the new arrangements, the 'production taps can be turned on and off'. To M.A.P. eyes this was a rather unhappy phrase; it described a belief about industrial production which could easily become dangerous, as was illustrated when violent fluctuations in the demand for artificial horizons led to considerable difficulties, including labour unrest, in the factories concerned. On the other hand no provisioning scheme in itself could wholly reconcile the differing points of view of production and operational authorities, and Scheme B, by bringing them into closer contact, helped in the process of mutual education.

There were, however, other problems of the relationship and division of functions between the Air Ministry and M.A.P., even within

the field of equipment, which were causing concern in the summer of 1941. These related not to the form in which requisitions were made but to the calculations on which the requisitions were based. The question of who should calculate the amount of equipment to be produced had been a source of difficulty, and even of confusion, ever since the foundation of M.A.P. Under the agreement between the Minister of Aircraft Production and the Secretary of State for Air defining the duties of their respective ministries, it became the responsibility of M.A.P. to provide equipment for new aircraft and repairs to aircraft which were beyond the capacity of R.A.F. operational and training units to carry out. The organisation known as the Directorate General of Equipment (M.A.P.) was set up on 25th July 1940 in order to undertake this responsibility, which was expected to involve the calculating of requirements of the equipment indicated above, of which M.A.P. was itself the 'user', and also the organisation of its distribution. Mr Stephenson, the head of the Woolworth organisation in Britain, was appointed by Lord Beaverbrook to be Director General.

In August 1940 there was a discussion between the two departments about their responsibilities. The chairman of the meeting thought that aircraft equipment could be divided into items required to complete aircraft for operational use; those required for repairs carried out by M.A.P.; and those required for maintenance at Air Force units. The M.A.P. was not concerned with the calculation of requirements or distribution in the last class. The meeting decided that as a first step arrangements should be made for the transfer of the responsibility for the provisioning and distribution of items within the first category. As records were already maintained by master provisioning officers it was agreed that arrangements should be made for representatives of the Director General of Equipment (M.A.P.) to be attached to each master provisioning officer and also to Air Ministry headquarters, so that they might undergo an apprenticeship in provisioning techniques. These people would form the nucleus of the provisioning organisation of M.A.P. should it be desired to set up a separate organisation to deal with M.A.P. requirements. The Air Ministry agreed to consider what staff could be spared to assist the new directorate general, which could be staffed on a civilian basis, although it might be desirable for certain specialist officers to be attached to M.A.P. headquarters in an advisory capacity.

It appears therefore that at that time the new directorate general was intended to take over from the Director General of Equipment (Air Ministry) at least part of his provisioning functions. During the course of the year the intention changed, or possibly difficulties appeared in the way of its fulfilment. When the duties of the Director General of Equipment at M.A.P. (now renamed the Director General

of Aircraft Equipment) were redefined in December 1940, although they still bore a reference to responsibility for provisioning, it was clear that the energies of the directorate general were to be directed mainly towards hastening the progress of equipment from supplier to user, determining priorities in cases of shortage and securing the redistribution of surplus stocks, rather than towards any important calculations of requirements. The Director General was, in short, a distributing rather than a provisioning agent. The post was now held by Mr Marshall, chairman of the National Cash Register Company, who brought to bear on the problems of distribution his experience of 'mechanising' the processes of handling stock figures.

Attempts to take a hand in the provisioning function proper—that is, in the determination of quantities to be produced—were limited and somewhat devious. One such attempt related to spares. The Director General set up a committee on spares which reported early in 1941. The report stated that there were frequent differences of opinion regarding the correct division of the limited capacity available to M.A.P. for the production of finished aircraft and of spares for repair and maintenance. Provisioning figures, the report pointed out, were the result of recurring issues, non-recurring issues, stock build, and forecast factors. The committee's investigation was concerned with recurring issues of maintenance spares. It planned to provide a figure representing the actual consumption of spares at the squadron and repair depots, as distinct from the *issues* of spares from the universal equipment depots, with the object of helping to see requirements more clearly. It was proposed that a section should be set up in the Directorate General of Aircraft Equipment under a statistician and that representatives of the Director General should be placed in the Directorate General of Equipment at the Air Ministry to check new requisitions with consumption, prevent the building up of surpluses and assist the flow of repairable items back to stock. All the information was to be clearly charted, and production directorates would receive spares data to meet their special requirements. The Director General attempted to act on this recommendation. There is evidence that such a section was in fact set up, but the proposals were received coldly in the Air Ministry.

Another example of competition between M.A.P. and Air Ministry occurred in respect of engines. In the summer of 1941, owing to shortages of certain types, M.A.P. were anxious that as many types as possible should be sent to aeroplane manufacturers' works for installation in newly completed airframes so as to ensure the highest possible figures of aircraft production. The R.A.F. also required a substantial, but variable, quota of engines for aircraft in the Service which would otherwise remain grounded. The Director General of Equipment (Air Ministry) did his best to ration the issue of available

engines after comparing requirements with available supplies. Awkward complications arose from time to time owing to the inability of contractors to deliver engines strictly in accordance with forecast figures. In order to smooth out the difficulties, M.A.P. proposed to take over responsibility for allocating engines, and to create an organisation (to be supplied by the Deputy Directorate General of Aircraft Equipment) which would keep in much closer touch with engines requirements, reporting these weekly to M.A.P. headquarters, manufacturers, etc.; and issuing delivery instructions to firms on the basis of an allocation approved by the Director of Aeroplane Production.

This was the general position when, in July 1941, the Second Secretary raised the whole question of provisioning in a memorandum addressed to the Aircraft Supply Council. In this memorandum, the Second Secretary pointed out that on some occasions Air Ministry statements of requirements were received too late to allow of production being arranged, while in other cases the Air Ministry were ordering in excess of requirements. If this state of affairs were to be cured it was necessary that M.A.P. should be satisfied that the quantities required by the Air Ministry were intelligently estimated on reliable data. A complicating factor was the inclusion in Air Ministry calculations of requirements for servicing and overseas repair. The main difficulty, however, was that requirements for both M.A.P. and the Air Ministry were calculated by the Director General of Equipment at the Air Ministry on a bulk basis, namely by recording the total recurring outgoings of an item from his stores for all purposes over a past period and multiplying this by one and a half to give the requirements for an equal future period. The factor of one and a half was deemed to measure the expansion of the Air Force. The Second Secretary proposed to arrange a meeting with the Air Ministry with a view, first, to obtaining for M.A.P. a foothold in the business of determining the Air Ministry's needs, for example of bombs; and secondly, as regards equipment and spares of which M.A.P. was a part user only, to securing in addition that M.A.P. requirements were calculated with a proper regard to M.A.P. needs. It is clear from this memorandum that the original purposes of the early Directorate General of Equipment in M.A.P. had not been fulfilled, and that its later attempts to keep a check on the storage and issue of aircraft equipment had not been adequate, in M.A.P. eyes, to prevent the Air Ministry from making excessive statements of requirements.

The Council at its meeting on the 21st July approved the Second Secretary's proposal, and the outcome of the discussions with the Air Ministry was the creation of a secretariat division in M.A.P. to administer in co-operation with the Director General of Equipment the provisioning and distribution of equipment. This division, which

from the outset included an experienced statistician in its staff, began by investigating the provisioning policy of the Director General, and in particular the question of the allowances which should be made for items obtained from repairs. These investigations enabled the division to form views on important points of principle. They came to the conclusion that neither Scheme A nor Scheme B worked satisfactorily, and they disagreed with the aim of separating Air Ministry and M.A.P. provisioning. The whole field of provisioning and distribution for all purposes for both departments, they considered, was one indivisible job.

As this activity marked the first really determined attempt by M.A.P. to play a part in provisioning it is not surprising that the way turned out to be a little rough. The difficulties arose, not *vis-à-vis* the Director General of Equipment, but rather between the provisioning authorities (of whom there were now three, namely the Deputy Director General of Statistics and Planning, the Director General of Equipment and the Secretariat) on the one hand, and the production directorates on the other. Initially, the new methods complicated the task. 'The effect on the production branches', it was alleged by one writer drawn from their ranks, 'was that requisitions which were urgently needed to ensure continuity of production were not infrequently delayed while the two M.A.P. branches argued with the Director General of Equipment in the Air Ministry; even when the maintenance factor was agreed and a requisition received the unhappy production branches still had to receive formal estimates of repairable arisings from P.O.A.E;¹ finally, constant difficulty was caused by both the maintenance factor and the assumed repairable arisings being altered as the statisticians happily continued with their interminable calculations.'

This of course was a frankly partisan view. The expansion of the Air Force, the rapidity of development, the multiplication of the kinds of equipment, the opening of campaigns in new and distant theatres of war, as well as other factors, all combined to render the provisioning of equipment a vastly more complicated task than it had been in 1939; even then it had not been a simple one. The secretariat people concerned gave an immense amount of study to their problems, and sought advice, amongst other sources, from the Organisation and Methods division of the Treasury. These experts were against the changing of delivery rates merely because stocks were too high or too low; the rate should be changed only when the estimate of requirement was found to be wrong. But it would seem that the methods proposed were either not adopted or not efficacious, since so late as December 1943 the Air Ministry and M.A.P.

¹ A later development of the M.A.P. Secretariat Division. See later in this section.

described changes in delivery rates as 'unnecessarily frequent and often hysterical'.

Meanwhile, during 1941, another development of some importance was taking place. This was the transfer to the Deputy Directorate General of Aircraft Equipment, in August, of the Embodiment Loan Control office, which 'created all schedules and raised all demands for and controlled the flow of embodiment loan equipment and materials for equipment'. Already, in April, a deputy director of aircraft equipment was authorising issues of embodiment loan equipment and controlling surpluses and shortages. In the autumn of 1941 Mr Marshall was making preparations for the setting up of a new system by which at least part of this equipment should be transmitted direct from supplier to user, that is from the manufacturer of the equipment to the constructor of the aircraft in which it was to be embodied.

This scheme, which was known as the Direct Delivery Plan, did not meet with great favour in the Air Ministry, although they were willing to see it put into practice over a limited field for an experimental period. Air Vice-Marshal E. W. Havers, who was Director General of Equipment at the time, said that his principal fear was that the proposed alterations in the delivery system would result in the Service units being deprived of their operational requirements.

Meanwhile both the M.A.P. secretariat and the Directorate General of Equipment were steadily applying themselves to the refinement of the statistical technique of provisioning. Analyses were made of the estimates made by various provisioning sections; the accuracy of samples of total estimate was compared with the accuracy of samples of current estimate; and particular attention was concentrated upon the effect of the forecast (or expansion) factor recurring items, which in March 1943 was still the figure of 1.5 which was now consecrated by time but was seen to be responsible for some of the worst divergences from accuracy of recurring estimates. In this highly specialised and technical field M.A.P. and the Air Ministry co-operated so closely that the divergences of interest were at a minimum, and although the M.A.P. authority, as we have seen, watched the domestic interests of its production directorates, it acted with equal freedom as technical adviser to the Director General of Equipment. The investigation into the working of Scheme B continued intermittently during the whole of 1943 as the officers engaged upon it had frequently to turn their attention to other tasks, and when at the end of the year a comprehensive report was published it revealed that a good deal had been learned, although a shortage of staff restricted the number of practicable proposals that could be made. The most important was the suggested lowering of the forecast factor from 1.5 to 1.33 applied to the

recurring demand of the past twelve months, and 1.25 applied to the recurring demand of the last six months. In September 1944 this series of analyses was concluded by the calculation of factors of 0.82 and 0.79 for the next stage of the war.

Under the Direct Delivery Plan, M.A.P. came near to achieving what it originally set out to do in August 1940. The plan, however, covered embodiment loan items only, and although it was calculated in 1943 that half the cost of Lancaster bomber items was met in this way, it was clear that more could be done to unite the two ministries in the provisioning task. At the end of 1942 measures were proposed to this end.

Under the new arrangements, the Director General of Equipment in consultation with the secretariat in the Air Ministry would forecast, in respect of a given range of equipment or spare parts, the future established strength of the Air Force to which the provisioning should be related. Before a periodic review of requirements, the trend of past use and the accuracy of previous forecasts would be determined by an analysis of the provision statistic cards of the master provisioning officers (Scheme A), and of the D.G.E. provision record cards (Scheme B). This analysis and the formulation of the conclusion to which it led would be undertaken by the Director of Aircraft Equipment who would inform the Director General. Where the provisioning was based on a distinction between recurring and non-recurring use, the analysis would evaluate each of the estimates.

The Director General of Equipment and the Director of Aircraft Equipment were to decide jointly the data with which to measure past and future use, and the forecast factors applicable to past use. They were also to decide jointly the form in which to express requirements, the period to be covered by the requisition, and the permissible variations from the approved average stocks. All this meant that the Director of Aircraft Equipment had to absorb the secretariat division which had hitherto been concerned with production interests. For the charge of the fused organisation a Principal Officer of Aircraft Equipment was appointed. The staff of the new aircraft equipment organisation was some 540, spread over headquarters (London and Harrogate), outstations and the regions.

The Air Ministry had no objection to the study of provisioning technique made by the Principal Officer of Aircraft Equipment; on the contrary, they welcomed the assistance which it provided. Sharing responsibility for provisioning itself was another matter, despite the agreement on the subject about which M.A.P. had informed the Treasury. This agreement was an agreement 'in principle' only, and the details of its working had not been accepted by the Air Ministry. The details provided many stumbling blocks,

and the feeling in M.A.P. was that despite the sympathetic attitude of the Director General of Equipment himself the Air Ministry was not particularly anxious to surmount the difficulties. In April 1943, the Principal Officer—M.A.P.'s new plenipotentiary—reviewing progress at the third quarterly meeting of his organisation, stated that:

It is a matter of great regret that for reasons outside our control no agreement with the Air Ministry has yet been reached on the procedure for exercising joint provisioning responsibility. I cannot pretend that this is not an embarrassment, impediment and discouragement to our work.

Attempts to make the agreement work continued throughout the year, and M.A.P. methods were gradually accepted and introduced by members of the Directorate General of Equipment. But the going was slow, and it was not until the summer of 1944 that a new situation emerged. It was at this time that M.A.P. began to give serious consideration to the planning of output for the next stage of the war, and in August the Controller of Repair, Equipment and Overseas Supplies wrote to the Air Member for Supply and Organisation inviting the co-operation of the Air Ministry. Discussions between the two departments followed, and the result of these discussions was a greater measure of co-operation in provisioning than had ever occurred before. Joint reviews of requirements were carried out, and the results obtained from analyses of the Principal Officer were applied. By the spring of 1945, when the reassessment of equipment needs for the next stage of the war was occupying an increasing amount of time, the Principal Officer and the Director General of Equipment were co-operating so closely in carrying out this reassessment that it may be said that administrative unity had at last, rather painfully and slowly, been reached.

(iv)

Storage and Distribution of Aircraft

In any transaction between a user and a supplier there must be a point at which the product passes from one to the other. When the supply and the use are both upon an immense scale and the product is exceedingly complex, this passing is not a simple matter. There will be a period during which responsibility is shared; when an element of urgency is introduced, it is somewhat as though the whole operation had to be carried on with the two parties running side by side as during the handover in a relay race. In the relationship

between the M.A.P. and the Air Ministry the key transaction of handing over aircraft was part of an elaborate process of storage, distribution and final completion. Storage and distribution of aircraft coming from the factories were among the many problems which the Air Ministry had tackled in the rearmament period.

The solution of the problem had been found in a system of aircraft storage units, or A.S.U.s as they came to be called. By May 1939, there were twenty-four units distributed throughout those parts of Britain removed from Continental Europe. Each unit had about ten hangars and the total space available in the A.S.U. system was sufficient for the storage of almost 10,000 aircraft. The units were primarily stores for reserve aircraft in transit from factory to squadron, but they also served as stores for obsolescent aircraft in transit to training squadrons or elsewhere, and as assembly shops for operational equipment. This was a remarkably bold and far-sighted attempt to anticipate the storage problems which would arise out of a large scale of action, yet when Lord Beaverbrook, on his appointment as Minister of Aircraft Production, took over responsibility for storage and distribution, events had already rendered the Air Ministry's system out of date in one important respect. The basis of the A.S.U.s was the large hangar containing a considerable number of aircraft. The establishment of the Luftwaffe across the English Channel and in Norway laid this country open to the kind of intensive short-range bombing which had proved so disastrous elsewhere in Europe. Large concentrations of aircraft, whether completed or not, had to be avoided. A policy of still more widespread dispersal suddenly became imperative. To meet the new situation, the M.A.P. quickly established what came to be known as 'purgatories', or storage premises adjacent to contractors' works, for incomplete aircraft. Completed aircraft which for some reason could not be flown away at once were stored in small units at dispersal points on factory aerodromes or adjacent fields. At existing airfields at which A.S.U.s had been established, the number of aircraft in each hangar was restricted to those actually being worked on. In addition, further new airfields were planned in a system of A.S.U. satellite.

Meanwhile, an administrative complication had occurred. No. 41 Group had been brought into being on the 1st April 1939 for the sole purpose of controlling the A.S.U.s. The group was part of the Air Force Command system and continued to be so following the transfer of responsibility for storage and distribution to M.A.P. It was inevitable that this responsibility should pass to M.A.P. since the units were not only storage premises but also played an important part in the completing of aircraft up to operational standard. Articles 7 and 8 in the Heads of Agreement between the Minister of Aircraft Production and the Secretary of State for Air, which was signed on

3rd August 1940, agreed that while the control of the units would revert to the Air Ministry as soon as it was practicable to arrange for the fitting out of aircraft at factories, 41 Group (in the meantime) was to be subject to the control of Ministry of Aircraft Production which would accept the directions of the Air Ministry in regard to the distribution and allotment of aircraft. Further decisions were taken at the first meeting of the Joint Standing Committee of M.A.P. and the Air Ministry on 13th August. The Air Ministry was no longer to issue instructions to 41 Group but would continue to communicate with the group direct on day-to-day requirements concerning replacement aircraft. All aircraft in the units, except those required by M.A.P., were to be regarded as being at the disposal of the Air Ministry but would remain under M.A.P. control until actually issued to the R.A.F. While 41 Group was to be responsible for the security of aircraft under its control, it would exercise this responsibility within the framework of directions laid down by the Maintenance Command of the R.A.F. Routine Air Force questions relating to R.A.F. personnel were to be dealt with by the Air Ministry who would, however, consult M.A.P. before making major changes. Nevertheless, the essential part of the arrangement was that an Air Force group would come in regard to functions, if not discipline, under the control of a civilian sitting in a civil department.

Unusual as it was, the system, both in regard to administration and in regard to functions, worked reasonably smoothly. The principal difficulty arose over the degree of completion of aircraft at the factories. Aircraft arriving at A.S.U.s were normally without the equipment required for operations. These items were obtained by the A.S.U. either direct from the contractor or from a universal equipment depot, which was an Air Force store unit for holding and distributing equipment. From 15th August 1940, A.S.U.s were required to hold a three months' maximum and two months' minimum requirements of aircraft stores. Responsibility for the allocation of equipment from contractors or depots belonged to the master provisioning officers. In September 1940 the Minister of Aircraft Production appointed a senior supply officer to each of four master provisioning officers to process demands for equipment. If necessary equipment was not available in a universal storage depot, the M.A.P. liaison officer was to arrange for the issue of a diversion order so that the equipment could be delivered direct from a contractor. During 1941, this system remained in being and the question of operational completion at contractors' works was hardly raised. In the early summer of 1942, when the critical shortage of equipment had been eased, the Air Ministry suggested that certain batches of aircraft should be allotted direct from the contractors to

squadrons. The question of operational completion of new aircraft was thereafter almost continuously under discussion during that summer.

Another problem had arisen. Uncertainty about the completion state of aircraft arriving at A.S.U.s meant difficulty in determining the staff necessary to deal with them. If men were kept standing by to deal with a sudden rush of work there would be under-employment. M.A.P. accordingly created an urgent shortage section, a 'chasing' organisation which, working together with 41 Group, was successful in reducing Spitfire deficiencies—selected as its first task—to negligible proportions.

But the basic difficulty had not been overcome. The production of equipment was not being brought completely into phase with the production of aircraft, and as manufacturers were determined to clear their floors as quickly as possible aircraft continued to be flown out deficient in equipment. The problem was complicated in 1942 by the responsibilities which M.A.P. assumed in respect of naval aircraft. A decisive step was taken early in 1943, when Sir Stafford Cripps appointed a director to ensure that aircraft equipment manufacturers kept the main airframe contractors supplied in such a manner that the equipment was always available when it was required for fitting. In November 1942, 20 per cent. of all aircraft were being completed by the contractors; a percentage lower than had occasionally prevailed in the past although much higher than the figure during the worst period. The new director was given wide powers and his activities resulted in an increase by the end of 1943 to 80 per cent. The main airframe contractors never achieved 100 per cent. completion, otherwise the task of 41 Group would have been reduced to mere storage and the inclusion of modifications approved too late for inclusion on the production line.

A new factor came into play during 1943 and imposed an additional strain on the A.S.U.s. This was the United States Army Air Force, now building up its bomber offensive. M.A.P. agreed to store 500 heavy bombers by the end of the year. It was intended that the Americans would in time administer their own storage facilities, but in the meantime the 500 bombers provided a considerable addition to the British programme and had to be taken into account in planning additional facilities. Fortunately there had been in 1942 a relaxation of the dispersal rules laid down in 1940. Further relaxation was authorised in the summer of 1944. As a result a larger number of aircraft could be stored. At the end of 1944, the number of aircraft held by 41 Group was 10,632 of which 4,381 were operational types, 5,100 non-operational and 1,151 for breakdown.

The study of the problems encountered in the storage and distribution of aircraft and the means adopted for solving them offers an

impressive record of the farsightedness of the authorities who, in 1935, planned storage resources for 9,600 aircraft. This figure was exceeded only in the latest stages of the war, and if the need for dispersal and the employment of heavy bombers then called for additional capacity, it was not difficult to provide it. The administrative arrangements between the Air Ministry and M.A.P. as user and supplier, unusual as they were, and despite the forebodings and uneasiness to which they gave rise, withstood the test and justified the unorthodox approach of those who had evolved them.

We have now covered four fields in which the relationship between user and supplier had special importance. In each of these fields the relationship finally arrived at gave satisfaction to both parties, and in each case this was an administrative achievement of major importance. In the case of modifications, the relationship was always satisfactory; arrangements made in 1938 proved to be capable of adaptation to all the exigencies of evacuation, the creation of M.A.P., the great expansion of the Air Force, and the hazards of war. In regard to design and development the interesting case arose of the authorities discarding the tradition or policy of having senior Air Force officers (i.e. 'users') in the most responsible controlling positions on the 'suppliers' side, and then, at a late date, returning to that policy. The provisioning of equipment was the last field in which a satisfactory position was reached. It was, on the other hand, the field in which the most genuinely important and successful (if not the most surprising) administrative innovation was made. The determination of requirements, before the war, seemed naturally and exclusively to be a 'user' function, yet by the steps which have been traced in the preceding pages, it came by the end of the war to be a function shared between M.A.P. and the Air Ministry.

CHAPTER XVII

THE ADMINISTRATION OF RESEARCH, DESIGN AND DEVELOPMENT

(i)

Research

A COMPARISON has already been made, in dealing with the design and development of Army weapons, between the position of, say, the tank on the one hand and the aircraft on the other. Even more than the ship the aircraft is a natural recipient, in peace as well as in war, of the attention of research scientists. Not only its commercial possibilities and the inherent interest of the technical questions which it poses, but also the spectacular nature of the results of failure—all these have always tended to attract attention towards it. In Britain, this interest has tended, from the earliest days of flying, to be focussed through the Government, and the Air Ministry from its earliest days had powerful assistance in its great task of research and development from sources outside the internal organisation which was sketched in the introductory section of this volume. It is indeed most difficult to understand the nature of this task without knowing something of the history of two bodies, both older than the Air Ministry itself, with which the Ministry entered into relations upon its foundation. These bodies are the Aeronautical Research Council¹ and the Royal Aircraft Establishment. The Aeronautical Research Committee was a body of distinguished scientists, appointed in 1909 by Act of Parliament in order to guide and foster research in aeronautical science in Great Britain. In their first annual report, presented to the Prime Minister in 1910, the committee noted that the work fell into sections. The first section concerned the scientific study of the problems of flying, with a view to their practical solution, and the second involved research and experiment into these subjects in a properly equipped laboratory, with a trained staff. These may be taken as a valid definition of the two parts of the committee's work throughout its entire history.

¹ Originally called the Advisory Committee on Aeronautics and later the Aeronautical Research Committee.

At the time when the Aeronautical Research Committee was founded, there was also set up in the National Physical Laboratory at Teddington 'a special department for continuous investigation—experimental and otherwise—of questions which must from time to time be solved in order to obtain adequate guidance in construction'. The committee was a purely advisory body, giving no instructions, but indicating lines of research. The purpose of the new 'special department', which became known as the Aerodynamics Department, was to carry out this research, but for all administrative purposes it was, and has always remained, a part of the National Physical Laboratory.

The Aeronautical Research Committee thus preceded the existence of the Air Ministry by a number of years. The Royal Aircraft Establishment was an even older body, having evolved from a unit set up to deal with military ballooning in 1882. During the early years of flying in Great Britain it had made a most distinguished contribution to the new science of aeronautics. In the first World War the Establishment was reinforced by university scientists, and many tributes were paid by Air Force commanders and others to their achievements. When the war ended Farnborough was acknowledged throughout the world to be a vital source of aeronautical experiment and technical advance.

The Royal Aircraft Establishment has of course always been under the direct administrative control of a department of state, first the War Office, later the Air Ministry, and from 1940 onwards M.A.P. The Chief Superintendent 'took his orders from' the head of research and development (the Air Member for Supply and Research, the Air Member for Development and Production and the Controller of Research and Development successively from 1934-45) in the same way as did the Directors of Scientific Research and Technical Development. Yet, as is well known, research and development establishments enjoy differing degrees of independence and are able to a greater or lesser extent to influence the instructions which they receive about the work they are to do; moreover, in the case of the Royal Aircraft Establishment, the Aeronautical Research Committee played an important part in determining the programme.

We shall return, later in this chapter, to a detailed consideration of the role of the R.A.E. in the design and development of British aircraft. Here it is sufficient to notice that the existence of the Aeronautical Research Committee and the R.A.E. made of aeronautical science in Britain something quite distinct from the case of naval vessels or military weapons. It took a great deal of responsibility out of the hands of industry; it kept aircraft development in intimate and continuous touch with the general progress of science, and it tended to elevate this development to some extent above the financial

depression of the inter-war period—as witness the fact that the year 1931 saw the largest estimate for R.A.E. expenditure of any of the inter-war years.

Within the Air Ministry itself the Directorate of Scientific Research was the keystone of the organisation with which we are here concerned. Moreover, important as was the role played by the Aeronautical Research Committee, the role of the directorate was a much wider one. The committee's interest was limited to aeronautical science, and despite the preoccupation of the Air Ministry with this field, it had vital interests in other fields of science. While the activities of the directorate were extended in certain directions between 1924 and 1945, the basic functions remained almost unaltered. The founding of the directorate in 1924—some fourteen years before an equivalent post was created at the War Office—was largely due to the initiative of the Aeronautical Research Committee, and was intended to represent in the higher councils of the Air Ministry the point of view of a research scientist. This responsibility demanded a comprehensive knowledge of all aspects of defence requirements on the one hand and of scientific advances on the other. Such knowledge was gained in a number of ways. The Director and his staff spent much time in reading reports on scientific work done at the Royal Aircraft Establishment and the National Physical Laboratory and also in studying the Aeronautical Research Committee's reports on research in aeronautics done in various places, including the universities. It goes without saying that the Director kept himself acquainted with the papers published by the various learned societies. This study of reports and papers represented one important source of information on scientific advances. In addition, the Director and his staff spent a great deal of time in committee. He was of course the leader of the official representatives on the Aeronautical Research Committee, while members of his staff took a prominent part in the work of the sub-committees. He also sat on interdepartmental committees and so kept himself in touch with the general scientific work done by the other defence departments and more particularly with all work bearing on aeronautical science done anywhere in this country or abroad.

In the direction of research within the Air Ministry, the Director had a primary responsibility. In particular he examined all the programmes of research and development produced in the department, sifting them to ensure that research was not limited to tinkering with problems which really called for long-term fundamental examination. Without such examination by a man concerned primarily with scientific research rather than with technical development, it was only too easy for important indications or consequences to be overlooked in the pressure to provide quick solutions, on an *ad hoc* basis, of

difficulties encountered in the course of development. On the other hand, it was not desirable wholly to exclude relatively short-term problems from the purview of the directorate. Indeed the first Director of Scientific Research, who held the appointment from 1924 until 1937, formed the opinion that it would have been to the general advantage of the efficiency of the R.A.F. if the Director had been more fully consulted during the design stage of new aircraft.

During the period when the first Director was shaping the methods and traditions of his directorate, that is to say from 1924 to 1934, the Director of Technical Development conducted all the negotiations with the Air Staff and with firms, which were necessary when a new aircraft was being designed. The Director of Scientific Research was available to be consulted during these stages of the development should his technical colleague so wish it, but it does not appear that such consultations took place very frequently. It was not until a model of the new type was ready for wind tunnel tests that it became an administrative necessity that the Director of Technical Development should consult the Director of Scientific Research; this because the latter, so to speak, 'owned' the wind tunnel.

Yet if during the expansion period the Director of Scientific Research may have felt that he could with advantage have played a larger part in the development of aircraft, he could hardly complain that his voice was not heard upon other subjects. It was largely his initiative, in fulfilling his task of casting an eye ahead over the whole field of Air Ministry responsibility, which brought into being the Committee for the Scientific Survey of Air Defence, and so led to the utilisation of radio waves to detect aircraft. If the part which the directorate played in the early history of the jet engine was not distinguished by the same kind of vision, this may be looked upon as a natural balancing error, since the directorate tended to look upon the engine as a scientific experiment rather than a more or less immediately practical proposition.

The outbreak of war did not change the role of the Director of Scientific Research, but it did involve the continued expansion of his activities. This may be illustrated from the field of armament research. Like the other development directors, the Director of Armament Development was overwhelmed with the pressure of day-to-day demands, and he was accordingly provided with a deputy, who reported both to him and to the Director of Scientific Research. It was of particular importance that armament research should be pressed with vigour since it had been somewhat neglected in the inter-war years. The heaviest bomb available to the R.A.F. at the outbreak of war, for instance, weighed only 500 lb. Admittedly at that stage the tactics which the Air Staff intended to pursue, notably their insistence on the precision bombing of military objectives only, did not seem to

call for a heavier missile. On the other hand, little was then known about making successful bombs carrying a very heavy charge. Consequently when the blitz of 1940 showed that the Germans were not inclined to restrict air attack to precision bombing, and that their equivalent high-capacity blast bombs were more effective than our general-purpose bombs, it became necessary to consider the design of heavier bombs. The problem of designing bigger bombs was not merely a question of scaling up from the smaller sizes. It involved new principles and methods, and in particular there was the difficulty of finding a method of detonating simultaneously the whole mass of explosive. This problem of detonation was very complex and involved fundamental research by explosives chemists, a research that was started under D.S.R.'s auspices. Only when this research had been completed successfully was it possible for the Directorate of Armament Development to function as a development directorate overseeing the production of the bomb.

Armaments experts, whether in the Directorate of Armament Development or in industry, thus turned naturally to the Deputy Director of Scientific Research (Armaments) as soon as any really novel principle appeared to be involved in a projected development. In other cases the Director's deputy for research in armaments himself initiated research in a new field. One such field was the behaviour of rockets projected from aircraft. Rockets as an anti-aircraft weapon fired from the ground had been studied for some considerable time, but little was known about their performance when used as aircraft armament. The problem was entirely new—it was a question of determining how accurately a relatively slow-moving, non-rotating, self-stabilising projectile could be aimed from an aircraft, compared with a fast-moving rotating projectile like a bullet. Moreover, since the rocket was fitted with stabilising fins, it was reasonable to think that it had good underwater ballistics and might therefore be an efficient anti-submarine weapon. These possibilities all required scientific examination. Accordingly, in 1941, a long series of carefully controlled experiments was initiated. On the basis of the results of these experiments a successful aircraft rocket was finally developed.

Thus while the activities of the Directorate of Scientific Research expanded in wartime, it remained fundamentally unchanged in character. The story of this process, the enlargement of activity based upon an unchanging function, was however associated with organisational changes and with the functions of the Royal Aircraft Establishment, and it cannot be fully elucidated unless some account is given of these changes and functions. We have seen elsewhere that when M.A.P. was formed, the joint Directorate of Scientific Research and Technical Development was among the organisations which were

transferred *en bloc*. Even before this date, in January 1940, the Directorate of Scientific Research had been strengthened, the Director having been provided with two deputies. One of these was in charge of research in aerodynamics and in aircraft materials, and also dealt with general administrative questions affecting the scientific research staff. The other deputy was responsible for research into armament problems. The next considerable organisational expansion took place in May 1941 and was due to the new arm of defence—radar. As early as 1938 it had already become evident to those responsible for the development of radar that, if the fullest use was to be made of the information obtainable from the new coastal chain of long-range warning radar stations, it would be necessary for the radar scientists to study at first hand the operation of the Fighter Command interception control system in order to see how best to introduce into it the data from the radar stations. Accordingly, with the co-operation of the Command, scientists were sent to the various operational centres to watch their activity during exercises. This work was continued after the outbreak of war, and the scientists who carried it out may be looked upon as the first operational research section. The administration of the section in regard to staffing, postings and promotion raised the same problems as the management of other scientific establishments and it was decided that it should be undertaken by the Director of Scientific Research. The control of operational research, among other factors, was responsible for the appointment of a third deputy to D.S.R. in May 1941.

The organisation which was employed to associate the development work of M.A.P. as a whole with the scientific research interest of the Directorate of Scientific Research was one of the most important (as it is generally agreed to be among the most successful) achievements of Air Ministry/M.A.P. administration, and in the case of the Directorate of Armament Development this organisation underwent some important modifications. We have seen that when a Directorate of Armament Development was set up in 1937 the Director was assisted by a Deputy Director of Research and Development who was responsible to him for development and to the Director of Scientific Research for research. In May 1939 two assistants had been added, responsible for research and development of guns and bombs respectively. In 1942 armament research was still the responsibility of a Deputy¹ Director of Armament Research who was a member of the scientific research staff but working in the Armament Directorate. This arrangement was not considered to be satisfactory; according to the Director of Scientific Research it did not prevent misuse of the officer for development work. The Controller of Research and Development, to whom the matter was then referred, considered that

¹ The post of Assistant Director of Armament Research had lapsed in 1941.

the Director of Scientific Research should control the execution of armament research because of his close contact with the scientific world and his fuller knowledge of the facilities available and that he should do this through a deputy director in his own directorate. 'In the last analysis', the Controller wrote, 'armament is the *raison d'être* of the Royal Air Force and nothing must be done to curtail research and development in all branches of the subject.' The decision shows the importance which was attached to keeping the independence of scientific research uncompromised.

By February 1943 the Directorate of Scientific Research had reached its mature war-time form. It had greatly expanded, but it is important historically to note the absence in the war-time history of the directorate of any radical changes in organisation, notwithstanding the expansion. It is clear from this fact that the pre-war organisation was a sound one, and that it was capable of meeting the exigencies of war and of expanding without dislocation or difficulty.

'Except for two small sections . . .' as the Controller of Research and Development explained to the Aircraft Supply Council in 1944, 'the Director of Scientific Research does not control staff directly, but the work of getting the results of research applied to the development work is done by means of the Deputy and Assistant Directors in the Development Sections. These, with the exception of the Armament Directorate, are all responsible for research as well as for development, and are expected to keep in touch with the Deputy Directors and Assistant Directors of Research on their appropriate subjects. They are assisted in this, in many instances, by having Scientific Officers of various grades on their staff.'

This account of the organisation shows that the essential characteristic of the directorate as it was conceived in 1924 was still a vital one twenty years later. When it is considered that these twenty years had seen not only the crisis of war, but also the extreme financial stringency of the depression years, the vitality of the conception of the joint directorate is a remarkable tribute to the foresight of those who originally planned it.

In so far as the administration of scientific research was a self-contained headquarters function it was not administratively complex. In fact, as will be apparent even from the brief references that have been made to the Royal Aircraft Establishment, it was far from being self-contained. It was, moreover, even more closely than has so far appeared, associated with the administration of design and development. This was the case even at headquarters; in the scientific establishments research and development became, during the war, indistinguishable elements in a homogeneous process.

(ii)

Design and Development

Design and development grow out of research, and eminent scientists and technicians find it difficult to define adequately even the theoretical difference between the two activities; in practice, and in dealing with particular cases, the merging of the two is often a serious problem to administrators who want for one reason or another to distinguish between them. The Air Ministry avoided so far as possible the need for making distinctions about the nature of the work and made them instead, arbitrarily, about the nature of those employed upon it. The Directorate of Technical Development, as inherited by M.A.P. from the Air Ministry, consisted of those officers, whether at headquarters or outstations, who had been recruited as 'technical development' staff, irrespective of whether they were, at a particular time, actually working upon development or upon research problems. Similarly with the Directorate of Armament Development and the Directorate of Communications Development.

As regards its functions, the Directorate of Technical Development was 'responsible for the design of aircraft as a whole, that is, for its success in fulfilling given operational functions'. It was 'responsible for' the design of aircraft, but it did not itself undertake it. No Government agency had designed an aircraft since the R.A.E. ceased to do so during the first World War. That was the firms' job, and the Director of Technical Development in the Air Ministry and M.A.P., unlike the Director of Naval Construction, whose staff actually designed warships, or the Director of Tank Design, whose staff designed tanks, did not 'design' aircraft directly. His role was to advise and his object was to bridge the gap between the operational requirements and quantity production orders. D.T.D. kept the industry informed of the trend of user needs; it issued specifications for the design of new aircraft; it watched over the production of the prototype and its tests; and, generally speaking, it piloted the aircraft throughout its development stage into a condition in which it was capable of being ordered and produced in quantity. Nor did its responsibility cease then. Throughout the whole production life of an aircraft the directorate retained control over further development and technical standards.

The Air Member for Research and Development had nursed this directorate with care during the rearmament period. He had expanded it in 1936, and in 1938 caused a particularly searching investigation to be made into its constitution and methods of working. The report opened by saying that the work of the directorate could be

viewed from two aspects; that of engineering and scientific enquiry and testing, and that of getting jobs done efficiently and quickly. It went on to say that 'the task of making a technical organisation (that deals with experimental work) really hurry is the most difficult of all.' The proper way to face the difficulty was to have an adequate number of senior and directing posts, filled by first-rate men, with the technical ability to guide their juniors but also with the judgment which would prevent their becoming too deeply immersed in such guidance; the men at the top must have both the stature and the time to keep their eyes on the distant objectives.

The report made many detailed suggestions, but the most important outcome was a new organisation of the directorate as a whole. The organisation up to that date had consisted of a director with a general-purpose deputy and three assistant directors for aircraft, engines and instruments. The new directorate consisted of a director with three deputies, one each for aircraft, engines and technical investigations. There was also an assistant director for instruments and an adequate force of assistant directors in the three main divisions. The main new departure was the deputy directorate of technical investigations. This had been recommended in the report as a branch ' . . . charged with responsibility for all special technical investigations, not fully amenable to the scope of the aircraft, aero-engines and instrument branches, and fundamental to the progress of the directorate as a whole. . . . It should give the Director a disposable reserve of planning and thinking power. . . . '

This, and the other proposals in the report, were approved, and in its new form, the directorate, so far as it was concerned with the development of aircraft, proved well able to meet the strains of war, and no further important reorganisation occurred during the war period. The increasing importance of engine development however brought about some changes on that side. In December 1940 a post of Director of Engine Development was approved, and became part of the joint Directorate of Engine Development and Production, thus ceasing from that date to be one of the direct responsibilities of the Director of Technical Development.

So research and development were prepared and organised for war by the Air Ministry and M.A.P. To see the organisation in action however, we must shift our attention from the headquarters where the planning was done to the institutions where it was mainly carried out. The Royal Aircraft Establishment has already been introduced in this chapter, and we have seen that it had an illustrious history long before M.A.P. or even the Air Ministry had been founded. Yet in collaboration with its partner, the Aircraft and Armament Experimental Establishment, it remained capable of very important developments in function and administration. The other major M.A.P.

establishment, the great radar research centre, had a very different history, and we shall turn to it later.

(iii)

The Research Establishments

Among the whole range of Service research and development establishments, diverse as they are in origin, scope, size and purpose, there is none which resembles the Royal Aircraft Establishment. Its history, which is comparatively speaking extensive—it was in origin the balloon establishment of the Royal Engineers—is also peculiar, in that it was intended, in its modern form, as a *design* agency for aircraft, but has been, since the first World War, an *adviser* only upon such design, although it has continued to design equipment. The historical reasons for this are to be sought in the extreme uneasiness with which the men of the youthful British aircraft industry, in the period before the first World War, regarded what they stigmatised as unfair Government competition. The difference between military and civil aircraft at this period was not so broad as to suggest an analogy in the field of aircraft design with the Director of Naval Construction, and in fact R.A.E. design came quietly to an end before the 1918 armistice. Its continued existence as a great centre of research and development in aircraft design, and as an actual designer of aircraft equipment, is the chief single difference between the Air Ministry—M.A.P. design organisation on the one hand and that of the Admiralty or the War Office—Ministry of Supply on the other.

Broadly speaking the theory was that headquarters, in consultation with the Air Staff and the Aeronautical Research Committee, determined what work should be done and instructed the R.A.E. to carry it out. The method was to lay down for each department of the Establishment a programme of research and development covering a yearly period; the function of the Directorates of Scientific Research and Technical Development was to evolve this programme from their interpretation of the technical aspirations of the Air Staff; the task of the Royal Aircraft Establishment was to carry out the programme laid down for them. In practice the R.A.E. played rather less the part of a servant, and rather more the part of a colleague, in this process. Members of the Establishment were installed in the main source of inspiration, the Aeronautical Research Committee. For that matter the circle of people engaged upon aeronautical research and development was not a large one, and if the R.A.E. was barred from official contacts with the Air Staff, members of the Establishment were not debarred from personal contact with Air Staff officers.

Standing somewhat outside this relationship was the engine development organisation, consisting of the headquarters directorate (the Directorate of Engine Development, as it became in 1940) and the Engine Department of R.A.E. In the years immediately after the first World War, the Establishment played a prominent part in guiding engine development, but during the second part of the post-war decade there was a tendency for the headquarters branch to restrict the Establishment to technical problems, reserving for itself all issues involving policy. This tendency, which encouraged the existing strongly independent line of the firms, led eventually to the concentration by the Establishment on engine auxiliaries, particularly carburettors. By 1934, the role of the R.A.E. in engine development had become more or less settled as that of a specialised expert adviser, and little change in this position occurred during the following ten years.

The Directorate of Engine Development and the Engine Department apart, however, the Directorate of Scientific Research, the Directorate of Technical Development and the Royal Aircraft Establishment must be looked upon as a single organisation, with planning and general direction emanating from headquarters and the actual task of research and development being done in the Establishment. For this purpose it may be considered as being divided into two parts. On the one hand, there were a group of departments whose main function was to advise industry, and on the other, a group whose main function was the actual design of equipment. The former group was made up of the aerodynamics, structural and mechanical engineering and materials departments, and the latter of the radio, instruments, armaments and electrical departments. The engine department did work of both kinds. This division is not of course complete. The design departments have always devoted some proportion of their time to research, the end of which was the issue of information to the industry rather than the design of equipment; the distinction is however important. It is historically true of the British aircraft industry that the men who developed it and were its leaders during the rearmament period and the war were in general practical engineers rather than theoreticians. This practical bias was due not only to the personal predilections of the leaders of the industry, but to the existence outside the industry of several institutions specifically equipped to carry out theoretical work. Both the advising and the design departments of the R.A.E. have always undertaken a certain amount of such theoretical work, the results of which were published either in the annual report of the Aeronautical Research Committee, or as R.A.E. reports or scientific and technical memoranda. All these papers were for the information of the designing firms. During the inter-war period the work of the advising departments was mainly of

this type. Some sections—for instance the flight section of the aerodynamics department—did very little of any other kind of work. The results of such basic research were evolved and published, and then, so far as the Establishment was concerned, it became a matter for the firms to use the results according to their ability to do so. Research leading to the publication of scientific papers may be distinguished as the first peace-time function of the advising department of the Establishment.

The second function was related to particular aircraft. The R.A.E. first entered the picture when the specification for a new type of aircraft, drawn up by the Directorate of Technical Development on the basis of an Air Staff requirement, was sent to them for comment. Normally they had little to say about it. The specification was a guide to the operational requirements of the aircraft rather than a statement of its technical features, and its chief interest to the Establishment was an indication of the problems with which they would be faced during design period. Both the Air Ministry and the R.A.E. were, however, anxious that the latter should come to grips with the design problems at the earliest possible moment, and consideration was frequently given to devising means which would enable them to do so. In December 1937, for instance, the Director of Scientific Research wrote to the Chief Superintendent that it was desired 'to make arrangements by which the aerodynamic features of new aircraft, particularly in so far as control and stability in all conditions of flight are concerned, may be examined at the Royal Aircraft Establishment, at the earliest possible stage in the design'. For this purpose, the Director went on to say, copies of the relevant parts of all tender designs would be sent to R.A.E., and a preliminary opinion would be required in two or three weeks, for the information of the Director of Technical Development at the Tender Design Conference. The brief provided by the Establishment for the conference constituted the most exhaustive technical assessment of the competitive designs, and played a considerable part in the selection of the Director of Technical Development.

It was during the next stage, that of the preparation of a detailed design by the successful firm, or firms, that the advisory departments of the R.A.E. made its most characteristic contribution. Innumerable specific problems arose in the fields of aerodynamics and airworthiness—on controls and control surfaces; on strength of material; engine installation, both in regard to the power of the engine and the aerodynamic problems which it raises; internal arrangement of fuel tanks; climatic proofing; and many similar matters. All these problems were fully thrashed out between the Establishment and the firm in visits and discussions.

The advice of all departments of the Royal Aircraft Establishment

was freely at the disposal of all design firms. In general it was freely used, but it was also at the disposal of designers in the sense that they were free to reject it. It was a fundamental feature of the relationship between the Establishment and the aircraft industry that the designer had the ultimate responsibility for the success of the aircraft. The Establishment had always to be on their guard against persuading designers to adopt suggestions, however good the suggestions might be in themselves, if the designers could not, so to speak, digest them. This careful preservation of the attitude proper to a consultant encouraged designers to keep in constant touch with the Establishment by giving them the assurance that they would not be 'pressed to buy'.

The stage where the R.A.E. assisted mainly by advice merged into that in which they assisted mainly by tests. The preparation of a detailed design in the firm's drawing office was followed by production jigging and tooling and preparations for the production of the prototype in their shops. This was also the stage when models of the new design were submitted to wind tunnel and other tests. While these tests were usually of a general nature, they were arranged in co-operation with the design firm, and took account of any particular problems which the firm might raise. Wind tunnel tests were perhaps the most important, but they were by no means the only tests which the Establishment carried out. The prototype undercarriage, for instance, and all the other mechanical and structural features, were tested for strength, smoothness and stiffness. The control services were tested for reliability and flutter. Meanwhile, even during the stage in which model and other tests predominated, the firm were still seeking and being given advice on design problems. This stage was concluded by the final design conference, at which the Establishment again briefed headquarters with an assessment of the design. The Establishment was now intimately familiar with all aspects of the design, and their brief provided the Director of Technical Development with his main authority for technical criticism.

The first flight of the prototype aircraft was accordingly watched by the R.A.E. representatives with all the anxiety which arose from the sense of a considerable, if indirect, responsibility. The first flight almost invariably revealed some fault or defect which was at once referred to the Establishment. This might be, as in the case of the first flight trial of the prototype Meteor, a matter which could be cleared up by an investigation on the spot; it might on the other hand be as serious an occasion as when the first prototype of the Typhoon broke its back in the air and was only saved by the skill of the test pilot. A lengthy and fundamental investigation carried out by the Establishment, in conjunction with the firm, was required to trace the fault to the rudder section and effect a cure. Up to the stage of a first flight of a prototype, the Establishment was a contributor only, paying in

from its stores of knowledge. From the prototype flight stage onwards, the Establishment was to some extent a beneficiary inasmuch as it was constantly in receipt of information about the behaviour of the aircraft which was incorporated in records and contributed to the great mass of information which the Establishment had at its disposal. Such information was the raw material for the long-term work of scientific research officers. This process continued when the aircraft went into operation and use, and in fact until the end of its operational life.

In peacetime the contribution made by the Royal Aircraft Establishment after the aircraft was in operational use was not a large one. The duty of testing the flying quality of new aircraft was that of the Aircraft and Armament Experimental Establishment,¹ which was staffed by serving officers and civilians, and which passed judgment on behalf of the Air Force, particularly on performance and handling qualities. The Aircraft and Armament Experimental Establishment was, as its name implies, much more than a testing establishment, and its contribution to the development of aircraft during their operational life was highly important. During the war, however, not only this Establishment but also the R.A.E. was called upon to play an even larger part in such development. No air force in the recent war, however arduous its training, or however great the forethought of its leaders, had been able to foresee all the problems of actual combat. Aerodynamic and structural failures in battle were naturally frequent, and the functions of both Establishments were developed to seek cures for these failures. A series of accidents occurred to the Halifax for example, which, from the accounts of survivors, appeared to be due to the locking of the rudder when violent evasive turns were made. Flight trials were carried out in which Halifax aircraft were taken at a safe height and the circumstances in which the accidents had occurred were deliberately simulated under careful control. The fault was diagnosed in this way and a cure was suggested. Another classic case was that of the Spitfire ailerons. It was realised in the first days of the Battle of Britain that the Spitfire, when diving at high speed, was unable to roll easily and quickly out of the dive. All possible effort was at once turned to seeking a cure for this dangerous defect. The design firm and the Establishments, in collaboration, devised a remedy for existing aircraft, but the extension of this work into a field of general experiment, and the evolution of data applicable to all fighter aircraft, was characteristic of the official contribution to development. Among many other cases in which the Government side made important contributions to curing faults in operational aircraft were those of the defective longitudinal stability

¹ The Marine Aircraft Experimental Establishment must also be mentioned.

of the Beaufighter and the Defiant, and the carburation of Halifax II and Lancaster III.

Concentration upon work of this kind was a very important development, and a development which illustrates very clearly the flexibility of the administrative structure of the joint directorate of research and development both at headquarters and within the establishments. Whereas in peacetime, as we have seen, almost all the work of, for example, the flight section of the Aerodynamics Department of R.A.E. was long-term research which had no immediate application, already, by August 1940, the Director of Scientific Research could say that: 'The distinction between research and development, in so far as this indicates distinction between a "long-term" and a "short-term" programme, has now ceased to exist, since everything on the programme is now related to what is essential to the war effort'.

The functions of the design departments of the Royal Aircraft Establishment differed very widely from those of the advising departments. Although they too undertook a certain amount of basic research, their main function was the actual design of equipment. Radio sets, instruments, cameras and electrical equipment were designed by the appropriate department and only turned over to industry when they were ready to be put into production. During the expansion period the design departments were active in all these fields, and V.H.F., or very high frequency radio communication, was a major triumph of these years. Another was the design and evolution, during the period 1938 to 1942, of the gyroscopic gunsight. In this case, the R.A.E. co-operated with a number of commercial firms, but both the initiation of the project as a whole, and the vital steps in a design involving wholly new principles of the most extreme difficulty, came from the Establishment.

V.H.F. and the gyroscopic gunsight must be taken to stand for a vast number of R.A.E. designs of instruments, armaments, engine ancillaries and radio equipments, which it would be a formidable task even to catalogue. What is important for our present purposes is the reason which made it necessary for R.A.E. to undertake this work. The scale of orders for specialised Air Force equipment between the wars was so small that generally speaking it was not worth while for commercial firms to acquire the advanced knowledge and skill necessary to design them. It was this vitally important fact which, among other things, and in another field, that of radar, led to some very peculiar and interesting developments in the administration of research and development by the Air Ministry and M.A.P.

When, during the years 1934-39, the long-range early warning radar stations were being developed and constructed round the coast of Britain, the leadership, and most of the actual work of design and

development, came from Bawdsey Research Station. This was an inter-Service, or rather interdepartmental research establishment, but it was administered by the Air Ministry. The development of radar rested in official hands partly because the technique was a new one, entirely unfamiliar to everyone except a negligible handful of men in the laboratories of large industrial firms, who might have happened to touch upon it, and partly because, in any case, radar was a vital defence secret.

In the years immediately before the war, Mr (later Sir) Robert Watson-Watt, who had adopted and had had accepted by the Air Ministry and the Committee for the Scientific Survey of Air Defence a policy of concentration upon the development of the Home Chain, permitted a very moderate diversion of effort from this urgent task and the Bawdsey Research Station turned to evolve new techniques and design new devices. By this time a good deal was known about the behaviour of radar pulses and about the means of utilising them, but this knowledge had been evolved at Bawdsey and was still the most carefully guarded of all official secrets; it was only in the autumn of 1937 that two of the leading radio firms had been called in to manufacture equipment for the Home Chain. A final factor in determining the nature of the war-time Telecommunications Research Establishment was the recruitment of university scientists which took place on the outbreak of war. Considered as a move in the organisation of scientific effort this was a step of the highest importance. The scientists (mainly physicists) who came to Bawdsey represented a respectable proportion of the younger leaders in their field in the country as a whole. It was certain that their presence at the Telecommunications Research Establishment would attract others. It was also certain that the work of such a group of men in a field of known promise would achieve outstanding successes. Similar successes could have been achieved by the same men in other fields, and the decision to concentrate upon radar, even though it was partly the choice of the individual scientists themselves, was a notable example of the planning of scientific effort. It was these men, with their research outlook, who, during 1939 and 1940, pressed through the work of evolving centimetric radar. Although important contributions to this research were made outside the Telecommunications Research Establishment, notably in the University of Birmingham, and although (most unusually) the Research Laboratories of the General Electric Company were invited to undertake research simultaneously with the Establishment, nevertheless the effect of the introduction of centimetric radar was to concentrate development to an even greater degree in the hands of the research scientists in the Establishment. Meanwhile, on the outbreak of war, T.R.E. had become a purely Air Ministry Establishment, as both the Admiralty and the War Office

had decided to pursue their own research independently. The Establishment as M.A.P. inherited it in 1940 was nevertheless a very large one, and had even then evolved a strong tradition of independence of headquarters.

We have already discussed, in another connection, some aspects of the relations between the Telecommunications Research Establishment and M.A.P. headquarters,¹ and we are concerned here only with the functions of the Establishment. Not only was it responsible for all the major advances in the general technique of radar for the Air Force, but in the absence of a widespread ability in the radio industry to deal with advanced technical and scientific problems a great deal of the work of pioneering the design of new devices was done at the Royal Aircraft Establishment, often by scientists whose technical qualifications had been acquired 'as they went'. The leading radio firms had in their laboratories men who possessed qualifications of both kinds, and some of those who remained with their firms made important contributions both to research and to development. Others, however, joined the Telecommunications Research Establishment or other establishments. The general run of development technicians who remained in the industry developed considerably in their ability to tackle radar problems, but as the scientists in T.R.E. also advanced in technique and in the understanding of production problems they continued up to the end of the war to undertake at least the early stages of the design of the bulk of new equipments and new variants of existing equipment. Thus the Telecommunications Research Establishment as a whole was analogous to what may be called the 'design departments' of the Royal Aircraft Establishment, in that these departments also, like T.R.E., were responsible for the actual design and development of equipment.

The organisation of research and development in time of war concentrated attention upon some administrative problems which had already begun to claim attention in the pre-war period. The differences between administering scientific research and, say, the finance of shadow factories, had always been appreciated in the Air Ministry (although there had been periods when the appreciation was less exact and keen) but in war more began to emerge about the nature of the difference. As both the administrator and the scientist had the same interest—the greater efficiency of the Air Force—any divergence of outlook between them must have been due to temperament and training, and while of course certain of the civil servant's characteristic virtues, such as the ability to think logically, and patience in checking results, are also characteristic scientific virtues, there is a margin of discord. The civil servant's prudence and scrupulous regard

¹ See p. 327 *et seq.*

for authority are opposed by the scientist's boldness of vision and independence of mind. The value of the scientific individualist, unsuited to co-operation, is not readily accepted by the administrator whose whole idea of the value of an individual's work is bound up with the idea of the individual's taking responsibility for the work of others. From 1924 until 1934 the Director of Scientific Research was engaged in the task of gaining the administrators' sympathy for scientific method and also for the scientific temperament. During the latter part of this period, the scientists and technicians began to enjoy a greater measure of independence in deciding what work they should do and how it should be done. Promotion became somewhat easier for the able researcher who was not capable of administering or leading the work of others. The founding of Bawdsey Research Station and the great promise of the new radar technique put research ability at a premium, moreover the ignorance of the new science at headquarters was such that no one was in a position to give the scientists instructions. This was a blow to the view, once fairly prevalent in the Air Ministry, that the proper function of the scientist was to answer a series of questions addressed to him by people, such as the Air Staff, who would fit the answers into the larger operational framework of which the scientist was naturally and properly ignorant. In regard to radar this was an impossible attitude because no one except the scientists themselves knew what questions to ask. Moreover the university scientists who joined the Establishment on the outbreak of war made it a matter of policy to be informed of the whole strategical background against which any projected radar device was to operate. One result of these developments was the existence in the war-time Telecommunications Research Establishment of basic research sections headed by senior scientists who were completely free to decide from time to time what work they should do; one such research leader specifically arranged with the Chief Superintendent that he should do no administrative or 'paper' work whatever.

Meanwhile, at the Royal Aircraft Establishment, the tendency was in the same direction. A new head, appointed in 1942, made it his policy to allow a broad margin of opportunity for individuals to carry on work conceived by themselves. In some cases not even their immediate superior would know of it, which was a desirable circumstance in the germination of 'far-fetched' ideas, which were sometimes too easily killed by scepticism. The Chief Superintendent considered that there was little danger in the existence of a reasonable amount of such 'private' work. If it showed promise its author would soon publicise it; if it did not the solitary worker would become discouraged. Another important point in the administration of the Royal Aircraft Establishment was that representation on committees of the Aeronautical Research Committee was not confined to senior scientists

who, in many cases, had become administrators rather than researchers. The Chief Superintendent particularly encouraged the selection of young research workers as members of such committees.

Although the administration of scientific research, design and development by the M.A.P. makes a somewhat complicated subject, most of the complications can be referred to the extreme complexity of the 'end-product'—the military aircraft. The design of an aerodynamically sound aircraft is a technical achievement of the utmost difficulty, and in Great Britain the men who undertook it did not, generally speaking, attempt to carry out research in the science of aeronautics upon which their work was based. This work was done in the Royal Aircraft Establishment, the National Physical Laboratory and the universities, and was administered by the Aeronautical Research Committee, the Directorate of Scientific Research and the university authorities in co-operation. But such research was inextricably mingled with the designers' job of perceiving the potential successor in each aircraft and of designing this successor. To this development work, the Royal Aircraft Establishment made an important contribution, and while the design of the aircraft as a whole was the function of the industry, the administration of both processes was in the hands of the Directorate of Technical Development. Hence the necessity for a co-operation between directorates of technical development and of scientific research so close that only the organisation of the joint directorate could satisfy it. Moreover, as military aircraft must be able not only to fly but to fight, and were to a large extent 'built round the guns' (or bombs) the Director of Armament Development must be equally closely linked to his colleagues. Because radar equipments, however essential to the successful conduct of operations, were not an integral part of the design of aircraft, the Directorate of Communications Development and the Telecommunications Research Establishment could exist to some extent in a separate world, and were in fact administered by different members of the Aircraft Supply Council, the Controller of Communications Equipment instead of the Controller of Research and Development. Thus M.A.P. in its organisation had to take account of the diversity of the activity which goes to design an aircraft as well as of the cohesion of some of its parts.

Yet if the organisation of research, design and development in the Ministry of Aircraft Production is compared with that of the Ministry of Supply, it is the singleness of aim of the former which is striking, and which determines many of the differences. No single establishment as big as either R.A.E. or T.R.E. could have formed part of the Ministry of Supply organisation, for the reason that no single interest or natural combination of interests figured so largely amongst its responsibilities. The other fundamental difference is that progress in

the design of military aircraft is closely bound up with the design of civil aircraft, and to maintain an aircraft industry in being it is obviously and imperatively necessary to have a strong and coherent organisation for research, design, and development. Britain did in fact enter the rearmament period with such an organisation; the contrast between the aircraft and the tank in this connection has already been drawn, and need not be laboured.

CHAPTER XVIII

PLANNING AND PROGRAMMING

(i)

Programming as a Function of Finance, 1934-38

WHEN, IN 1934 and 1935, the Air Ministry began to turn its attention to the expansion of the Air Force, the two principal obstacles standing in the way of high rates of output were technical and financial. The technical obstacle was that the advanced types of aircraft with which it was desired to re-equip the Air Force were not yet available. The financial obstacle was the limit placed upon expenditure by the Treasury. The technical problem did not, in itself, have much influence upon the procedure of planning. The close association between finance and planning, on the other hand, was the factor which mainly determined the procedure at least for so long as finance was the dominating factor in the expansion, and to some extent even after this date. The task of planning production on any considerable scale was however really a new one, and there was no section of the Air Ministry to which the responsibility obviously belonged. The Directorate of Equipment was a 'provisioning' branch, that is to say it was concerned with the intricate calculations involved in providing the Air Force with its multitudinous requirements of equipment, and it was already fully occupied with this task; in any case the machinery of that directorate depended upon a given plan being laid down. Until March 1936, when the Directorate of Aeronautical Production was created, there was no 'production' authority below Air Council level. The early expansion programmes were accordingly drawn up very largely by secretariat officers in conjunction with the Air Member for Supply and Organisation, the Air Member for Research and Development, and the Air Staff directorates, such as the Directorate of Operations.

So long as the construction of a programme continued to consist mainly in determining how a given amount of money could most usefully be spent, and in the simple arithmetical calculations required to determine how orders placed under the successive 'schemes' were being co-ordinated and fulfilled, the procedure of drawing up these programmes remained more or less unchanged. When, in March

1938, Hitler's entry into Vienna gave the stimulus which resulted in Scheme L, the Second Deputy Under Secretary was asked by the Secretary of State to prepare an urgent estimate of the maximum production to which the aircraft industry could be expected to expand by 1940 if told to go all out for it. After some very rapid calculations, he came to the conclusion that it could be expected to produce about 4,000 aircraft in the year 1938-39 and about double that number in the following year. Hence a figure of 12,000 was offered as a practical estimate of the maximum output of the industry by April 1940, and that figure was later submitted to the Government and became the basis of Scheme L. An account has already¹ been given of the formation of the Air Council Sub-Committee on Supply, and of the part it played in translating Scheme L from a statement of requirements to a programme of aircraft production. This marked a step forward in the procedure of drawing up a programme.

The 12,000 aircraft called for under Scheme L involved the finding of capacity for 4,500 aircraft over and above what had been envisaged under the superseded programme. This was the task to which the Supply Committee, in conjunction with the firm's representatives who appeared before it, addressed itself. One or two examples will make the process sufficiently clear. Representatives of Handley Page appeared before the committee in April 1938 and in the course of discussion it appeared that they might be able to add to their planned output of Hampdens some 570 to 620. A. V. Roe considered that 'the additional order recently approved for 200 Ansons can be achieved without interference with the Blenheim and Manchester programmes'; indeed they thought they could take on a further 400 Ansons additional even to the 200, plus 100 additional Blenheims. The committee, however, regarded the firm's estimate in regard to Ansons as optimistic; a total addition of 300 Ansons and 100 Blenheims would 'suffice for the present'. So with Spitfires, Supermarines told the Director of Aeronautical Production that the accelerated delivery programme would mean an addition of 305 Spitfires to the 310 already on order, but the committee did not consider that it would be 'safe to bank on more than an additional 100 Spitfires on the accelerated programme'.

The process is clear enough. The Air Ministry drew up a rough programme reducing the 4,500 additional aircraft to types and probable main contractors. Detailed discussion with firms' representatives informed the Supply Committee as to what the firm themselves thought they could do, and also, in moderately detailed terms, of how they proposed to do it. This information the Supply Committee interpreted according to its own judgment; the interpretation was reduced to a tabular form by the secretary, and these calculations constituted

¹ See p. 40 *et seq.*

the Scheme L programme. Thus even as late as the initiation of Scheme L the programme was still little more than the sum total of orders which the Air Ministry had placed or was hoping to place.

(ii)

New Approaches

The need for a different approach to the planning of aircraft output, which had been emergent for a considerable period, became very clear during the early days of Scheme L. The discussions with the firms had emphasised the extent to which estimates of output were subjective. The firms were generally optimistic, and the Air Ministry had to make a guess, based upon experience, of what to allow for optimism in each case. Yet since the 'market' alternative to 'planning' aircraft output, that is to say leaving this output to be determined by the free play of the price mechanism, was for many reasons obviously impossible, and was never even considered in the Air Ministry, the aircraft industry and its subsidiaries were necessarily taking shape as a unitary planned economy, and better methods of shaping it had to be found. Yet already, in 1938, the Air Ministry's planning methods were to a large extent 'set' so that it was virtually impossible to make radical changes. As regards the aircraft programme, since Scheme L was a programme of maximum output, no successor could ever be a really 'new' programme. It could only be a development, at so many removes, of Scheme L itself. This situation in fact had not started with Scheme L, but went back to the earliest rearmament programmes. Thus the Air Force requirements of aircraft, as reflected in any particular programme, were always anchored to the plans it had made for recruiting and for constructing airfields; and these plans, in turn, had been based upon the anticipated deliveries of aircraft under some earlier programme. Aircraft planning, in fact, was in midstream quite soon after the opening of rearmament, and it could not swap horses. It could only effect improvements in its existing methods. During the expansion period the Air Ministry made more than one kind of approach to this problem, and although the approaches were not carried very far, they had considerable interest and significance.

If we understand by 'planning' the making of a coherent series of decisions which seek to control exactly and over a long period the disposition of available resources, and by 'programming' the largely statistical process of drawing up a detailed estimate of future production, then it is obvious that a knowledge of production potentialities was a first requirement of these two related activities. The planners in the Air Ministry and M.A.P. always hankered after 'independent'

knowledge, that is to say knowledge not based simply upon what the firms told them, but knowledge attained by their own exertions which would enable them to check the production promises given by the firms. In the spring of 1938, when financial limits had—more or less—been lifted, the Air Ministry made their first serious and consistent attempt to gain such knowledge. It was in order to make a start upon this task of measuring the potential of the aircraft industry that Mr Lemon, upon his appointment as Director General of Production, appointed Mr Lewis Ord, an experienced production engineer, to make a survey.

Mr Ord's survey was based on the assumption that in aircraft production 'those items which are measurable and accurately predictable cover the great bulk of the work'. His wish was to measure these factors very accurately and closely, but this was not possible, as it was a matter of urgency to determine whether Scheme L—already in operation—was a feasible programme. Also the staff which Mr Ord recruited for this work was small and had to be coached in a common procedure of investigation. Much of the information upon which he relied had to be obtained by the department's technical costs officers, but these men, uniting in themselves qualifications both in accountancy and engineering, were always too few in numbers, and too much overworked at their main task of assessing firms' production costs, to do much special investigation. Mr Ord's initial investigation therefore had to be reduced until it was little more than a summation of floor area, both actual and required, together with some information about raw material requirements and man-hours. A small amount of additional information was collected and served to check the results, but the procedure fell far short of Mr Ord's ideas of what was required. Knowledge of the relationship between man-hour costs and a rising curve of output—the central economic feature of serial production—was his aim, but the curves which he drew of falling real costs had to be based upon very limited data. Nor were his investigations of such matters as the loading of machine tools and numbers of workpeople employed per unit of floorspace very extensive. He would have liked a full and accurate assessment of floor space, labour and raw materials, in order that he might, for example, have plotted a curve representing the variation in the productive man-hours from the first to the last aircraft of a type or order. This curve would be determined by the size of the factory, the size of the order, the design and size of the aircraft, the amount of special tooling required, and the speed with which tooling was completed in relation to the progress of the order. Another focal point of his interest was the relationship between design and efficient production, and the problem arising out of this relationship he put in the form of a question as follows: 'If twenty firms . . . had to design

the same aircraft to identically the same outside dimension surface, contour, shape and weight, the details of construction which they would use to attain the required strength and shape would vary widely. In fifty years they would probably all be using the same or a very similar detail or structure design. Could we not accelerate that development?' But even if Mr Ord's ambitions were not matched by achievements—which was hardly possible in the very limited time he was able to give to the task—he had embarked upon the ocean of scientific investigation, and had even begun to chart it. He was able to give some moderately reliable figures of a useful kind. For example he estimated that the increments of acceleration in the monthly increase of output rate could be increased by between two and a quarter and two and a half times the former average rate of increase. He was also able to make recommendations as to how this should be done. The result of Mr Ord's investigation was that for the first time, in the words of the Air Member for Development and Production, a 'planned airframe output programme' was adumbrated.

From the production point of view this was, so far as it went, satisfactory, or at least encouraging. But as an element in the organisation of the Air Ministry central planning was not yet on a permanent footing. Mr Ord had been engaged for six months only; he had hoped at the end of that time to leave behind him colleagues trained in his methods and able to carry them on. These colleagues, although they had acted in some ways as members of Mr Ord's staff, really belonged to existing directorates, and were by the diversity of their interests rather a planning group of production men and engineers than a homogeneous organisation of 'planners'. The Director General of Production however was anxious to give to the planning function the permanency and status of a directorate, and he accordingly selected Mr T. S. Smith of the Bedaux organisation to fill the post of Director of Statistics and Planning, which came into being in November 1938. The creation of the Directorate of Statistics and Planning was of course an important new departure in the organisation of planning in the Air Ministry, but the organisation of the new directorate itself was upon a modest scale. It consisted of one senior technical officer, one statistician, one production officer, and three planning engineers. With this organisation Mr Smith would not have been able to achieve Mr Ord's extensive ambitions in the way of collecting information, but he had in any case a rather different idea of his functions.

Under Mr Ord, the emphasis had been upon investigating the production processes of individual firms. Their potential and their efficiency were to be measured by continuous and searching investigation, carried out by Mr Ord's representatives who spent as much time as possible in the factories for this purpose. Mr Ord himself had

had experience of aircraft production, and may be said to have had, so far as the nature of his task permitted, 'a practical bias'. The new Director of Statistics and Planning did not by any means ignore the production engineering aspect of this task. Indeed in a reorganisation of the directorate which he proposed in May 1939, he was anxious to obtain a principal technical officer whose duty would be to keep in close touch with the development of new aircraft, establish the necessary relationship between jig and tool cost, production rate and economic man-hour assessment, the factors determining the rate of diminution of man-hours per aircraft, and extend the investigation into the engine and other main sections of the industry. On the whole Mr Smith was more anxious to continue the work which Mr Ord had begun on establishing on a statistical basis the measurement of production factors and indices. Among these were the utilisation of floor space, the relationship of production to non-productive labour, and man-hour figures not only of the main contractors themselves but also of sub-contractors. A survey of the situation made by the Director General of Production in July 1939 embodied these results, and when, in January 1940, a new programme was issued, it was to a greater degree than ever before based upon the correction of firms' forecasts by information independently acquired.

Planning was nevertheless, at this date, still in an elementary stage. It was almost entirely confined to the production of airframes. The planning of raw materials production was particularly weak, and failed to take account of supplementary requirements for spares, and changes in programme, and still less of unforeseen contingencies. And in the field of airframes the measurements were crude. Even when adequate man-hour figures were available the efficiency of labour utilisation in particular firms remained an unknown factor. Data on such matters as the working of overtime, shift-working, and incentives generally, had not been brought into coherence. The same was true of the actual processes of production. Questions of layout and of tooling, such as the relative advantages of machine tools and bench tools in particular types of operation, were known to be important, but could not be answered. All these were serious imperfections, but their gravity was mitigated by the fact that they were recognised to be imperfections. The Director of Statistics and Planning wanted only the time and the staff to tackle all these problems.

But all these projects, even if time and effort could have been devoted to carrying them a good deal further, would not, at least in any very direct manner, have advanced the task of programming, that is to say, of compiling a reliable estimate of future production of aircraft, type by type, which could serve as a basis for the ordering of materials and components, and be used as a yardstick to measure the actual performance of the industry.

In any case no very serious attempt had yet been made to associate a central planning agency with the formulation of high policy. The business of estimating Air Force requirements in relation to strategy, of determining what types of aircraft were required and in what proportions, and of preparing a framework into which to fit the demands that should be made upon firms—all this remained the business of the Air Staff, the Air Member for Development and Production, the Director General of Production and the senior administrators. Up to May 1940, administrative civil servants continued to play a fairly large part in estimating the output of the industry and in formulating production policy. From May 1938, this activity lacked its original solid administrative foundation in financial control. Yet, although it was no longer the Permanent Secretary who, in the last resort, actually determined how many aircraft should be produced, the tradition died hard. It is true that it was killed stone dead in May 1940, but up to that date the administrators were always, at least, welcome guests in policy discussions about planning.

This was the position when, in May 1940, the Ministry of Aircraft Production was created, and placed in the charge of Lord Beaverbrook. The decision to concentrate on the five types, which has already been referred to, meant that central planning of the kind we have been describing was marked for sacrifice in any case even if the Minister's methods could have found room for it. But it was doomed on this count also. Lord Beaverbrook believed in personal effort rather than in statistics and calculations, and just as he was opposed to the giving of formal designations to his lieutenants on the grounds that they restricted initiative, so he was suspicious of the whole idea of a programme on the ground that it tended to limit production. The only programme was 'all that can be done'. The abandonment of long-term central planning was marked by one change in organisation which has already been briefly noted—the promotion of Mr Smith to the newly created post of third Deputy Director General of Production. In this post he was to supervise the work of his old directorate and also of the Directorate of Materials Production. This promotion was no doubt due to the recognition of the contribution to the work of M.A.P. which Mr Smith as Director of Statistics and Planning had already made. It also extended his control over a field—raw materials—in which we have already seen that planning was weak. In other circumstances the appointment would no doubt have strengthened the position of central planning among the functions of the Ministry. But even apart from the difficulties already outlined the day-to-day problems of raw materials production were urgent and made heavy claims on Mr Smith's time, and it may be said that, broadly speaking, there was no central planning in M.A.P. for the first six months of its existence.

Yet, of course, since orders were placed, and calculations had to be based upon estimated delivery dates, something in the nature of a programme did actually exist. It was the elementary type of programme of the pre-Scheme L days, the sum total of orders which the Air Ministry had placed or was hoping to place. Concentration on the five types had in fact brought about a repetition of the circumstances in which an overall plan was not essential, as the industry as a whole was not being economically exploited. As soon as it became possible to return to contemplation of the less immediate future, the danger of a relapse into planning by the industry was seen. Lord Beaverbrook accordingly instructed Mr Hennessy to prepare an 'aircraft programme'.

Mr Hennessy's programme, when it appeared on 2nd October 1940, was a document of great interest in the history of aircraft planning. It was based, as all aircraft programmes were based, upon an extrapolation of the current production curves, and as these curves at this date were rising steeply, it was, if for this reason alone, an 'optimistic' programme. It did not pretend to incorporate any of the more refined processes of statistics, nor had a determined effort yet been made—it was perhaps hardly possible—to build up the mass of accurate statistics upon which some simpler processes might have been based. It depended a good deal on calculations about assembly shop floor space, the most favourable factor in production. Yet it was not by any means a naïve essay in the science—or art—of programming. It was deliberately and specifically a product of judgment, of the judgment of industrialists, headed by Mr Hennessy, who had a long and successful experience of industrial planning within a particular firm, and who believed as a matter of principle, and not merely as a matter of expediency, in trusting their experience or judgment. And if the results were optimistic, this was not undesirable; an optimistic programme seemed to the Minister to be good psychology. It was intended to stimulate manufacturers and others to the greatest effort of which they were capable. It was a goal, a 'target programme' (the official designation) or, as it came to be known, a 'carrot programme'. Thus the kind of programming to which M.A.P. returned after the crisis of 1940 was very different from what was understood—or was at least beginning to be understood—by that term in the past. Nevertheless a return had been made, and from 2nd October 1940 until the end of the war, M.A.P. was always basing its detailed plans upon a 'target programme' however that programme might be drawn up. The life of the October programme was brief. It was brought up against the results of German bombing and of dispersal, which would have falsified even the most restrained and realistic forecast. It was accordingly quickly followed by a first and then a second successor. These programmes were issued on 7th March

and 3rd July 1941, and while they reduced the October figures to more practicable levels, they were not new programmes in the sense of being based upon different methods of compilation from those which had been adopted for the October programme.

Lord Beaverbrook's departure from M.A.P. signalled the end of the great crisis in aircraft production which he had done so much to overcome, and from that date onwards the department was increasingly preoccupied with building up the bomber offensive. The backbone of this offensive was to be the heavy bomber, and while plans for heavy bomber production had been included in the programme since before M.A.P. was founded, they had been sacrificed to the 1940 emergency, and were only now emerging as the dominating feature of the programme. This was the position in the first two programmes of the Moore-Brabazon regime, the provisional target programme of 11th September 1941, and the famous 'Prime Minister's Programme' of the autumn of that year.¹ It was not possible for the former Directorate of Statistics and Planning to take a very large hand in the drawing up of these programmes. From the time of Mr Smith's promotion, it had been reduced below the status of a directorate and employed only a handful of statistical and production officers, none of them of very high rank. There had been a certain revival of interest in the spring, when both Mr Hennessy and Mr Westbrook had stated that they wished to see the branch extend its activities. The establishment authorities, however, did not think that its current responsibilities entitled it to act as a directorate. Of the kind of activity which had been the principal *raison d'être* of the directorate in the past—the collection of essential planning data, the study of such data, and the production of basic programmes—there was hardly any. Only one senior officer was available for the work, and he was preoccupied with statistics. In these circumstances the drawing up of the basic programme was left very largely to the production side of the department, in conjunction with the firms, and with the heads of the department themselves taking a considerable share in the work. Considered as scientific central planning this was an improvement upon the procedure adopted in Scheme L only to the extent that the production authorities had now acquired a mass of additional knowledge about the firms, and a proportion of this knowledge, heterogeneous as it was, was useful for planning purposes.

¹ We are concerned here only with the departmental activity in connection with aircraft programmes. An account of the machinery by which the targets were set will be found in Part V, Chapter XIX (iii).

(iii)

The Deputy Director General of Statistics and Programmes

But already, while these programmes were under discussion, a step had been taken which was shortly to launch M.A.P. into a new epoch of central planning. In the spring of 1941 the department invited Professor Jewkes, Professor of Social Economics at Manchester, and a temporary civil servant in the Offices of the Cabinet, to examine their statistics and planning organisation and make recommendations. The report which Professor Jewkes submitted in September underlined what was already known in M.A.P. about the weakness of the planning organisation, and proposed an ambitious scheme for the creation of a planning organisation, and for a scientific attack on the problems of programming. Professor Jewkes envisaged a directorate which would link aircraft production and Air Force requirements in statistical terms, and which on the production side of this link would undertake the important but neglected task of preparing programmes for the various components of aircraft production which would march in step with the main airframe programme. Professor Jewkes's points were accepted by the Ministry, and as it was evident that he himself would be the best man to carry them into effect his services were obtained from the Cabinet Office and his appointment as Deputy Director General of Statistics and Programmes in M.A.P. was announced on 18th September 1941.

The task of the newly appointed Deputy Director General was threefold. He was, first 'to assist the Controller General in the co-ordination of the relevant statistics in the preparation of the programmes; secondly to assist the Controller General in the examination of the general trends of production and the extent to which a balance was being maintained between the various items; and thirdly to prepare for the Controller General and the production directorates periodical returns, covering the broad field of aircraft and equipment production, designed to throw light upon the extent to which co-ordination in output is being obtained'. It was not intended that, in carrying out these functions, Professor Jewkes should obtain statistical information from the firms direct. This had always been a function of the production directorates, and it was to continue in their hands. He was to obtain such information as he required from the production directorates, and, in general, was to deal rather with finished statistics and their co-ordination in a programme. He was however to be called into consultation by production directors in regard to the form in

which statistics should be obtained. Broadly speaking, therefore, his work fell into two parts, and it was for administrative purposes divided accordingly. The Deputy Director for Programmes was responsible for the co-ordination of the relevant statistics in the preparation of the programme. This task, in turn, was divided into six parts—airframes; engines; engine accessories and raw materials; radio equipment; American supplies; and machine tools and armaments. The Deputy Director for Statistics and Charts supervised that part of the work which was concerned with preparing the periodical returns of current production and other matters.

All told, the deputy directorate general was not large. In addition to Professor Jewkes himself and his deputies already indicated, it comprised, when it had got under way in 1942, four assistant directors, seven statistical officers and some ten or twelve temporary assistants with qualifications of various degrees in statistical work. From the beginning great importance was attached to the keeping of accurate records of output and of stocks, and since at least one-quarter of the effort was devoted to this, economy had to be exercised in the work done upon the 'programmes' side. It was of great importance to ensure that the staff should do only what was most useful, and this was clearly related to what they were best qualified to do. The department in general may be said to have had fairly decided views about this question in its negative aspect; there was a wide measure of agreement on the production side about what the deputy directorate general should not attempt to undertake. There were clear historical reasons for this attitude. Lord Beaverbrook's methods and outlook continued to exert a powerful influence long after Lord Beaverbrook himself had gone, and this influence worked against any extension of central planning into fields which were considered to belong to the firms. The Controller General, Sir Charles Craven, was himself a successful industrialist and believed that the industry was capable of accepting, and ought to be made to accept, a large share in the responsibility of planning its own output. This *laissez faire* tradition was reinforced first by the feeling that the indices of production which the Air Ministry had been employing prior to 1940 were very imperfect, and secondly by the fact that even such as they were, they could not be improved upon by the personnel of the Deputy Directorate General of Statistics and Programmes, who were economic statisticians rather than production engineers. These were the circumstances in which the new planning organisation began its work, and they all tended to divorce this work from the investigation of firms' capacity and concentrate it upon the statistical task of programming.

From now on the central theme and the constant effort of M.A.P. planning was to produce a more accurate airframe programme, and it is to the development of this theme that our account will mainly be

devoted. But if the development of realistic planning is to be treated mainly in terms of airframes, it is necessary to realise that the same methods were applied to engines, and that there were periods when engines and not airframes were the limiting factor in aircraft production as a whole. The engine programme offered severe and intractable problems. Difficult as it was to expand airframe capacity, or make switches inside existing capacity, it was even more difficult to do so when working with engines, because of the length of time—up to two years—which it took for new capacity to become effective, and because operational engines were the highly individual products of three great firms, Rolls-Royce, Bristol, and Napier, and their shadow or daughter factories. Technical difficulties and uncertainties in development were generally even more harrowing and prolonged for engines than for airframes. For these reasons, and for others including the traditional autonomy of the great engine firms, there had been no engine programme, properly speaking, up to the end of 1941. Statements of requirements existed; so did forecasts by firms of future output: and both were described as programmes. But the two things were never combined in a single authoritative document.

Professor Jewkes's programme of 1st January 1942 was accordingly a real landmark, not the less so because it marked only the beginning of a struggle. The aim of this struggle was to maintain in being, through subsequent developments, an engine programme as an accurate and worthwhile planning instrument. Some of the difficulties involved have already been indicated, but they were more elaborate and numerous than a mere indication could cover. They all fell under the general heading of 'marrying up'—to employ the usual phrase—the aircraft and engine programmes. Thus engine capacity had to be *prepared*, at least, for the situation which would arise when any given airframe programme expired; and since the airframe programme covered a period of from eighteen to twenty-four months, and since as we have seen engine capacity was not capable of reacting strongly within twenty-four months, it was necessary to make some plans at least for engine output two and a half or even three years ahead. Another aspect of the problem was that of attempting to determine the amount by which engine production should vary from the number required for the 'new build' of airframes. Ideally there should have been little or no variation, but in fact allowance had to be made for the pipeline to the aircraft or power-plant manufacturers, for replacing unserviceable engines at squadrons, and for stocks of various kinds. Even with these factors alone the calculations were reaching a certain elaboration,¹ but in fact the calculations were rendered much more difficult by lack of information, which declined,

¹ See Devons, Ely, *Planning in Practice* (Cambridge University Press, 1950).

as regards stocks, when they were in Service hands, and declined sharply again when they were in Service hands overseas.

Many of these difficulties about the engine programme were, by determined efforts, mastered or subdued. Difficulties in other fields remained insuperable. An example is provided in what was attempted in the field of radio production. In the spring of 1942 it was the practice of the Director of Radio Production to issue a monthly forecast of production, for which he did not claim the highest accuracy. He was not concerned with the installation of radio in aircraft, and accordingly drew up his forecast not in complete equipments, but in units such as transmitters and receivers. This was not readily intelligible to the inexpert, nor was the forecast of the Director of Radio Production at all what Professor Jewkes's representative in this field understood by programming. Indeed it seemed to Professor Jewkes that the Director of Radio Production limited his functions in this field to the placing of a series of unconnected small contracts and keeping them under review. His own ambition, however, was a production programme showing the target of complete sets of equipment which M.A.P. were to produce month by month over a period of twelve months.

Professor Jewkes and his staff appreciated the difficulties. They had conceived an even more comprehensive programme, but it had broken down over the difficulty of classifying radio output for statistical purposes. However, to an extent which was even greater in radio than in other fields, the design of the majority of units was not finally known, and constant changes of priority by the Air Ministry caused great difficulty in the supply of components by involving switches of raw materials and machine capacity. In radar in particular, events moved with such speed that a new move on either side—for example an advance in enemy jamming technique—might precipitate sudden and far-reaching changes of production plans. Added to all this there were crash programmes with their serious interference with production and their repercussions on contracts which had already been placed.

Considering these difficulties, the Director of Radio Production and his superiors were satisfied that his monthly production forecast represented the maximum economic effort in the planning field. They considered that any attempt to plan radar production on a long-term basis was not merely useless but absolutely wrong in point of policy; while even in regard to radio production their view, for rather different reasons, was coloured by a measure of disillusioned scepticism. They were far from being convinced that the kind of programme envisaged by Professor Jewkes would be feasible or even desirable. This view was frequently expressed by the radio production authorities during 1942 and 1943 and as late as September 1943 they were still

doubtful about the necessity for a D.G.S.P. programme. By August 1942 one of Professor Jewkes's staff had so far fallen in with this view as to recommend to his chief that in order to get the programme out quickly, it should be confined to airborne main units. His view was that a really effective radio programme should cover eighteen months, should be in terms of units rather than complete assemblies, should show different marks of the same equipment, should show individual firms, and should, in short, be both comprehensive and detailed. The argument continued for many months. The Director of Radio Production urged the difficulties which have already been indicated. In these circumstances there was little that Professor Jewkes, whose functions were after all advisory, could do to carry the ideas of his organisation into effect, and the attempt at scientific central planning of radio production may be said to have been tacitly abandoned.

Other items of production, fortunately, proved more amenable than radio to this kind of planning. Raw materials, armaments and equipment did not provide the formidable problem of classification which radio had done nor were the demands for them too immediately and largely dependent upon tactical developments. In each of these fields the Deputy Director General was able to agree with the appropriate production directorate upon the nature of the information to be supplied by industry, and was able to build up from it a more or less extensive forecast of production. This was an extremely important and useful function, but it was of course subordinate to the task of building these ancillary programmes into the main airframe production programme, and the actual compilation of this programme itself. It is to the methods employed in this section of the work that we must now turn.

We have already remarked upon the disposition in M.A.P. to leave the primary work of programming in the hands of the firms themselves, and have illustrated, in discussing the relation between the Deputy Directorate General of Statistics and Programmes and the radio production authorities, the kind of difficulty which was experienced in trying to impose ideas of a different kind of planning. The difficulties experienced in planning radio production were extreme. Nevertheless they illustrate the difficulties encountered in other fields, including that of airframes. All the airframe programmes issued from the foundation of M.A.P. until the advent of Sir Wilfrid Freeman and the creation of Deputy Directorate General of Statistics and Programmes were based almost entirely upon the firms' estimates. In November 1942 Sir Wilfrid remarked that it was his understanding that the 100 per cent. heavy bomber programme had been decided on by asking firms what they could produce and then adding a percentage. During the following months a great deal of thought was

given to the technique of programming, and complicated as the issues were they can in fact all be related to the Chief Executive's succinct précis. Most of the thought was directed to the process of 'adding a percentage'. Was it really desirable to add a percentage? Why should it be added? How should it be added? Correct answers to these questions, the M.A.P. authorities believed, would be the key to a better programme. We shall return to them shortly, but first we must consider the first part of the Chief Executive's statement. Was anything done to put the programme on a basis other than that of asking firms what they could produce?

Professor Jewkes, in the report which he had made before joining M.A.P., had addressed himself to this problem.

. . . there are those [he wrote] who consider that, in the framing of a programme nothing more is required than merely to ask firms what are the possibilities of production. But whilst it is clear that firms must be closely consulted in the preparation of any programme, it is equally clear that that constitutes a first step only. Apart from other reasons, the firms may be led to give unreliable information. They may exaggerate the probable future output because they think this will give them a better chance of obtaining raw materials: or they may underestimate their future output because they do not wish to be accused of falling short on their programme. More important still: the probable future capacity of any individual firm depends upon a correct assessment of general factors, such as the supply of raw materials, machine tools and labour in the country as a whole. No individual firm can be a good judge of these general factors. A programme must be built up on more scientific methods than the mere consulting of firms.

The 'more scientific methods' could however be applied only to correcting estimates which were obtained from firms in the first place, and in fact if any attempt was made by M.A.P. to supersede the preliminary process of consulting the firms it would appear to have been rapidly abandoned. Throughout the war the first step in composing a new programme or amending an existing one was a request to the appropriate firms for a statement of what they thought they could do in certain given circumstances. The firms' proposals were expected to be sufficiently detailed and exact to be, in effect, the basis of the new programme. We may take, as an illustration of the way in which the process worked even at a late stage of the war, the proposals which were considered in January 1944 for increasing the production of the Lancaster. Letters were sent by the Chief Executive to the firms of the Lancaster Group asking them to consider very carefully what they could do to increase the rate of build-up. They were asked to submit alternative proposals on two assumptions: first that the existing labour force would be maintained, and secondly that the necessary

additional labour could be supplied. Vickers-Armstrongs, in their reply, suggested that in the prevailing conditions of labour supply it was 'quite useless' to submit the higher programme. They accordingly submitted a programme based on the first assumption. The other firms in the group appear to have done the same, and at a meeting of the group which was held on 18th January they offered a total increase of 147 Lancasters over the year. M.A.P. then proceeded to examine the factors which would determine the practicability of their proposals, and, in particular, the embodiment loan position. As a result of this examination it was decided that the increase which it would be reasonable to expect would be approximately 100, and a programme was drawn up accordingly.

This incident illustrates the way in which firms' estimates remained the basis of all programming. It also illustrates that M.A.P. had developed, by 1944, methods upon which it relied fairly confidently for the correction of firms' estimates once they had been given. We must now return to the discussions which took place at the end of 1942 and the beginning of 1943, when these methods were inaugurated. In a memorandum on the technique of aircraft programming which Professor Jewkes submitted to the Minister in December 1942, he discussed in some detail the whole question of correcting firms' estimates. He began by enumerating the diverse purposes which the programme served, a diversity which had already been stressed, as we have seen,¹ in somewhat similar discussions in the Ministry of Supply a few months earlier. It was, in the first place, the basis on which the Contracts Department of M.A.P. ordered aircraft from the firms. Secondly, it was the basis for the provisioning of all component items either by the M.A.P. or the Air Ministry, and also the basis for calculating the M.A.P.'s requirements of raw materials, machine tools, and labour. Thirdly, it had a different function in the operational sphere inasmuch as the Air Ministry and Admiralty used it to learn how many aircraft they would be receiving, a point upon which their planning of operations partly depended. Lastly, it had another different kind of function, that of providing a standard, first a standard against which the performance of the aircraft firms was measured by M.A.P., and secondly a standard against which the performance of the M.A.P. itself, as well as of the firms, was judged by the War Cabinet and other external authorities.

The advantages of having only one aircraft programme, Professor Jewkes continued, were obvious. The purposes which the programme served, on the other hand, were so diverse that contradictory influences were at work. Thus a realistic forecast was desirable in the interests of operational planning, and an over-estimate might have unfortunate effects there. But a realistic programme would tend to

¹ See p. 200.

make firms think that M.A.P. did not want more aircraft, and some firms at any rate needed a carrot. If provisioning were done on the basis of a realistic programme the firms would not receive sufficient components to allow them to exceed it. In brief—a minimum programme was always in danger of being taken as a maximum programme. Professor Jewkes therefore argued that to produce a given number of aircraft it was necessary to plan to produce something more and that the official programme must include the ‘something more’. The difficulty that outside bodies, including the Air Ministry, would be misled by such an inflated programme could be overcome by informing them as to its nature, and in the case of the Air Ministry, by telling what element in the programme could be guaranteed. Professor Jewkes noted that the danger of providing misleading information extended to the date of introduction of new types, which would be delayed if, owing to inflation of the programme, the old type took longer to run out than it should have done if the programme were accurate. This difficulty could not be avoided, but the splicing in of new types must in any case always be a matter of judgment.

There must, then, be some inflation of the programme. How was it to be effected? It could not be done upon the uniform basis of adding the same percentage to each firm’s own estimates. Efficient firms had themselves a very exact idea of what they could do, and made their proposals to M.A.P. honestly and without self-deception. Inefficient firms did not know what they were capable of, and were not honest or free from self-deceit about reporting even what they thought they could do. In these circumstances Professor Jewkes’s suggestion for the compilation of the programme was that M.A.P. should fix a minimum realistic programme for each firm by reference to its past performance, the speed with which it was likely to obtain labour, machine tools, etc., and the views of the firm itself. M.A.P. should then add on to the programme for each firm a percentage to allow for the extent to which they believed that firm was likely to fall below any programme which was set it. Sir Stafford Cripps supported the idea of a realistic programme, and expressed his distrust of the ‘carrot’; ‘if dangled too long’, he wrote, ‘it loses its effect altogether’. With ministerial approval, therefore, it was decided to produce a new programme of a kind which had not been seen since 1940.

The first attempt at a programme in accordance with the ideas of the Deputy Director General of Statistics and Programmes was made in January 1943. This January programme showed a startling contrast to all its predecessors since the days of the Harrogate programme. Basically, it was a minimum programme. It represented that number of aircraft which the M.A.P. was prepared to guarantee that industry could deliver, taking into account all foreseeable

contingencies, or, in the Minister's words, 'the most accurate forecast (possible) of what we shall in fact get produced'. It accordingly allowed for all predictable contingencies such as holidays, sickness, and absenteeism. The programme was not however quite so unsophisticated as the M.A.P. comments upon it might suggest. In drawing it up, Professor Jewkes and his staff devised allowances to cover the purposes indicated in the preceding paragraph, and the incentive inflation or 'carrot' was thus not entirely eliminated. The object was to put the programme for inefficient units beyond their current output but not beyond their reasonable capacity, in order to provide the Ministry itself (as Sir Stafford Cripps put it) with the carrot which was to make the firms achieve their programme by improvement in their managerial functions. To meet the other objections which have been indicated above to the minimum programme, special arrangements were made for provisioning materials at a rate greater than the programme required, so as not to prejudice the possibility of its being exceeded by the more efficient firms.

The use of the programme as a yardstick was diminished by those qualifications. The difficulty was well expressed in a departmental comment upon a scheme which had been suggested by the Minister for promoting competition between the firms on the basis of achievement of the programme: 'Are we to give the inefficient firm a good mark if in fact it turns out to be slightly less inefficient than we had feared, and an efficient firm a bad mark if it turns out to be not quite so efficient as we had hoped?' There was nothing for it but to accept this defect and weigh it against all the advantages of retaining a single programme. In any case, the chances were that the margin of error due to unpredictable influences would counteract miscalculations about degrees of efficiency. The realistic basis of the January programme and the possibility that some firms would exceed their part in it, made it essential that a close watch should be kept on the actual performance of each firm, so that adjustments could be made to ensure that components and materials were available. To this end three special provisions were attached to the programme. The first was that as the programme was only a minimum one, every endeavour must be made to exceed it though not at the expense of spares. The second was that one month's lead of materials and components should be allowed to contractors in addition to that already provided, i.e. for provisioning purposes the programme was put back one month. Thirdly the programme itself was to be revised at quarterly intervals to take account of the trends which had showed themselves in the actual performance of the industry. So much for the background of the January 1943 programme, which may be summed up as a minimum programme with certain qualifications devised by M.A.P. to stimulate output and efficiency.

Considering the care which had gone into its compilation, this programme as a realistic forecast was disappointing. Output fell well below it. The reasons were numerous and plausible, but the state of affairs nevertheless gave rise to a good deal of anxiety. Why was the realistic programme not realistic enough? Which was at fault, the methods adopted in compiling the programme or the actual production effort itself? These were the questions which arose out of the gap between programme and output. In some ways it was clear that the realistic programme had justified itself. It had been proved that all firms did not need the 'carrot' as an incentive; several firms had actually beaten their target for the first quarter of 1943 and had had their programmes for the second quarter raised accordingly. The Services, moreover, had had a much more accurate forecast of the numbers of aircraft they were likely to get. Yet the realistic programme was looked upon with disfavour not only by the Air Ministry but even by the Ministry of Production. There was some suspicion in the air; if the Ministry of Production did not in fact believe that M.A.P.'s object in producing a realistic programme was to reap the credit of achievement, they were at any rate suspected by M.A.P. of harbouring this suspicion. Even so, when the programme received its first quarterly adjustment in April it was reduced in terms of the most useful real measure, structure weight, from 397·8 million lbs. to 396·7 million lbs. for the period 1st April 1943 to December 1944. Although this April revision, like the January programme itself, took account of 'all the predictable factors', the gap between programme and output was not closed. In commenting upon the revision the departmental experts had emphasised that one important factor always had been and presumably always would be unpredictable. This was the factor of technical change. Modifications and new mark numbers of aircraft always resulted in loss of production, which meant that M.A.P. was never likely to achieve the written programme for those types of programmes where there was constant technical change, if there was only just enough capacity to undertake the written programme. The proper course was to have a margin of capacity in hand so as to be able to produce the numbers shown and also to cope with changes. But neither the planning of margins nor the efforts which were made in the production field could close the gap, and the Deputy Director General of Statistics and Programmes gave his views on this in what was in effect a post-mortem examination of the 1943 programme in November of that year.

'We always tend', he wrote, 'to oversimplify the numerous and complex forces which control and limit the growth of an organism as complex as the aircraft industry. No one would assert that the size of a man is uniquely determined by the quantity of food given to him; we know that size is intimately connected with the balancing and

integration of the related parts and with the forces which are engendered by growth which finally constitute a limit to the growth itself. But we are too ready to assume that more labour or more machine tools, etc., automatically will produce a bigger industry and more aircraft.'

This important memorandum, analysing the situation and the prospects in 1944, stated that M.A.P. was rapidly approaching the peak of the aircraft production effort. Shortage of labour and weariness would be factors to reckon with; there would be less room near the peak for special efforts. M.A.P. must combat this sluggishness, but at the same time must take it into account. In particular the principle of realism must be maintained in the 1944 programme by taking into account the less tangible factors which were likely to affect output in 1944. The Deputy Director General was also decidedly of the opinion that M.A.P. should refuse to increase the planned peak output. He was determined to adhere to the principles of 'realism'; if there was reason to believe in the existence of any factors which might depress output then an attempt must be made to measure these factors. It was to allow not only for all foreseeable contingencies, but was also to take account of factors which were admittedly extremely intangible. Meanwhile, in the field of foreseeable contingencies, very important developments were occurring. At the end of 1943, the Cabinet evolved a manpower policy to cover the concluding stages of the war in Europe. This policy, which was designed to effect the maximum impact on the enemy during 1944, provided for an aircraft production labour force at the end of the year of 1,753,000, which was short by 155,000 of what was required under the current programme. Thus for the first time since 1938, the aircraft production authorities were faced with a situation in which the resources at their disposal were specifically limited by administrative decision. The only way to meet this situation was to recast the programme, reducing the output of less important aircraft in order that production of the vital types, and particularly of the Lancaster, should be maintained at the highest level. This was accordingly done, and for the first eight months of 1944 the programme was a realistic programme of the January 1943 type, reviewed to take account of the labour cut imposed at the end of the year, and also of the 'less tangible factors'.

The second important development in planning during 1944 was the attention which now began to be paid to the date at which the German war was likely to come to an end. The importance of this point could not be overlooked, but the War Cabinet, which was no doubt concerned not only at the harm which might be done by naming a premature date, but also at the possibility of discouraging effort by naming any date at all, seemed to those who were waiting for instructions to be somewhat slow in giving them. In August 1944,

they made a fresh decision about the future size of the Air Force, and again reduced the M.A.P. labour allocation. M.A.P. was then again constrained to draw up a new and reduced programme. In the following month—September—a further new programme was drawn up, based this time upon the assumption now authorised by the War Cabinet that the German war would not continue beyond 31st December 1944 and that the Japanese war would last eighteen months beyond the German war. Action on the September programme was however suspended from the day of its issue. The existence of these two programmes, and the uncertainty about the terminal date, were a cause of anxiety in M.A.P., and revealed once again the difficulty of explaining to the outside world what was involved in the technique of programming aircraft production. The suggestion was made that for the time being the M.A.P. should order aircraft and plan production upon the August programme, but should at the same time make its plans for putting the September programme into effect at some indefinite date in the future. Sir Stafford Cripps pointed out to the War Cabinet that a production programme with dates left blank for the future was a practical proposition only in the case of standard established articles such as bombs or guns; an aircraft programme must provide for the successive alteration of types and of marks of aircraft at definite dates determined largely by the expected progress of design work and the operational demands of the Services. He added that if production continued in accordance with the August programme and victory in Europe came by March 1945 the aircraft components were already being produced at a rate of approximately £5 million in excess of requirements. Some date, the Minister argued, must be given, since M.A.P. must know the peak rate of production expected for each type of aircraft, and the date when the peak must be reached; otherwise planning was impossible. Unplanned production on the other hand meant unbalanced production; components or materials would be supplied in excess of requirements and others would fall short; in fact there would be chaos. The Minister added urgency to all this by suggesting that the absence of an authorised programme during the last few weeks was already causing something like chaos in the materials field. The September programme was accordingly authorised on 29th September 1944 and, subject to further cuts, remained in operation until the end of the war. Its operation involved no important developments in the technique of programming, and, although there were absorbing problems and challenging difficulties still left to be faced, those concerned might well feel that they had undertaken what was perhaps the most important and revealing of all the British essays in the large-scale planning of war production.

PART V

The Co-ordination of the Supply
Departments

CHAPTER XIX

CONTROL BY COMMITTEES

1939-42

(i)

The Search for an Instrument, 1939-40

THE TIME HAS now come for one of those changes of view and of subject which, in tracing the history of a very large and complex organisation over a period of years, must involve long retrogressions. We have been observing the history of supply organisation through the eyes of the departmental official, the senior official with a fairly extensive view beyond the boundaries of the department, but nevertheless the official for whom the supplies for a particular Service often became the be-all and end-all of a harassed and over-worked existence. The need for co-ordinating and controlling these efforts was a constant preoccupation of the Cabinet, the Prime Minister, individual ministers, and senior officials. The machinery which had been prepared before the war for this purpose was subjected to strains and stresses beyond anything that had been foreseen. The temptation to be ruthless in the pursuit of departmental aims was strong; it fell both upon permanent civil servants who in some cases had not freed themselves from an older tradition of departmental autonomy and upon recruits from the business world to whom competition with rival firms had been the breath of life. The keeping of departmental ambitions within the bounds of a reasonable and healthy rivalry was not of course the main reason for providing an adequate system of co-ordination; the necessity for this arose from the nature of the tasks to be undertaken. Yet the friction or lack of friction between departments was often in the minds of the ministers and of the small group of senior civil servants who, from a central position in or associated with the Cabinet Office, devised the organisational skeleton of Britain's production forces. It is through the eyes of these men that we must now re-survey the years 1939-45. Our concern in this chapter is with the first part of this period, from the outbreak of war until the founding of the Office of the Minister of Production in the spring of 1942. During this period the instrument of co-ordination and of control was still the committee, and the supreme responsibility in our field of study was committee-making.

We have already examined the structure of the committees which exercised the central control of munitions supplies on the eve of war.¹ The Committee of Imperial Defence, having absorbed the Defence Policy Requirements Committee, was itself devoting a good deal of time to that supervision of departmental planning and progress which the D.P.R. had instituted. The Principal Supply Officers Committee, which had been set up in 1924 to deal with the subject of war potential, was still active in 1939, as was its subordinate agency the Supply Board, although as we have seen the two processes of planning war potential and organising current output for war purposes had ceased to be separate some years previously. The third body which must be recalled here was the Ministerial Priority Committee, which had been set up in April 1939 and began to operate in September with the Minister for the Co-ordination of Defence as chairman, in order to lay down principles by which conflicting demands for raw materials, manpower, manufacturing capacity and transport services might be settled.

The outbreak of war, although it was hardly a major landmark in the history of production, was a landmark in its organisation. It brought to an end the Committee of Imperial Defence, and consequently the whole organisation of the Principal Supply Officers Committee, Supply Board, and Supply Committees. The most vital responsibilities of the Committee of Imperial Defence were absorbed by the War Cabinet itself, but it was the Ministerial Priority Committee, and the organisation which was brought into being to assist it, which now emerged, and which, for the first eight months of war, was the principal instrument of interdepartmental co-ordination. The committee itself acted, as it had been intended to act, as an appeal court. It met once only in formal session, and only eleven memoranda were circulated to it. Although it may well be that they could not have done so if competition for supplies had become critical, the sub-committees which formed the courts of first instance were in fact able to decide most of the issues that were raised, and it was upon them therefore that the main burden of administration fell. It was indeed the sub-committees which provided the means of handling all the routine day-to-day business of interdepartmental priorities. There were six of them; they dealt with materials, production, manpower, labour, works and buildings, and transport. They were, in character, official and not ministerial, although they mostly had ministerial heads, and they were attended not only by senior officials from each department, but also by the department's Principal Priority Officer who was an *ex officio* member of each committee. Some at least of these sub-committees met very frequently; the Joint Materials and

¹ See pp. 49-68.

Production Sub-Committee, for example, had held over forty meetings by the beginning of April 1940. The Labour Priority Sub-Committee, on the other hand, did not meet at all during the first eight months of the war, because in the absence of power to direct labour there was little that could be done to give effect to any priority that might be given.

There must also be mentioned in this connection the Central Priority Department of the Ministry of Supply, which in October 1939 absorbed the duties of the Supply Board. This can however be conveniently treated later, since it continued undisturbed as the servant of the Production Council, which as we shall see succeeded the Ministerial Priority Committee.

During the first nine months of the war the Ministerial Priority Committee machinery handled a sufficient amount of business for some opinions to be formed about its form, methods, and utility. By the spring of 1940 these opinions had coalesced into a movement in favour of what amounted to a new and different system. The committee was thought to be too large, and its sub-committees cumbersome; Mr Churchill thought the latter 'a fearsome array'. It had also been assumed that the committee's main interest would lie in adjudicating between the three Services; in fact, the civil departments had appeared as formidable contestants, particularly for steel. Secondly—and from the administrative view this was a more fundamental point—the idea of having interested parties represented on the committee had fallen out of favour. Indeed already, in the War Cabinet Office, the idea had been raised of replacing the Priority Committee by a single priority minister. Such a minister, with a seat in the War Cabinet, had existed in the first World War, and while it was thought that if the office were revived the minister might have a committee to assist him, what was now being considered was essentially the placing of authority in the hands of a single individual.

This was the situation when, in May 1940, Mr Chamberlain resigned and was succeeded as Prime Minister by Mr Churchill. The great national crisis which followed and which opened a new chapter in so many different fields of history, brought about an important development in the field with which we are here concerned. We do not however lose sight of the thread of development. Indeed, since the idea of a single minister lapsed for the time being, and the system of control by committees was retained, the thread is a strong one, since it is at any rate possible that if Mr Chamberlain had remained in office the larger change—to a single minister—would have been made. It was the aim of the new Prime Minister to reduce the number of War Cabinet committees, and to regroup according to some system those which survived. The affairs of the country as a whole were accordingly considered under the three heads of Defence, Foreign

Policy, and Economic and Home Affairs, and the last division, with which we are concerned, was made the business of five committees. These five committees were the Production Council, the Economic Policy Committee, the Home Policy Committee, the Food Policy Committee, and the Civil Defence Committee. It is in the Production Council that we recognise the successor of the Ministerial Priority Committee.

Another very important innovation which was made at this date cannot so conveniently be treated as part of the apostolic succession of production committees. From June 1940 onwards, until the end of the war, the Defence Committee (Supply), a War Cabinet committee presided over by the Prime Minister, played a most active part in the determination of production programmes. It dealt with ends, rather than with means, with figures rather than with words, and with decisions rather than with discussions. It dwelt apart from the Production Council and its successor the Production Executive, and must be considered separately from them. The existence of the Defence Committee (Supply) and its role as the fountainhead of authority in production matters must be borne in mind from this point onwards; it must be fully dealt with later; but we are here concerned to tell a story which has important elements of continuity.

As between the Ministerial Priority Committee and the Production Council we may note in particular two such elements. In the first place the offices whose occupants were members of the Production Council were much the same as those which had carried seats on the Ministerial Priority Committee—the supply ministers (now three in number), the President of the Board of Trade and the Minister of Labour and National Service. Secondly in the appointment of the Minister without Portfolio as chairman there may be seen a reflection of the view that priorities should have the special attention of a high-powered independent minister. These were elements of continuity, but to get a fair and full picture we must also consider the important difference between the old committee and the new council. Labour supply, which had merely been one among many problems to the Ministerial Priority Committee, loomed over the whole inception of the Production Council, and Mr Bevin, from his new office in the Ministry of Labour and National Service, played a dominating part in determining its character. Mr Bevin was anxious that the responsibilities of the Council should be widely extended; he foresaw it assessing all the factors which played a part in production and ensuring that commitments were kept in line with potential. Mr Bevin's idea of the Production Council went even further than this, for he saw it undertaking primary responsibility for the whole great task of bringing munitions production into alignment with the strategical development of the war. These views were reflected in the terms of

reference of the Council which called upon it to give general directions not only about the priority but about the organisation of production, and also to survey the whole field of production from time to time in order to see where particular effort was called for.

The formation of the Production Council was announced in the House of Commons on 22nd May 1940¹ and it did in fact in these dramatic early days of its existence appear to be about to exercise a responsibility as weighty and widespread as Mr Bevin had foreseen for it. Summing up its first meeting the chairman, Mr Greenwood,² said that it appeared that the responsibility resting on the Council was that of planning the best use of manpower and materials; and secondly that 1940 was the critical year and production which would mature within the year must be given priority over production which would mature in later years. As the weeks passed however the items which appeared on the agenda insensibly formed a character and role for the Council of a rather less exalted and ambitious kind.

To the nature of the work which was carried out by the Council we shall return later. It will be convenient however to say something at this point of the machinery which it operated. The committees which it inherited were four in number: they were entitled Manpower; Joint Materials and Production; Works and Buildings Priority; and Transport. Important as was the work carried out by these committees, particular interest attaches to two new committees which were set up by the Council. The Industrial Capacity Committee was the instrument which the Council used to make one of its most important contributions to the organisation of supplies; it was this committee which undertook the first extensive reorganisation of the Area Boards (which will be referred to later) in August 1940. The committee, by its organisation of capacity exchanges, and by its use of the censuses of machine tools, made a useful beginning in the difficult field—about which many hopes were nourished—of regional or local planning. The other sub-committee which played an important role was the Sub-Committee of Principal Priority Officers. The absence of a committee for machine tools is noteworthy. The allocation of machine tools under the control of Sir Percy Mills however was held to be such that no committee was necessary.

The Council's work in the administration of priorities was of particular importance. The new Government had not delayed in issuing general instructions about production to meet the emergency. Weapons that could be used against the enemy within three months were of paramount importance; in the second place anti-aircraft guns, bomber and fighter equipment and trained crews were vital.

¹ H. of C. Deb., Vol. 361, Col. 157, 22nd May 1940.

² Minister without Portfolio.

The situation was however complicated by the fact that Lord Beaverbrook, at the Ministry of Aircraft Production, had suffered even less delay to occur in giving direct orders to contractors to concentrate on production for aircraft. There were two ways in which effect might be given to the instructions of the War Cabinet so as to avoid the disruption which a too enthusiastic interpretation of M.A.P. priorities might have caused. They could be passed on to the heads of firms in a form devised by the Production Council, a form less general than that in which they were laid down by the War Cabinet, but a form which would nevertheless offer guidance in a way which would necessarily allow a great deal of scope for interpretation. The alternative was a system of priority certificates, such as had been employed in the last war, which purported to give a degree of priority to each individual job. The disadvantages of the latter system, which was liable to flood the country with certificates, were obvious, but it was nevertheless favoured originally by the Production Council, who, at their second meeting, set up an emergency sub-committee of the Principal Priority Officers of the Service and supply departments to make detailed plans. This sub-committee was, first, to decide which of the Service requirements (which had already been listed for the Council) were capable of being used against the enemy within three months; and, secondly, to put into operation a system of priority certificates. The chairman of the sub-committee reported at the end of May. Although they had not formally been asked to consider the alternative, they nevertheless condemned priority certificates and proposed a general priority direction. The Production Council accepted this recommendation, and at its third meeting approved the issue of such a direction, giving first priority to fighter and bomber aircraft, instruments or equipment for such aircraft, anti-aircraft equipment, small arms and their ammunition, bombs, and components of any of these designated stores. The direction included a list of items which were to have what was in effect second priority, although in deference to War Office feeling in the matter the actual phrase 'second priority' was not used. In fact, while discussing priorities, the Production Council, led by their chairman Mr Greenwood, were already thinking of balancing production both by allocations of raw materials and industrial capacity, and were thus, particularly in their ideas of materials allocation, preparing the way for an immense step forward in the administration of war production.

So far as machinery was concerned the Council worked through the Central Priority Department, which, although nominally part of the Ministry of Supply, was in fact largely an independent organisation under the ministerial control of Colonel Llewellyn acting in his personal capacity. The Central Priority Department might in fact be regarded as the executive agency of the Council. Its duties however

lay rather in the field of allocations than in that of priorities, although it did advise on the drafting of the priority regulations. Its work upon allocations was carried on at least in part through the capacity register—the so-called Register or List 392¹—which it had inherited from the supply committees, and by which the capacity of firms was allocated either completely to a single department, or in stated proportion among the departments. The main burden of its routine duties consisted in secretarial and administrative duties for Colonel Llewellyn's committee on the allocation of materials. In collaboration with the Raw Materials Division it prepared estimates of available supplies and collected estimates of requirements, which—although to a rather limited extent—it subjected to critical examination.

The action which the Production Council took in the field of priorities was perhaps the most important single action in its history, which, on the whole, provides little of dramatic interest for the historian. Its somewhat unobtrusive role did however include a good deal of service which was not provided by any other means. The disputes which were avoided by the exchange of full and authoritative information about departments' plans and difficulties are naturally not to be found in any record. The Air Ministry could draw attention to the desirability of their being consulted about safe or dangerous areas for new production; the Minister of Labour outlined his plans for obtaining labour for the mines on which all production depended; he provided advice and obtained decisions about hours and conditions of work; pooling of stocks was discussed and arranged. Some more vital and far-reaching decisions were taken; it was the Production Council which, in July 1940, on a motion of the chairman of the Works and Buildings Priority Committee, decided upon the licensing of civil building.

This activity however, did not save the Production Council from criticism, or even from self-criticism. In the summer of 1940 the Council had raised—or resurrected—the idea of amalgamating the common services of the three departments in a single department of raw materials and priorities, and although this idea did not go far, it appeared also from an external source. A report of the Select Committee on National Expenditure, issued in August 1940, raised some major issues, and although the Government regarded the Select Committee's views on the administration of priorities, for example, as outmoded, the report was a document of considerable importance because it adumbrated ideas which had begun to be formed about the inadequacy of the Production Council procedure as a whole. The doubts and fears expressed about any interdepartmental body in the field of production were already quite familiar: it was not sufficiently

¹ See p. 243.

powerful, not sufficiently independent, not sufficiently thorough-going. It was true, for instance, that the Council left to departments the initiative in making complaints or representations, and in principle assumed that all was well unless such complaints or representations were made. It was curious also that if the independence of the chairman was important, the chairmen of two very busy priority committees were parliamentary secretaries of interested departments.

The Production Council was also accused in the House of Commons¹ of being cumbersome and of creating red tape, and there is no doubt that all this criticism found an echo in some ministerial hearts. Indeed in October 1940 the Prime Minister's own wishes were revealed when he invited Lord Beaverbrook to accept the combined office of Minister of Supply and Aircraft Production; Lord Beaverbrook's health did not permit him to accept this invitation.²

The Select Committee, however, did not deal in destructive criticism; it criticised rather by implication, and in its proposals for alterations. Thus in the matter of the priority organisation, to which it had devoted a great deal of attention, it proposed a single extra-departmental control to accommodate quantities and design to resources and to enforce interdepartmental co-ordination, and the setting up of an independent department with overriding powers to operate the priority organisation and the raw materials controls. In the field of progressing it proposed interdepartmental control from War Cabinet direction to delivery to user; and a unified inter-departmental organisation in the regions. The chairman of the Production Council, Mr Greenwood, in commenting on the proposals, referred to the great objection which there was to empowering any body with overriding powers *vis-à-vis* the supply departments—that it meant duplicating the departmental teams of experts and always doing the same work twice. He admitted some untidiness in the position whereby the priority organisation was responsible to the Production Council although working in the closest association with the Ministry of Supply, but he said that no one complained that the Ministry of Supply was doing better out of this than other departments. Yet the significance of the Select Committee's proposals was very great. Whether they were acceptable or not they offered an alternative to the existing system, and provided all the critics with material of one kind or another. These critics were now vociferous; and as the year went on the volume of their criticism, in Parliament and the press, grew. By the end of the year it had been accepted by the Government; in December the Prime Minister produced a plan

¹ H. of C. Deb., Vol. 364, Cols. 1303-1304, 21st August 1940.

² H. of C. Deb., Vol. 377, Col. 1402, 10th February 1942.

for the arrangements which, after full debate in Parliament,¹ was put into effect. In the production field the most important feature was that the Production Council was dissolved and replaced by another body with whose institution we step into a new phase of our subject.

(ii)

The Production Executive, January 1941

The new body was known as the Production Executive. Its creation, in January 1941, was part of a somewhat extensive recasting of the five ministerial bodies subsidiary to the division of economic and home affairs in the Prime Minister's scheme of May 1940. Two executives, the Production Executive consisting of the three supply ministers and the Minister of Labour, and the Import Executive consisting of the three supply ministers, the President of the Board of Trade and the Minister of Food, replaced not only the Production Council, but also, in effect, the Economic Policy Committee. The two Executives and other home policy committees dealing with American supplies, food, and civil defence, were to be 'concerted and directed' by the Lord President's Committee, and the Prime Minister himself assumed responsibility for ensuring that the work of both Executives corresponded with the general policy of the War Cabinet.² This responsibility the Prime Minister exercised in regard to the Production Executive mainly through his chairmanship of the Defence Committee (Supply); how this process was carried out we shall consider later. As to the Lord President's Committee, it operated in a wider field than that with which we are here concerned; suffice it to say that it did in fact provide a framework of economic policy within which the Executives might work.³

The basic principle of the Production Executive, explained in Parliament by Mr Bevin, was that the whole business of production and supply should be gripped and controlled at the top by a small and compact directing body, consisting of the ministers responsible for the executive departments concerned.⁴ The Minister without Portfolio had in fact disappeared from the production scene to deal with post-war problems. It was thought that the ministers concerned would reach rapid decisions on matters which were within their scope and would themselves see that such decisions were quickly carried

¹ H. of C. Deb., Vol. 368, Cols. 81-150, 21st January 1941.

² H. of C. Deb., Vol. 368, Col. 263, 22nd January 1941.

³ For a fuller account see Hancock and Gowing, *British War Economy*, *op. cit.*, p. 220.

⁴ H. of C. Deb., Vol. 368, Col. 81, 21st January 1941.

into effect. The two Executives, in short, were 'framed for action and not for debate'. The responsibility for production of the respective ministers was maintained; but they were combined in executive groups to prevent conflict, bottlenecks and waste.

This conception was maintained with great spirit by the Prime Minister in winding up the debate. Mr Clement Davies had outlined a scheme for a small War Cabinet not exceeding three in number assisted by five super-ministers—the Chancellor of the Exchequer and four ministers each controlling a group of departments (internal affairs, external affairs, defence, production). Mr Churchill took the view that some at least of the key departmental ministers should be in the responsible directing centres of Government; he defended the Cabinet committee as an instrument by which every British Cabinet over thirty or forty years had conducted a large part of its work; and held that where such committees were based upon the ministers, the co-ordination of whose departments was essential to the solution of the problem, these had the strongest incentive to agree, and if they agreed they could make their departments carry out their decisions and carry them out with alacrity and goodwill. He rebutted the argument that the Executives would overburden ministers who had their own work to do. This, he said, *was* their own work; management of these affairs and their interplay with other departments constituted the major problem before each one of them. He dealt with the question of super-ministers by asserting that if at any time it became necessary to appoint a Minister of Defence who was not also Prime Minister, that Minister would have in fact to be First Lord of the Admiralty and Secretary of State for War and Air and hold the seals or letters patent of those departments, otherwise he would have no more power than the various ministers for the co-ordination of defence had had in the years before the war and in the six months at the beginning of the war. Applying these considerations to the civil side he asked where he was to find a man who, without himself being Prime Minister, would have the personal ascendancy in his nature to govern and concert the action, and drive in a happy and docile team the Minister of Supply, the Minister of Labour and the Minister of Aircraft Production—ministers of departments with very strong characteristics and each with definite constitutional responsibilities to Crown and Parliament. The way to help busy men was to help them to come to a decision together by agreement. There was no more formidable and effective organisation of power than a set of four or five consenting minds, each of which had at its disposal full and necessary powers for the discharge of the business entrusted to it.

These observations of Mr Churchill's sharply emphasised the nature and quality of the new Production and Import Executives, as he conceived them. A further observation threw up a limitation. It

was not, he said, for these Executives to decide how many men should be allotted to the Army, the Navy or Air Force, or how much shipping should be used to bring in food or materials or carry troops to this commission or that. These particular responsibilities belonged in the main to the War Cabinet, and he himself accepted the task of making sure that the general policy determined by the War Cabinet was interpreted correctly by the Executives, or in the last resort settled by the War Cabinet. He went on to indicate that the Lord President's 'steering' or planning committee would relieve the War Cabinet itself to a large extent in dealing with the larger issues and with questions of adjustment. These, then, were the arrangements, and the Government's view of the arrangements, which came into being at the beginning of 1941.

To single out any period of the war and suggest that munitions production was during that time a more vital or important matter than during another would be almost meaningless. The eventual setting of sharp limits upon manpower in the munitions industries and the drawing up of 'manpower' programmes reflected the War Cabinet's views upon the changing optimum balance between numbers of men in factories and numbers of men in uniform, but up to the very end of the war the men in supreme control of production shouldered a vast responsibility and were constantly faced with momentous issues. Yet it would probably be true to say that no period of equal length brought a heavier responsibility in the production field than that which ran from January 1941 to the spring of 1942, and during this period the Production Executive was undoubtedly intended to bear the main burden of this responsibility. Its powers, its composition, its organisation, its methods, the nature of its task and the success it achieved in it are all matters which call for close examination.

The Production Executive was to consist of the three supply ministers under the chairmanship of the Minister of Labour, and its powers and terms of reference were broadly conceived. It was 'to give effect to the general policy of the War Cabinet', and, more specifically, to undertake first the allocation of all the various factors affecting production and secondly the determination of priorities. It was especially noted that the Executive would take account of the needs of departments whose ministers were not included in its membership. The Minister of Labour remained chairman of the Production Executive throughout its existence. Mr Bevin had played a great part in the discussions which led to its being set up, and he had given clear expression to his views about its task. He had wanted an active committee and a powerful committee, and the Production Executive was both. Out of a total of 261 attendances spread over thirty-one meetings, the ministerial members (the Minister of Works

into effect. The two Executives, in short, were 'framed for action and not for debate'. The responsibility for production of the respective ministers was maintained; but they were combined in executive groups to prevent conflict, bottlenecks and waste.

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In the course of the year 1941 two further committees of the Production Executive were created. The first marked a new departure; the second was a revival. In March there was set up the Industrial Publicity Committee, on which departmental Public Relations

was not, he said, for these Executives to decide how many men should be allotted to the Army, the Navy or Air Force, or how much shipping should be used to bring in food or materials or carry troops to this commission or that. These particular responsibilities belonged in the main to the War Cabinet, and he himself accepted the task of making sure that the general policy determined by the War Cabinet was interpreted correctly by the Executives, or in the last resort settled by the War Cabinet. He went on to indicate that the Lord President's 'steering' or planning committee would relieve the War Cabinet itself to a large extent in dealing with the larger issues and with questions of adjustment. These, then, were the arrangements, and the Government's view of the arrangements, which came into being at Joint Materials and Production

duction Council. The occasion of this revival was a revision of the Priority of Production Direction of 14th June. This involved not only the issue of a new Order under the Defence Regulations,¹ but the revival of priority certificates. These were to take the place of a general direction to manufacturers, but in fact the whole priority system was now giving way to the rival system of allocations of raw materials and industrial capacity, and only fifty-three certificates were issued during the effective lifetime of this revived committee, which did not extend beyond the summer of the following year, when this allocations system had clearly achieved success and finally ousted priorities.

The system of committees which has just been described, together with a strong secretariat, constituted what might be called the headquarters organisation of the Production Executive. There was however another side of the organisation, which has already been referred to, and which must now be examined in detail. This was the area organisation. The idea of using local knowledge in production and capacity problems had long seemed an attractive one—not least to the men who possessed such knowledge. Their suspicion that Whitehall experts were not prepared to take adequate pains to secure it is painfully evident in the earlier history of the area organisation. This had begun when, in January 1940, the Area Boards (twelve in number covering Great Britain and Northern Ireland) had been set up by the Ministry of Supply, in agreement with the Admiralty, Air Ministry and Ministry of Labour. Their objects were (*inter alia*) to promote co-ordination between the local officials of the departments and Services concerned with production in the area and to make proposals for the exploitation of additional capacity found in the area. They were composed of officials, but were to be advised by District Advisory Committees representing industry and consisting of equal numbers of

¹ Defence Regulation No. 55.

employers, nominated by employers' federations, and trade union representatives, nominated by the T.U.C. The boards were organised and controlled by the Director of Area Organisation of the Ministry of Supply. The Industrial Capacity Committee, on being established by the Production Council in July 1940, took on the task of strengthening and supervising the boards, and in August 1940 reorganised them. To the five official members (Admiralty, Board of Trade, Labour, Aircraft Production, Supply), of each board were added as members of the board three employer representatives and three trade union representatives. The chairman and deputy chairman were to be drawn one from the employer and one from the trade union members.

This area organisation, which the Production Executive had inherited from the Industrial Capacity Committee, was not in a happy state. Although pieces of useful work had been done here and there, the organisation as a whole was more of an aspiration than a reality. Apprehensions of the dissatisfaction of those concerned having caused the Parliamentary Secretary of the Ministry of Supply to make a tour of inspection in April 1941, he found that the apprehensions were more than justified. The unofficial members of the boards in particular had reached a stage of frustration such that the Minister feared resignations, attacks in the House, and even the withdrawal of trade union representatives. It was clear to him that some fairly drastic reform was called for, and Mr Macmillan proposed a scheme which was accepted for this purpose by the Executive. The boards were, in the first place, renamed the 'Production Executive's Regional Boards' and made responsible in their corporate capacity to the Executive.¹ The official membership was extended by four members so as to complete the range of interest, and provision was made for the conduct of the work of the boards by means of an executive committee. The boards were also empowered to set up capacity clearing centres. The new list of duties² gave the boards a wider reference, but it was recognised that the most solid piece of work which they could do lay in relieving main contractors and their sub-contractors in the task of finding additional capacity.

This reorganisation undoubtedly marked a step forward in the history of the area organisation (the most important indeed until the boards came under the chairmanship of the regional controllers of the Ministry of Production in the spring of 1942 and virtually changed their whole nature).³ The Production Executive remained concerned that the boards should be properly employed and various means were taken to this end. In July 1941 each board was invited⁴

¹ The official members remained individually responsible to their own department.

² Citrine Report. Cmd 6360, paras. 8-10.

³ See Chapter XX (ii).

⁴ Ibid.

to set up a sub-committee under the chairman of the Machine Tool Area Committee to consider questions relating to the supply, demand, and exchange of cutting tools urgently needed to relieve bottlenecks in production. Again, in October, the boards were entrusted with some responsibility for the redistribution of skilled labour; and all boards were instructed to set up a labour supply committee of a prescribed composition to assist the Minister of Labour in meeting the demands, especially in skilled engineering labour, and to hear, and so far as possible settle, disputed cases concerning the transfer of labour, up-grading, dilution, training, or increased employment of women. Particular problems were also referred as they arose or became acute; in November, for example, the Executive invited the boards to consider the staggering of hours of work in order to relieve the pressure of the peak loads on all forms of transport. It was however in the establishment and administration of capacity clearing centres that the boards found their steadiest as well as their most important employment. Thirty-six such centres had been established by April 1942. When, in the spring of 1942, a year after Mr. Macmillan's tour of inspection, a committee under Sir Walter Citrine reported upon the function of the boards, it was seen that they were more usefully and fully employed than they had ever been before. The room for improvement however had been very great, and a sense of disappointment and frustration among the non-official members, which had almost reached boiling point in 1941, had not altogether disappeared in 1942.

The area organisation was not the only body which was anxious to provide the Production Executive with advice and assistance. In June 1941 the Joint Consultative Committee of the British Employers' Federation and the T.U.C. approached the Executive with a proposal for the setting up of an advisory committee consisting of twelve representatives from each side of industry. They suggested as their terms of reference the giving of advice on 'general production difficulties', but specifically excluding questions of wages and conditions in individual industries normally subject to joint negotiation. The proposal was adopted, and the committee, under the name of the Central Joint Advisory Committee, met in July for the first time with an extensive agenda for discussion (including the use of railway workshops, industrial plans in the event of invasion, and coal production) mostly suggested by the T.U.C. The Production Executive referred no questions for discussion to this first meeting, and this, as it turned out, was to be characteristic. The Executive was not obliged to seek the advice of its committee, and showed little disposition to do so. By the end of September the T.U.C. was complaining of the fewness of the questions which had been referred, and was asking to be supplied with extensive statistics of output, labour, and

employment. These the Executive was not prepared to provide, but it did express an intention of providing the committee with more work. This intention, according to the Citrine Report already quoted, was not fulfilled.

We regret (the Report stated) to have to put on record that since its inception the Committee has rarely been consulted by the Government. It has held five meetings and of some fifteen topics of major importance in relation to production considered by the Committee only two were initiated by the Government. The failure of Government Departments to seek the advice of the Committee appears to us to reflect a disbelief in the value of consultative machinery as a whole (a disbelief which we are glad to say the evidence put before us shows to be waning).

It has been necessary to deal with the powers, organisation, and composition of the Production Executive at some length because without a knowledge of these it is hard to deal with the other elements in its history. Everyone who has any experience of administrative problems is however aware that between the formal items of reference of any committee and its organisation as it appears on paper on the one hand, and the actual work it handles and the degree of success which it attains on the other, there is a gap, smaller or wider, in which the more vital and interesting part of its history lies. The kind of work which the Executive in fact handled, the nature of the problems which it solved, and the degree of success which it was considered to have attained as an administrative instrument are the matters to which we are now free to turn. An examination of the papers of the Production Executive shows that a great deal of the business which it handled fell under one or another of three heads. In the first place the chairmanship of the Minister of Labour naturally gave prominence, as had no doubt been intended, to problems of labour policy. The chairman brought forward business under this head very freely, and policies which he introduced under the ægis of the Executive included the extension of detailed powers for the direction and transfer of labour and the introduction of the Essential Works Order. Both this and the Registration for Employment Order were taken, in draft, as an item of business by the Executive in February. Manpower requirements of particular industries; schedules of reserved occupations; ages of reservation; transfer problems; congested areas; along with more detailed questions such as holidays; hours of work in factories; double shifting; training; assisted travel; housing; transport; welfare; and joint consultation in industry—all these were among the topics discussed. The second major source of business was the allocation of materials on reference from the Materials Committee. It was the Executive which took decisions on the quarterly steel allocations of drop

forgings, tinplate, cotton, timber and other materials, and it was the duty of the Materials Committee to submit reports after each allocation period showing the actual deliveries of materials to the various departments in relation to the allocations made. Two surveys of raw material requirements as a whole were submitted to the Executive: one, covering 1941 in January of that year, and the second, covering the first half of 1942, on October 1941. The Executive did not however use these as occasions for discussing questions of policy, nor did such questions emerge from any other source in this field of materials. It was content to act as the ruling body within an accepted framework. The third main class of business was the building programme, and the connected problems of labour and materials and the control of the building industry. This business was brought before the Executive by the Minister of Works and Buildings, and it bulked large enough to justify the appointment of Lord Reith as a full member of the Executive.

The Production Executive, then, had under almost continuous consideration the three great factors governing munitions output at the stage which the national build-up had then reached. Building in particular was a critical problem during 1941, with heavy uncompleted programmes on the one hand and considerable pressure for withdrawal of labour on the other. With these vital problems coming before it, it is clear that the Production Executive was in a position to exercise that authoritative, decisive, and sharp control over the whole field of production which it had in some quarters at any rate been expected to wield. It was a body which had claimed for it the highest promise: what was its performance?

There were many who found it disappointing. The faith of the Government in the Production Executive, as expressed with powerful advocacy by the Prime Minister when it was set up, had persuaded the critics to hold their fire. Yet the fear that no such committee could ever be sufficiently independent was very strong and the actions of the Executive were not able to dispel it. It was, after all, a meeting of high contracting parties. Sovereignty was not merged or waived, a fact which ministers not infrequently emphasised. The emphasis was not entirely on the positive side; the distaste which the Ministry of Supply evinced for the raising of wider aspects of raw materials policy might be considered as a kind of negative emphasis. It was indeed with the Minister of Supply that the Production Executive came nearest to raising as an issue the question of departmental autonomy. There was more than one point on which Lord Beaverbrook did not see eye to eye with the Executive, and he was for long reluctant to abandon his view that final responsibility for departmental allocations of raw materials lay, not with the Executive, but with himself as Minister of Supply, a view which the Executive could

not agree to accept. In November 1941 the Prime Minister, in response to a request by Lord Beaverbrook, clarified the situation by stating that there was no question of the Executive interfering in any way with the authority of the Minister of Supply over the Iron and Steel and Machine Tool Controls, although he presumed that Lord Beaverbrook did not himself claim the right to decide the allocation of steel or machine tools. Episodes such as this gave such ground as there was for the criticism made by *The Economist* in January 1942 that the Production Executive was a battle-ground rather than a place of decision, but (even if this antinomy be a proper one) such episodes were few, and hardly deserve the name of battles. Two articles in *The Times* in the same month under the title of *Brakes on Production*¹ were however of a nature which in the context might properly be described as sensational, speaking as they did of 'a Production Executive which does not function as such with Regional Boards which are almost wholly advisory and . . . have no authority', and describing these institutions as 'a fundamental hindrance to full production'. Such criticisms clearly called for an authoritative answer. The Prime Minister, in a speech in the House of Commons² in February, said that the Production Executive, grouping the three supply departments together for common purposes, had not done badly. A more extensive defence might have described how the Executive, in addition to settling a long series of problems in the fields which have already been referred to, had consistently brought not only knowledge but also valuable ideas to their discussion, and had frequently achieved an adjustment of claims and policies, and sometimes been able to accommodate the views of departments not represented on the Executive, such as the Air Ministry. An apologia which was actually put in the form of a note for the Prime Minister in refutation of press criticism made some rather different points. The planning of production in relation to strategic needs was not and could not be the job of the Production Executive. That was done by the Defence Committee (Supply). On the other hand complaints about the execution of the programmes should not be addressed to the Executive, since this was the responsibility of the departments. The suggestion that the work of the departments was not adequately co-ordinated was based upon ignorance of the structure of committees which in fact were carrying out this function satisfactorily. The Regional Boards did what they were meant to do, and the notion that they could do more if they had more authority was misconceived.

But although a defence of the status quo could be made in reasoned

¹ *The Times*, 2nd and 3rd January 1942.

² H. of C. Deb., Vol. 377, Col. 1403, 10th February 1942.

and forcible terms this did not mean that there was any complacency on this subject in Whitehall. On the contrary, concern about the adequacy of the Production Executive was widespread, if less anxious and marked than it was in the press. Coming from responsible officials and ministers it was constructive rather than destructive, and it is interesting to see how, from the autumn of 1941 onwards, the discussion evolved towards the concept of a Ministry of Production along lines rather similar to the evolution of a Ministry of Supply a few years earlier.

(iii)

The Defence Committee (Supply)

A distinct break between a period of 'control by committees' and control by the Ministry of Production is not of course to be expected by anyone familiar with the British system of government. One committee which was set up at the beginning of Mr. Churchill's administration continued throughout the war to play a role in the control of supplies which was quite distinct from that of the Production Executive, and which was certainly during the early and critical period of Mr Churchill's government a role of considerable importance. This committee has already been referred to; it was the Defence Committee (Supply), a War Cabinet committee presided over by the Prime Minister. Its composition was somewhat unusual. Although at least one minister was usually present, attendance by ministers was generally irregular and varied according to the subjects discussed. The backbone of the committee was expert, consisting of the senior service staff officers and the controllers and directors general of the supply departments. The authority exercised by a prime minister in any non-ministerial committee over which he chose to preside would under any circumstances be very great; as it was Mr Churchill added the authority of continuity to the authority of his position and personality. Although no fewer than eighteen meetings were held before the end of 1940, he did not miss one; nor did he often miss one thereafter. We shall see that the committee was in fact rather like a steering wheel whose importance was derived from its being in the hands of the Prime Minister. The life of the Defence Committee (Supply), as has been said, extended far beyond the period with which we are here dealing, and will be referred to again in later chapters: we shall examine here the functions which it performed during the years 1940 and 1941.

A casual glance at the memoranda which were put up to the committee in the first year of its existence is very revealing. They

consist of few words, and many figures. They deal with programmes, and they deal with them in detail, yet over a wide range. Types of tanks 'in the hands of the troops'; aircraft at training establishments; ammunition production; the requirements of the Services for armour plating; these are a few of the subjects on which the committee was provided with succinct information. Some of these matters were the subjects of weekly reports; others appeared, disappeared, and appeared again as they became critical. The treatment which questions referred to the committee received at its hands was however consistent. Here, subject only to the authority of the War Cabinet, was the nerve centre of production planning. Whether action took the form of a comment by the chairman, of an invitation to the responsible minister to consider (for example) the speeding up of filling ammunition, or of formal decisions, for example that M.A.P. should work on the basis of the September programme,¹ they had the same general effect. They directed searching attention upon weaknesses; they prevented its ever falling away from the great strategic aims and ambitions.

Important however as was the committee's long-term work, its great achievement was the firm handling of the production crisis which faced it at the moment of its formation. Before the end of June 1940 it had laid down a framework for Army supplies by establishing the making good of deficiencies over the next five months as a paramount obligation; and subject to that, laying down as a minimum objective, to be attained by Z plus 21,² the supplies called for by Z plus 24 under previously existing arrangements. This left untouched the longer-term fifty-five-division objective, and additional factories were to be proceeded with for this purpose within a limit of a quarter of a million tons of steel. The committee had also, early in July, carefully examined and taken note of the Aircraft Production Programme. They had given full attention to tanks not only in regard to numbers, but by considering and approving the specification for the proposed heavy tank, and, incidentally, noting with disapproval that this appeared to have changed without their consent. The position of anti-aircraft equipment, including the U.P. weapon, came under consideration in August, and a sub-committee was set up, for, among other purposes, recommending rates of production for 3.7 inch and Bofors guns. It is in fact not too much to say that in the three months, June to August 1940, the Defence Committee (Supply) had surveyed almost the whole field of war production (except shipbuilding), and had, by putting forward something here, and lopping off something there, established an overall balanced programme.

¹ See p. 391.

² The notation used in planning Army supplies took Z month as September 1939.

It is however by an examination of the transactions which occurred in connection with the expansion of the aircraft programme in the autumn of 1941 that the student will learn most about the machinery of British production planning at this period. The general strategic conception of the part to be played by the Royal Air Force in winning the war may be taken as being the Prime Minister's, since it was he who gave expression to it in the councils with which we are here concerned. His requirement, as stated in general terms, was that the Royal Air Force should be at least twice the size of the German Air Force, and should contain a bomber force appreciably larger than that of the enemy. The position at the beginning of September 1941 fell far short of this; indeed it was such as to offer little hope of exceeding enemy strength. This was the order of the gap faced by the Defence Committee (Supply). At the meeting at which the matter was first taken the committee consisted of the Prime Minister, the Secretary of State for Air, the Ministers of Supply and Aircraft Production, the Chief and Vice Chief of the Air Staff, the Controller General and the Controller of Research and Development of M.A.P., the Secretary of the War Cabinet, Lord Cherwell, and the secretary of the committee. The Chief of the Air Staff said that the Royal Air Force had now prepared an expansion programme to meet the Prime Minister's instructions; that the basis of this programme was a first-line strength of 4,000 heavy bombers by the spring of 1943; and that this involved the production of 22,000 bombers during the period July 1941-July 1943. This was what might be called the strategic target programme. M.A.P. had already at this date (4th September) produced a revised production target programme of 11,000 bombers in the same period. If there had ever been real hope that the United States could produce the other half of the 22,000 it had already been dispelled; they could produce one quarter, or 5,500 only.

With the actual content of the discussions which followed at this and subsequent meetings we are not directly concerned. As a general statement it may be said that they had an actuality and concreteness which consorted with the exercise of plenary power. Nothing was discussed without some action resulting. It has already been stated that such action did not necessarily result from a formal decision; thus when opinions were expressed about the desirability of cutting down factory construction, no 'conclusion' was reached, but the Prime Minister's remark that the list of factories under construction should be examined clearly had the force of an instruction. Indeed at two of its most vital meetings the committee recorded no 'conclusions' in the usual form at all. The formula employed was: 'At the conclusion of the meeting the Prime Minister directed'. These directions themselves throw further light on the administrative processes

involved. The first was that the Minister of Aircraft Production should prepare a plan for the production of 14,500 bombers in the period to July 1943. This was the Prime Minister's own idea of a reasonable target, and in it we may see, as clearly as may be in these complex matters, the original source and spring of initiative. The other directions given on this occasion were essentially consequences of this main one, but a further important step taken as a result of it was a minute from the Prime Minister to the Lord President asking him to discuss the 14,500 plan with the ministers concerned and prepare plans for implementing it. The calling-in of the Lord President to undertake this critical task is significant: was it not to undertake just such tasks that the Production Executive had been created? However it was the Lord President who was invited, and the Lord President who, six weeks later, proposed a programme to give 12,670 aircraft up to the summer of 1943, and an estimate of the labour required for the job. The Prime Minister's independence of departmental experts was again promptly demonstrated. He queried the figures put up to him: assuming an average labour force of 1,600,000, a fifty-five-hour week and a production of 57,000 aircraft of all types in the period September 1941 to July 1943, this gave a figure of 160,000 man-hours per aircraft. How, the Minister of Aircraft Production was asked, was this to be reconciled with his statement in the House of Commons that to produce one Stirling required 75,000 man-hours? The ability of the Prime Minister to ask questions such as this was not only a highly important factor in the organisation of war production; it was something approaching a constitutional innovation. It is true that on this occasion the figures were not so complicated but that any prime minister (or his private secretary) might have worked them out for himself, but it would be an impossible task for the Prime Minister so to examine any considerable proportion of the figures submitted to him every week by his colleagues. The initiative taken by the Prime Minister on this and on many similar occasions depended upon expert advice given by Lord Cherwell, with the assistance of the Prime Minister's Statistical Section for which he was responsible.¹ Explanations were of course forthcoming. The 75,000 hours covered the air-frame only; figures for man-hours were for 'productive labour' only. And so the process went on. This, the second meeting on the 'Prime Minister's Programme', concluded, like the first, with directions being given by the Prime Minister for further study of the problems under various heads; and, in addition, for various 'super priorities'.

¹ The Prime Minister's Statistical Section was, in effect, an extension of the private secretariat normally maintained by a prime minister. Its range of interest was co-extensive with that of the Prime Minister himself. It acted as a semi-independent critic of departmental proposals cast in a statistical form. For a fuller account of its activity see D. N. Chester (Ed.), 'Lessons of the British War Economy' (Cambridge University Press, 1951), essay by G. D. A. MacDougall.

These included the manufacture of six extrusion presses; the construction and equipment of additional airscrew capacity; and the completion of the equipment of an engine works. It was at the third and last of this series of meetings on 31st October that final decisions were taken, after reports on steel stampings, machine tools, and new building had been considered. On this occasion the formula employed was that 'the committee agreed', but the main point on which they agreed—that M.A.P. should work on the full September programme, keeping open the possibility of the supplementary programme—had been recommended for their approval by the Prime Minister. Again there was the unmistakable ring of authority in the points laid down; the Production Executive was 'instructed' to arrange for the necessary priorities; the Minister of Labour was 'directed' to provide for manning. In all this we may see the committee as the personal instrument of the Prime Minister. The reference to the Production Executive throws some light upon the somewhat obscure subject of its organisational relationship with the Defence Committee (Supply). This relationship was somewhat tenuous and occasional. Although there was some overlapping between the officials and expert advisers who attended both bodies there was less overlapping in the attendance of policy-making ministers. There was no set plan or pattern of liaison. At least one official observer commented upon the 'gap' which existed between the two committees and suggested that it could be bridged by making the chairman of the Production Executive a member of the Defence Committee (Supply) and the secretary of the former a joint secretary of the latter. This suggestion however was not adopted and for the remainder of the life of the Production Executive the two committees continued to operate in adjacent but separate spheres. This period was not destined to go on for long after the autumn of 1941.

The decisions about the aircraft programme which were taken at that time were no doubt the most important action taken by the Defence Committee (Supply) during 1941, and perhaps no more important decisions fell to be made in the field of production during the remaining course of the war. In the course of 1942 the character and role of the committee were somewhat modified; the creation of a Minister of Production, apart from any other factor, was bound to have this effect. It is with the genesis of this appointment that we must now concern ourselves.

(iv)

‘The Infant Born in Moscow’

Speaking of the Office of the Minister of Production, of which he was first occupant, Lord Beaverbrook informed the House of Lords that ‘that infant was born in Moscow . . . [and] grew up in Washington’.¹ This was perhaps the most significant single remark made in a high quarter about the origin of the new department. It seems fairly clear that the criticism of the Production Executive which had been accumulating through the winter of 1941-42 was not in itself moving the Government towards any drastic reorganisation. Yet this criticism, in so far as it was constructive, was constantly throwing into prominence, in one form or another, the idea of a new kind of agency for dealing with production. The idea ran on through the debate on production in the House of Commons in July 1941; Mr Mander gave it its most precise form in calling for ‘a Minister of Production with the three departments under him’.²

Even before the end of the Production Council the idea of ‘a strong and effective focus’ in production matters, corresponding to that exercised by the Minister of Defence through the Defence Committee in defence matters, had been raised in the Cabinet Office; the phrase ‘a little Ministry *in petto*’, which was employed on one occasion, may be taken as an attempt to make the end of the wedge as thin as possible. The idea of a ‘Production General Staff’ attained a good deal of popularity in some quarters. A proposal to create such a body emanated from the Admiralty in October 1941. A revival of the Principal Supply Officers Committee, the First Lord thought, might form the nucleus of a body which would stand in the same relationship to the Production Executive as did the Chiefs of Staff Committee to the War Cabinet. Such a General Staff would formulate the munitions targets along the lines of Intelligence appreciations or operational plans, in terms of labour, machinery, factory space and time. Some specific questions were suggested for the attention of such a body. How far and how soon could the country’s industrial resources strike the current ammunitions target?; should we go on building munition factories, not knowing whether we could ever find men to work in them?; should we continue to withdraw men from industry for the forces, or should the movement be the other way round? Persuasive as the idea of finding answers to such questions undoubtedly was, the Government and their most senior official advisers were

¹ H. of L. Deb., Vol. 121, Col. 801, 12th February 1942.

² H. of C. Deb., Vol. 373, Col. 224, 9th July 1941.

still quite satisfied that the Production Executive could itself do all that the proposed General Staff could do.

There was however one significant point in the reply made to the Admiralty. Their proposal, it was said, would work only if directed by a single overriding Minister. Addressed to the head of powerful independent supply departments, this argument was perhaps thought to have an irresistible appeal; yet it was in fact to the idea of a 'single overriding Minister' that such an appeal proved in fact to be attached. The idea of a Production General Staff reappeared in January 1942 in *The Economist*, linked with the idea of an authoritative neutral chairman for the Production Executive.

Meanwhile however an event had occurred which, in changing the whole prospect of the war as it lay before Great Britain, vitally changed the view of the Government about the administration of war production. 'The entry of the United States into the war', as the Prime Minister said in a review of affairs in the House of Commons, 'the far-reaching measures of the pooling of Anglo-American resources, and the appointment of Mr Donald Nelson over the whole sphere of American war production, created an entirely new situation.'¹ It was the Prime Minister's view that one individual representative of His Majesty's Government ought to be in a position to treat with Mr Nelson on equal terms, as bearing responsibility for the whole of British production, and the thought that had been given to the creation of a production minister was now to bear fruit. Government thought on the subject had issued in a memorandum prepared by Mr Harold Macmillan, then Parliamentary Secretary of the Ministry of Supply, at the end of January. The crux of this proposal was the subordination of the Ministers of Supply, Aircraft Production, Shipbuilding, Works and Buildings, and perhaps others, to the new senior minister. (The minister responsible for shipbuilding was to be a Civil Lord of the Admiralty.) The Minister of Production would receive the programme from the Defence Committee. He would have control of the factors of production—materials, tools, and labour—and would allocate them to his subordinate ministers, who would be directly responsible for carrying out the programme. The staff of the Ministry would be composed primarily of the staffs taken over with the controls and from the Ministry of Labour. The basis of the organisation would be a programme staff, built up by taking staff from the Ministry of Supply and the War Cabinet secretariat. Mr Macmillan's proposal proved to be only the first essay in a complex and many-sided attempt to frame a new and final system of controlling production. The instrument now to be devised, it was realised on all sides, would have to produce the weapons to beat

¹ H. of C. Deb., Vol. 378, Col. 1205, 12th March 1942.

Italy, Germany, and Japan. The future shape of the war was beginning to emerge, and already it was too late for experiments. What was done now must be final. The care, thought and experience which would be devoted to defining the duties of an important office of state at any time were lavished in profusion upon the office of the Minister of Production. No such project, even in the leisure of peacetime, can ever have received more anxious and scrupulous attention. Yet the movement of events was very fast. Mr Macmillan's proposal was dated the end of January; Lord Beaverbrook's appointment as Minister of Production was announced on 10th February; he was succeeded on the 24th by Mr Oliver Lyttelton.¹ Much arduous planning was accordingly crammed into the two months of February and March. During this time the conception of the new instrument changed from that put forward by Mr Macmillan, first to that of a co-ordinating office staffed rather along the lines of an expanded minister's private office than along those of a Government department; and secondly to something which had elements both of a controlling department and of a co-ordinating office.

The responsibilities of the office as it was accepted by Lord Beaverbrook were set out in a White Paper issued at the time of his appointment.² He was the War Cabinet Minister 'charged with prime responsibility for all the business of war production in accordance with the policy of the Minister of Defence and the War Cabinet'. For this purpose there was conveyed to him all the duties and responsibilities of the Production Executive, with the important exception of manpower and labour. While this involved the allocation of productive capacity and raw materials, the settlement of priorities, and the 'supervision and guidance' of the departments concerned, it did not—and this was made very clear—involve any abrogation of the rights and responsibilities of the existing supply ministers. It was specifically stated that these ministers had the right to appeal either to the Minister of Defence or to the War Cabinet. The departments would continue to administer common services, such as the controls, but under the 'general direction' of the Minister of Production and subject to his having direct access to the controls. The general tendency of the White Paper to define by negatives was extended to the relationship between the Minister of Production and the Ministry of Labour. Mr Bevin became, in effect, the residual legatee of the Production Executive. All its duties in regard to manpower, over which he had in any case exercised a strong influence, he was now to carry out directly, and his hand was strengthened by the authority

¹ See the Prime Minister's statements in Parliament of 10th February and 12th March 1942. H. of C. Deb., Vol. 377, Col. 1403, 10th February, and Vol. 378, Col. 1205, 12th March 1942.

² Cmd 6337.

given to his officers to obtain information about the use of labour. The emphasis here was again rather upon what the Minister of Production was *not* to do; he was however to represent the other supply ministers in discussions with the Minister of Labour. His shipbuilding responsibilities did not include the control of the design, construction and armament of naval vessels, nor direct control of the construction, repair and defensive equipment of merchant vessels, although the Admiralty was to be 'advised' by the Ministers of Production and War Transport about such matters as the types of merchant vessels to be constructed. The Minister of Production's 'general co-ordinating functions' were to be exercised within the framework of these exclusions. Finally the Minister was to provide facilities for the production programmes of the Board of Trade, particularly electricity; and in the course of his general functions he was to cover building programmes for the purposes of war production.

We shall see that this conception of the role of the Minister of Production underwent some important modifications, not only, and indeed not so much, in the revise of the formal terms of reference given to Mr Lyttelton, as in the interpretation of these terms of reference by Mr Lyttelton during a tenure of office which continued until the end of the war. The administration of the office in being however is a different story from that of the preparations for its creation, and will be told in the following chapter. We turn accordingly from a story of experiments to the story of the evolution of a department of State. The new departure coincided with and as we have seen arose out of the great turning point, Pearl Harbour. The entry of America into the war had its most profound significance in the field of history with which we are concerned because it provided a framework of strategic plans, begun at the Arcadia Conference in Washington in December 1941, in which a new kind of planning began to be possible. To complete this framework there was still needed the technique of comprehensive manpower budgeting. With the assumption of a strategic programme of realistic aims and a knowledge of the limits of the resources available for achieving these aims, however, the framework was complete, and within it it became possible to draw a grand design of British war production.

Planning of this sort was not possible in the days of the Production Executive and its predecessors, but it may be that some of the criticism of it made since its demise is coloured by a knowledge of later events. Certainly contemporary criticism of it was focused on its shortcomings and appeared in articles in the press. The authors, however well-informed, could not have a really intimate knowledge of the part which the Production Executive had played. The Government had no intention of abandoning it until America entered the war and a new situation was created. We have, in brief, been dealing with

a period of experiment. That the period we are now entering was one of highly successful development in the central control of production is testified not only by results but also by a general absence of serious press and public criticism. From now on there is very little to draw on in the way of unofficial evidence; what we have to tell is seen from within.

CHAPTER XX
THE OFFICE OF THE MINISTER
OF PRODUCTION:
THE EXPERIMENTAL PHASE

(i)

Preliminary Adjustment

LORD BEAVERBROOK'S tenure of office lasted fourteen days.¹ It may have been effective to some extent in bringing out clearly the difficulties that faced the Minister of Production, but it was not long enough for him to put together anything in the way of organisation. The organisation, however, might be expected to flow from the conception of the role of the Minister as set out in the White Paper.² The appropriate organisation for such a role was a small body of men specially selected for their experience or ability. It was repeatedly emphasised that the Ministry of Munitions in the last war was not to be the model for the new office. Indeed there was no radical departure from Mr Bevin's conception of the whole business of production and supply being 'gripped and controlled at the top by a small highly competent body'. The Prime Minister in March had said that the new Minister would not have a separate department but would be 'equipped with an adequate secretariat and staff' for carrying out his duties. Two separate schemes were drawn up to meet this requirement. One envisaged the formation in each supply department of a board or council consisting of three or four members free from executive duties who could give continuous attention to planning and thinking. The Minister would on his part have an advisory board composed of five men, who would link up (through this device) with the three supply departments and with the Commonwealth countries and Allies. The second plan, drawn up inside the Cabinet Office, consisted essentially of two elements; first

¹ 10th-24th February 1942.

² Cmd 6337. It should be noted that this document was soon withdrawn (H. of C. Deb., Vol. 378, Col. 1838, 24th February 1942). Mr Lyttelton and his advisers carefully scrutinised its terms and a revised version was to form the basis of the Prime Minister's statement in the House of Commons on 12th March (H. of C. Deb., Vol. 378, Cols. 1205-1207). The main principles of the White Paper were not, however, affected by the revisions. No White Paper was issued on the appointment of Mr Lyttelton.

a branch whose main task it would be to provide information about the programmes and target dates and about the progress of production, and secondly a co-ordinating staff concerned mainly with seeing that the component parts of the Minister's organisation worked smoothly together. Both schemes emphasised that the functions of the Minister were to be advisory and not executive.

Attempts to get down to details, of course, perpetually confronted those who made them with the great problem—that of devising an effective instrument for concerting, and in a large sense controlling, the activities of departments headed by ministers who were not in any constitutional sense subordinate to the Minister of Production. It had been specifically stated in the White Paper that no abrogation of the rights and responsibilities of the existing supply ministers was involved. But there was always a suspicion of inconsistency between the Minister's responsibilities and the constitutional position of the supply ministers. Was the new office to be simply a glorified production executive with the added task of liaison with the United States, or was it—in fact if not in theory—to confront the supply ministers with overriding authority? Both the plans already referred to relied upon the Minister's authority as a member of the War Cabinet to give some colour to the latter idea. Sir Walter Layton, the head of the Programmes and Planning Division, on the other hand, revived the term 'Production General Staff' in a paper in which he clearly envisaged the office very largely as a planning organ. Under this plan its functions would be to study programmes continuously with a view to their better co-ordination and to examine the problems of continuous adaptation to changing war conditions. It would establish priorities and guide the Government organs which allotted materials, labour, and industrial plant. Systematic liaison with the supply departments and their regional organisations would be maintained for the study of common production problems. Lastly, the office would undertake the co-ordination of the British war production programme with that of the United States and other allies, and the supervision of departmental dealings with America in connection with these programmes.

Mr Lyttelton gave his own ideas about the office in his speech in Parliament of 24th March, from which it appeared that they were closer to those of Sir Walter Layton than to what may be called the more authoritarian projects.¹ He envisaged the office as restoring the link between strategy and production which had lapsed when the supply departments were segregated from the Service ministries. The evil results that would inevitably follow the divorce of the two had of course been a main plank in the arguments of the opponents

¹ H. of C. Deb., Vol. 378, Col. 1838, 24th March 1942.

of the Ministry of Supply, and Mr Bevin, in his idea of the Production Council, had envisaged its taking primary responsibility for the whole great task of bringing munitions production into alignment with the strategical development of the war. The reconciliation of strategy and supplies by the Minister of Production might also help in resolving any difficulties that the Minister might have with the supply departments. With such considerations in mind Mr Lyttelton considered that adequate powers had been conferred on him since they involved 'actual control of the three ingredients of war production', that is to say, of raw materials, machine tools, and (in co-operation with the Ministry of Labour and National Service) labour. Whether or no the Minister was optimistic in estimating the possibilities of using these controls, with their settled and even traditional technique, as an instrument for enforcing policy or correcting the policy of the supply departments will be discussed in the next chapter.

The position as regards raw materials had in fact undergone some adjustments in these preliminary discussions. The Production Executive, it will be remembered, had been responsible for 'the allocation of the available resources of raw materials', a task which it had discharged through the Materials Committee. The Minister of Production now took over both the function and the committee, but his powers relating to raw materials required for war production in the United Kingdom received a more extensive definition.¹ He became responsible for planning the development of home resources, arranging the import programme, and settling the allocation and release of stocks. He was charged furthermore with directing the work of the British representatives on the combined bodies² set up to provide for the most effective use of the joint resources of the United Nations in raw materials, and with organising, in co-operation with the Commonwealth governments, the general planning of the production in the Commonwealth of raw materials. The Minister's functions therefore were much more extensive than those of the Production Executive. In any case the situation was entirely different from that of a year earlier owing to the great development of American war production, both actual and, still more, prospective. The loss of Malaya and the intensification of the U-boat campaign following America's entry into the war had also transformed the shipping situation.

Mr Lyttelton's initial view of his proposed powers, before Mr Churchill's statement in Parliament of 12th March, based on the former White Paper, found an inconsistency between the provisions under which the allocation of raw materials—including arrangement

¹ Cmd 6337.

² See Section (iii) of this chapter.

for their import—fell to the Minister of Production, while the controls were to continue to be administered by the supply departments. The provision in the paper under which the Minister of Production would have direct access to the controls while not entitled to give them instructions seemed to add to the illogicality. Mr Lyttelton's suggested solution, previously conceived by Sir Walter Layton, was that the 'Raw Materials Department and the Machine Tool Control and possibly the allocation of labour as thrown up by the Ministry of Labour' should be concentrated in a separate Ministry of Raw Materials and Industrial Capacity with a minister responsible to the Minister of Production. This idea had at least the attraction of familiarity; in one form or another it had been under discussion for years. In the event, however, a division of functions was agreed between the Minister of Production and the Minister of Supply which appeared to leave only high-level functions of allocation and determination of import programmes in the hands of the former. A rather different point arose on the import programme. Here the functions assigned to the Minister of Production overlapped the duties of the Import Executive. The executive was accordingly replaced by a shipping committee. At a later date the Minister made it clear to the departments concerned that they would still be responsible for the detailed work of administration in connection with import programmes. Enough ground had now been cleared to make the organisation of the office possible, if not easy. The idea of a production general staff dominated the conception; the difficulties of 'concerting and supervising the activities of the production departments' were minimised; and the small compact staff had become a clear idea which could be turned into a reality.

The concrete task of the organisation of the office fell to the newly appointed Secretary, who assumed office on 9th March. He produced within a few days a chart which was later modified by Mr Lyttelton's wish to a form with less of the characteristic hierarchical Civil Service pattern.¹ The Secretary, in producing this revise, in fact remarked on the resemblance which the organisation bore to that attached to a French Cabinet Minister. The final chart showed the Joint War Production Staff in the centre of the picture under the Minister and, grouped on either side of it, chief officers on production, raw materials, programmes and planning, a chief regional officer and the secretariat. Mr Lyttelton wished the heads of the main divisions of the Ministry to have direct access to him and to meet him regularly by means of a small Advisory Board or departmental meeting over which he would preside. These meetings were later to expand into the Minister's Council.

¹ See Appendix IVA.

The next step was to discuss this plan of organisation with the appropriate ministers¹ with whom it met with general acceptance. These discussions were, in fact, the basis of Mr Lyttelton's speech in Parliament on the 24th March 1942. The relations of this country with the United States were clearly the most important topic of discussion and also perhaps the one where agreement was most likely to be reached. The personnel and functions of the Joint War Production Staff therefore were first brought up. It was conceived as an ancillary, interdepartmental, and interstitial body to be served by a small permanent joint war production planning staff housed in the office of the Minister of Production. It was to include officers detailed by the Service departments, the production ministries and the Ministry of War Transport. The functions of the J.W.P.S. will be discussed later. Suffice it to say at this point that it was intended to bring strategical and production considerations into close contact.

The supply ministers asked that they should be entitled to attend any meeting of the J.W.P.S. at their discretion, a request that was granted at the outset.² It was also agreed that in addition to the Joint War Production Staff it would be useful for the Ministry of Production to have periodical meetings with the supply ministers and the Minister of Labour and National Service and such other ministers as might from time to time be necessary. The Minister of Production's Council was thus set up, to meet at regular weekly intervals, the agenda to be sent to all the above ministers although only those directly concerned with any particular item on the agenda would be expected to attend. The first meeting of the Council was held on 9th April 1942.

So far so good. Assent might well have been expected on these matters. The rub would come only with any proposal which might appear to the supply ministers to impinge upon their responsibility for seeing that production was carried out according to plan. The apprehension which these ministers felt about the office of the Minister of Production was that it might involve the setting up of a rival team of experts, perhaps seconded from their own department. The Minister of Production disclaimed such a wish. He was averse to the notion of a large department and though he asked for an official to be seconded from each supply department who would be qualified to give practical advice to his chief production adviser he emphasised that it was not part of his intention to interfere in day-to-day matters of the supply department. He said in so many words that the direct work of production and details of factory and work

¹ Ministers of Labour, Supply, Aircraft Production, Works and Buildings, and First Lord of the Admiralty.

² The first meeting was actually held on 23rd March 1942.

problems were properly in the sphere of the supply ministers. Nevertheless, as we shall see, the proposed production division of the Ministry of Production attracted considerable suspicion.

This reluctance on the part of the Minister to penetrate deep into the roots of the supply departments appeared again in the question of the relation between the supply department and the Ministry of Labour. Should they be directed as before or should they be conducted through the office of the Minister of Production? The Minister of Production took the line that only on matters of importance would he wish to deal with the Minister of Labour himself and Mr Bevin made it clear that his liaison officer with the Ministry of Production would have no power to take decision on labour matters on his behalf. The converse also was to hold good, in that the Ministry of Labour up to the end of 1942 tended to insist that all labour matters raised by the Ministry of Production should be handled strictly through its liaison officer. The net effect of this was that no labour allocation department was set up in the Minister's office and no regular administrative contacts established with the labour departments of the supply ministries, although against this must be set the fact that the Ministry of Labour liaison officer sat on the Labour Preferences Committee with a watching brief for the Ministry of Production.

What might be called the skeleton organisation of the Ministry of Production was finally announced by Mr Lyttelton in Parliament on 24th March 1942.¹ Its chief constituents were the Joint War Production Staff (and Planning Group), the Materials Division, the Production Division and the Regional Division. The formation of the Industrial Division and the setting up of an Industrial Panel—the two together representing what had been discussed under the name of the Production Division—were announced a month later.² During May and June the regional organisation was reformed and a regional organisation division was set up in the Ministry. This skeleton had been devised with the most careful consideration and caution; exceeding even what would normally be given to a new department of State. It was, however, only a skeleton, and it remained to clothe it with flesh. The eventual shape of the living body was to be determined to a considerable extent by the pressure of external events. The Combined Production and Resources Board set up in Washington in June 1942 soon threw up the production problems common to ourselves and the United States with which the Minister had much to do. The newly reorganised regional boards brought to the attention of the Minister much that would

¹ H. of C. Deb., 58, Vol. 378, Col. 1843, 24th March 1942.

² H. of C. Deb., 58, Vol. 379, Col. 626, 22nd April 1942.

formerly have been unnoticed. Nor did the Minister lack the stimulus of criticism; he had already been advised that the office was missing the opportunity of promoting full use of the country's productive resources. The process of clothing the skeleton with flesh was accordingly full of interest.

(ii)

The Early Months

The role of the Ministry of Production—the aims for which the organisation had been so carefully prepared—had been stated by Lord Beaverbrook in February: 'to insist upon the development of the resources of Great Britain to the utmost . . . to promote production . . . to give warning of waste in factories . . . to attack idleness . . . to co-ordinate the labour of those who work for different ministers'.¹ The Defence Committee (Supply) was entrusted with the task of supervising the Minister's general duties effectively, and to discharge his more specific duties competence had been conferred on him, in Mr Lyttelton's own opinion, by the assignment to him of the control of stocks and allocations.

For the carrying out of this role Mr Lyttelton's three main instruments were the Joint War Production Staff, the Production Division, and the Regional Organisation. We have already considered these in the context of the internal organisation of the office, but the importance of each was much wider than this, and the Joint War Production Staff in particular was a most important and original contribution to organisation at a very high level of responsibility. In his speech in Parliament on taking office² Mr Lyttelton put the Joint War Production Staff in the centre of his picture and it is no derogation of any other part of the organisation to say that it remained so throughout, despite the fact that the activities of the Regional Organisation lent his name more prominence. As we have seen the Joint War Production Staff was set up, on the initiative of Mr Lyttelton, by a War Cabinet decision on 23rd March 1942. It was to keep the Minister of Production in the total strategical picture on the one hand and the Chiefs of Staff well informed of production possibilities on the other. It was expected to supply the information required by the British representatives on the combined bodies set up under the Washington Agreement to deal with the pooling of Allied resources. It had also to control and centralise the demands of British production departments on American and other overseas

¹ H. of L. Deb., Vol. 121, Col. 804, 12th February 1942.

² H. of C. Deb., Vol. 378, Col. 1843 and following, 24th March 1942.

sources of supply. The staff also took over much of the existing work of the Defence Committee (Supply) which henceforward met only on special occasions.

As far as its formal organisation was concerned, it was a standing committee presided over by the Minister of Production or his deputy, Sir Walter Layton, the Head of the Joint War Production Staff. Its composition reflected the breadth of its scope and functions. The chief adviser to the Minister of Production on Programmes and Planning, the chief technical officers of the Ministries of Supply and Aircraft Production, the Controller of the Navy and representatives of the Service Chiefs of Staff were all members, and the Ministries of Labour and War Transport had representation. American representatives were from time to time invited to sit with the J.W.P.S. and ministers themselves frequently put in an appearance. The above departments were also represented in the small permanent Joint War Production Planning Group which served the J.W.P.S. Since membership of the Joint War Production Staff itself was irregular owing to the principle that its members were to be representative in quality this subsidiary body became the most important part of the organisation.

It consisted, apart from Sir Walter Layton himself who presided at several of the formal meetings, of the J.W.P.S. and his senior assistant, of officers of the status of directors of programmes seconded from the Services and interested departments who constituted a group for the purposes of this special task without at the same time being detached from their departmental context. The Planning Group emerged as a rather large body. As many as thirty persons were present at one of the early meetings and it was therefore replaced by a working committee of strictly limited numbers. One other body must be described here. The Programmes and Planning Division, an integral part of the Ministry of Production under the control of Sir Walter Layton, started life as an auxiliary of the J.W.P.S. with the functions of compiling regular weekly and monthly reports on munitions output on the basis of material collected from the Central Statistical Office, the supply departments, and American sources, and to carry out other information services of a similar nature. This body was eventually to become a common-service division of the Ministry. The Programmes and Planning Division was a body of considerable importance, and its work will be described in the later section devoted to American affairs, where its influence was most marked. Quite apart from the specific work it did in home affairs it bestowed upon Mr Lyttelton in his discussions with the supply ministers great authority on such questions as the relationship of requirements, strategy, and production. A scrutiny of its terms of reference, however, does not reveal the right radically to

advise, criticise, and if necessary to modify the production plans put into operation by the departments for carrying out the programmes of requirements. To this there were grave objections—the constitutional responsibilities of the supply ministers on the one hand and the danger on the organisational side of the multiplication and overlapping of personnel. Both the projects and the organisational steps of the first few months—some of which have already been introduced—involved excursions into difficult and debatable territory. In this territory nothing was more difficult and debatable than the proposed Production Division.

The Production Division was debatable because it embodied the proposals—the ambitions—which had been entertained for direct control over industry by the Ministry of Production. It was to be a small and entirely technical body, led by an industrialist with wide general experience. He was to have a technical officer from each of the three supply departments so as to maintain the closest touch with them. The functions of the division were to be confined to those subjects which affected all three supply ministers and which accordingly no single production minister could tackle alone. As an example Mr Lyttelton referred to the problem of changing over factories when one type of munition had to be substituted for another and the steady flow of production interrupted, with consequences of apparent inefficiency and perhaps idle time.¹

While the Secretary was engaged in finding a suitable head for the division the idea was germinating of collecting a panel of experts as a means of carrying out its functions. As put to the Minister's Production Council on 9th April the Industrial Panel was to consist chiefly of industrialists expert in factory management and representatives nominated by the Minister of Labour to deal with management problems and labour problems respectively. The panel was to include experts in all types of war production and its members would be available to give advice and investigate and rectify individual production problems. It was to be presided over by a full-time chairman with a general industrial knowledge who would have, either under him or at the same level, an expert in factory management, also full-time. The remaining members of the panel were to work part time. The chairman was to have the right of attending the meetings of the Ministerial Production Committee. Both the Industrial Division and the panel duly came into being. Mr Ivan Spens, a prominent financier, was appointed the leader of the former, and Mr R. Barlow, the managing director of Metal Box Co. Ltd., was selected to head the latter.

The Industrial Division—as the Production Division was actually

H. of C. Deb., Vol. 378, Col. 1847, 24th March 1942.

christened—did not fulfil either the hopes or the fears that were entertained about it. As regards its functions, they were to assist the supply departments on all questions of production either referred to it by the departments themselves or the regional organisations or from indications of failures in programme given by the statistics and planning sections of the office. Where the question at issue could not be resolved in collaboration with the supply department or departments concerned, the division had to advise the Minister either of the need for further investigation or about the action to be taken. The division as it was eventually set up was however somewhat different from this initial idea. An official with experience on the secretariat of the Production Executive was posted to the Industrial Division and brought with him a nucleus of experts by taking over from the Ministry of Supply the entire personnel of the Register 392, which had still survived all the hazards of administrative change. Apart from this the division did not take on any technical staff. Indeed its total staff apart from that occupied in maintaining Register 392 remained negligible. It carried out certain pieces of work, of which the supply of ball-bearings and the introduction of control of distribution of small tools may be cited as instances, and it handled many small interdepartmental questions. Also, in October 1942, it took over the secretarial work of the Location of Industry Committee. But it did not exercise anything in the nature of a central authority in industrial matters and although no direct criticism was made of its work it was bypassed by the turn of events. The proposals for the Joint Industrial Staff, which we shall soon have to consider, ignored it, and the Regional Clearing House, so-called, for dealing with questions of an interdepartmental character thrown up by the Regional Organisation was set up in the Regional Organisation Division in October or November, apparently without consideration of the claims of the Industrial Division under its terms of reference.

Nor did the Industrial Panel fare better. It was set up as a panel of industrialists—including three trade union representatives—who were available for undertaking specific enquiries proposed by the supply departments. It had no collective capacity. Its chairman (the title was purely honorary), acted frequently as adviser to the Ministry on industrial questions, but apart from this the work of the panel proved disappointing. Up to the end of 1942 it had undertaken twelve investigations, but although a system had been brought into being to try to ensure that recommendations made in panel reports were followed up by the interested departments, the results were not very good. Nor was there a materialisation of the prospect, foreseen about October 1942, that the panel would find a much enlarged sphere of work—of the same kind—in connection with the Munitions Management and Labour Efficiency Committees.

The lack of interest in these committees, if this is not wording it too strongly, is symptomatic of the Ministry's disquiet about its production responsibilities. Between March and June the future of the Industrial Capacity Committee had come under discussion, and this proved a gathering point for the discontent. One or two abortive proposals were made which seemed to suggest the senior members of the office were nursing ambitions that the Minister's 'General Staff' should extend its activities beyond its existing sphere of 'planning' to the subsequent stage of 'operations'. Items leading in this direction had already been discussed with the Minister, and there was proposed a joint production council under a technical chairman, as for example, the Controller General of Machine Tools, with strong technical representation from the supply departments. Since it was to be the forerunner of the Joint Production Committee the terms of reference of this body may be mentioned. Briefly, they were to examine and report to the Minister's Council on such questions, whether arising from the operation of the Regional Boards or otherwise, as might be referred by the Minister of Production or the supply ministers. Apart from the notion that the committee was to operate at a higher level these terms of reference do not differ markedly from those of the Industrial Division. Nor, it may be noted, was anything said about the conversion of programmes into actual production, or about progressing.

An extension into this field was, however, a feature of a plan put forward within the office. This proposed the appointment of a chief adviser on production symmetrical with the head of the Joint War Production Staff, to act mainly as chairman of a production council with the same membership as the abortive Joint Production Council described above, with the addition of 'somebody to deal with raw materials'. The terms of reference of the proposed organisation showed a decisive twist, namely, the conversion of planned programmes of the supply departments into actual production. A further memorandum of 18th July knit this scheme into the organisation as a whole, and brought out the analogy of the proposed Production Council with the existing J.W.P.S. An alternative definition of its functions was given. It was to make a joint central examination of the inter-Service or interdepartmental problems involved in converting approved programmes into actual production. A dominating position on practical production matters was assigned to the proposed chief adviser. The Central Priority Committee, the Materials Committee, the Labour Co-ordinating Committee, the Machine Tool Allocation Committee, and the Industrial Capacity Committee were to become sub-committees of the Production Council. The plan also provided for a separate chief adviser on research and development. This plan was an interesting one, but it was

of academic interest only, since it was not adopted. In the event the Industrial Capacity Committee died a quiet death without leaving behind it either a committee for discussion of general problems attached to the Industrial Division or a Production Council. Thus, even by the end of July, the issue of the all-important question of the relations between the Minister of Production and his supply colleagues was still uncertain. And in this state, for the present, we shall have to leave it. Decisions and advances were being made in other fields which cannot be neglected.

Among these fields were those of raw materials and regional organisation. The question of the Raw Materials Division, which had seemed to threaten trouble, had proved to be susceptible of a peaceful solution. A senior official was transferred from the Ministry of Supply in March and put in charge, with access to the Minister, of a division known as the Raw Materials Supply Division. This new division was to consist of three main sections, one of which dealt with general policy on production and the development of raw materials; the second with the control of imports of raw materials; and the third, known as the Empire Clearing House, was set up in London in March 1942 to centralise the requirements and statistics of the Commonwealth, India and the Colonial Empire.¹ The division was to work in close touch with the Programmes and Planning Division and the Joint War Production Staff, which in itself would be responsible under the Minister's direction for the adjustment of all long-term planning in regard to raw materials. The day-to-day adjustment of short-term plans would remain with the Ministry of Supply, and the allocation of raw materials still remained the business of the Raw Materials Committee. Co-operation between the Materials Committee and the Raw Materials Division presented no difficulty, for the Materials Committee with Lord Portal as chairman went over to the Minister of Production with its organisation. It was expected to function as hitherto and its secretariat was expected to go on dealing with the individual controls and with departments as it had done when the committee was still a semi-independent body in the War Cabinet offices.

These arrangements involved a redistribution of staff between the Ministry of Supply and the office of the Minister of Production. In the initial stages the Raw Materials Supply Division appeared anxious to avoid drawing on the staff of the Ministry of Supply. They felt that the department should not be deprived of a strong and efficient control of the execution of policy, and Mr Lyttelton was also probably anxious to avoid the pitfall of two rival teams of experts. But this was not easy. An analysis of the duties involved in the

¹ This section also had liaison with the Combined Raw Materials Board.

Minister's function, and the attempt to make provision for their due execution, almost immediately showed the need for more than the small nucleus of staff which had been initially transferred to the Ministry of Production. At the same time it was recognised that a question of the balance of authority was involved in the staff position. The relative positions on 5th May were that while the Raw Materials Supply Division of the Ministry of Production had but one principal assistant secretary and junior staff, the Raw Materials Department of the Minister of Supply was staffed with six men above principal assistant secretary level and also four men of that grade, all of whom were engaged full time on raw materials work. Some change was clearly necessary if the Minister of Production were really to control the complete framework of policy, leaving the execution of policy to the Ministry of Supply. Consequently the Second Secretary and two principal assistant secretaries were transferred to the Minister's office. The Second Secretary and the head of the Raw Materials Supply Division had between them built up the organisation of the Ministry of Supply and knew its working intimately. Their transfer therefore gave real force to the Minister's powers and a strengthening and rearrangement of functions soon followed.

This included the transfer of the British Raw Materials Mission in Washington to the establishment of the Minister of Production, thus placing it formally under his authority. It also included the appointment of an officer of the Minister of Production as head of the sections in the Ministry of Supply dealing with the import programme. This officer was charged with directing the Ministry of War Transport as to shipping negotiations with other departments and governments regarding production overseas and imports from overseas; and the revision of instructions to be sent to the British Raw Materials Mission. It was agreed that he should be instructed by the Minister of Production, through the Raw Materials Supply Division. The Minister's officers dealing with raw materials were at the same time to have such access to controllers and to the Raw Materials Department of the Ministry of Supply as they might find necessary to fulfil their functions.

The outline of the most important functions of the office of the Minister of Production has now been plotted with one single exception. When the Regional Boards were last under discussion the Citrine Committee had just presented its report.¹ The fate of the boards was still being debated at the time when Mr Lyttelton became Minister of Production. It will be remembered that the committee, while approving of the increasing use that was being made of the boards, had suggested that the exploitation of capacity left much to

¹ See pp. 421-422.

be desired and had touched on the dissatisfaction felt by the non-official members of the boards with their position.

But the report was not of course limited to complaints; it put forward a considerable body of recommendations. The committee was well enough convinced of the value of an efficient area organisation, and the assumption seemed to be implicit that a clear demarcation of authority might be all that was required to give efficiency. First of all, the context in which the boards functioned should be strengthened. The chronic weakness of the boards had been their ignorance. It was recommended that supply departments should keep their Regional Controllers, and through them the boards, well informed of the placing of contracts and of the general level of work. The boards would themselves give advice on the creation of new capacity and the substantial extension of existing capacity. The second step was to strengthen the organisation and the powers of the boards themselves. The main instrument by which this was to be achieved was through the appointment of full-time Regional Directors of Production in each region as the representative of the Minister of Production. The old question of division of authority was to be solved by entrusting the Regional Director with powers of concerting and supervising the activities of the Regional Controllers of the supply departments, acting as chairmen of the boards and with power to determine, after discussion with the executive committees or the boards and within the framework laid down centrally, all disputed questions affecting the local allocation of machine tools, premises and raw materials. Equivalent powers over labour were to be shared with the Regional Controller of the Ministry of Labour. To facilitate this sharing of powers, the regional offices of the supply departments were to be housed in the same building as the Regional Director of Production.

The Regional Director and the boards were to be given new powers over firms, powers of entry and inspection of undertakings, and of advising on the local aspects of all schemes for the creation of new capacity or substantial extensions of existing capacity. The boards were also to be given new powers with regard to questions affecting production brought to their notice by joint production committees or by trade unions or employers' organisations, other than matters normally handled by the joint organisations of employers and trade unions in connection with wages and conditions of employment. Thus the complaints that had been made of the lack of use that was being made of the Joint Consultative Committee were really answered by giving the Regional Director of Production a tighter grip on the entire direction of affairs. The work of the boards themselves was to be directed by an executive committee under the chairmanship of the Regional Director of Production.

The third important recommendation referred to capacity. To

utilise capacity most efficiently the boards were to set up district offices in which were to be merged the previous capacity clearing centres and also the independent organisations for capacity-finding established by the supply departments. Records of capacity and load were to be built up and maintained and an obligation laid on all firms in the engineering and allied industries to provide information as to contracts and unused capacity. A 'danger list' was to be the basis for preventing the placing of further orders with firms which were overloaded or in danger of becoming so.

Subject to what may be considered as certain concessions to the supply departments the recommendations of the Citrine Committee were accepted by the Government.¹ The concessions were that the title of Regional Director of Production was to be replaced by Regional Controller (Ministry of Production) and instead of 'concerting and supervising' he was to be charged with the task of 'co-ordinating' the activities of the Regional Controllers of the supply departments. Nor was this change of nomenclature an empty gesture. The new powers over industry that the Citrine Committee had wished to vest in the Regional Directors, such as the compilation of 'danger list', was to reside in the boards themselves. Certain matters were to be referred back to headquarters. Thus headquarters retained the right to forbid firms to accept further contracts. Nor was the organisation dealing with machine tool utilisation to be merged in the regional organisation as recommended by the committee but was to be available to the regional boards as a common service. In conformity with this policy of referring important questions back to headquarters, the Minister of Production set up the Central Co-ordinating Committee with supply department representatives under a member of his own department as chairman with the task of advising him on board matters of policy and co-ordinating action on administrative problems. It soon proved itself to be an indispensable piece of machinery. Its members had had considerable experience in regional matters, were quick to reflect the special points of view of their departments, and by virtue of their being a headquarters committee, could constitute an administrative link for obtaining really important departmental action. The task of reorganising the boards according to the recommendations of the Citrine Committee really devolved upon them.²

By 30th June the new full-time chairmen of the Regional Boards had been selected and their appointment announced in Parliament.³

¹ The committee reported on 1st May 1942. Its report was issued on 19th May with a covering memorandum by the Minister of Supply in which (with the concurrence of his supply colleagues) he accepted its main recommendations. Cmd 6360.

² Their first meeting was held on 2nd June.

³ H. of C. Deb., 58, Vol. 381, Col. 36, 30th June 1942.

One or two full-time deputy controllers were appointed later. The projected strengthening of the boards took place—their secretaries were raised in status and renamed assistant controllers. The executive committees, which, as we have seen, were to direct the work of the boards, were set up under the chairmanship of the Regional Director of Production. A vigorous and interesting attempt was made to deal with the capacity question. A system was introduced whereby visits were made to firms and returns completed by regional officers, in order to build up and maintain records of capacity and load by firms in each district. Obviously a prerequisite of the system was a complete and adequate record of available capacity, against which the current state of load as determined from the information supplied by the visits and otherwise would be recorded. The Ministry therefore decided to install a uniform system of records throughout the country covering in the first instance the engineering and allied industries. This project was duly carried out, and the available capacity of each area was thus clearly charted. But the value of the system depended on the use made of it. A start was made in the publicity field by giving it a clear exposition in the *Production and Engineering Bulletin* for November 1942. The process of educating contractors and departments to resort first to the system before deciding where to place their orders could not be an immediate one. Nor, of course, could the system of itself provide materials to advise on fundamental problems of the satisfactory location of industry, as we shall see later. But at least a system had been provided which within its known limitation was to last for the rest of the war.

(iii)

American Affairs

We have now surveyed the setting up of the Ministry of Production and its early months up to about the end of July 1942. It had had a spectacular début and had damped the fervour of potentially hostile critics by the modesty of the role which it set out to play. It had contrived to avoid an open collision with the authority of the supply ministers. It had clarified and invigorated the Regional Boards and within a few months had provided the organisational framework for a true rationalisation of capacity. As far as the Industrial Division was concerned it had not found its feet by July, but at least one important project had emerged—the production general staff under the name of the Joint War Production Staff. A review of American affairs will reveal the significance of the activities of this body. On his

entry into office the Minister of Production had been charged with directing the work of the British representatives on the combined bodies set up in Britain and in the United States to provide for the most effective utilisation of the joint resources of the United Nations in munitions and raw materials. In January 1942, following upon the Prime Minister's visit to the President in December, there was set up the Combined Munitions Assignment Board and the Combined Raw Materials Board. Two other combined boards were set up later in June 1942—the Combined Food Board and the Combined Production and Resources Board, the latter consisting of Mr Donald Nelson, who was in control of the War Production Board, and Mr Lyttelton.

It would be out of place here to deal with the great political events which led up to the combined total planning of British and American resources. They are fully dealt with elsewhere.¹ Suffice it to mention the so-called 'Purvis balance sheet', prepared during November and December of 1940, the first attempt to put on a single piece of paper for the information of the Americans a programme of the requirements in America of all three British Services, which played its part in the Lend-Lease appropriations; the Anglo-American consolidated statement compiled in July and August 1941, which aimed at setting down in one statement the munitions programmes of the United Kingdom and North America, which, while it was prepared in order to stimulate American production (and still more, American Lend-Lease aid) to the measure of British needs, constituted also an indispensable datum for the estimation and the planning of combined requirements if ever such a project should be contemplated; the formulation of the Victory Programme during the Beaverbrook-Harriman conference in September 1941—an estimate of the total quantities of weapons required at a given date, March 1943, in order to beat the enemy; these were landmarks in the process of combined total planning.

The system of combined bodies was, as we have said, born of the Prime Minister's visit to America in December 1941. He returned home impressed with the conception of such a role as was occupied by Mr Donald Nelson and the desirability of appointing, as chief of British war production, a minister who could negotiate with Mr Nelson authoritatively, and as an opposite number, over the whole field of the British Service requirements. Such a minister would be responsible also for the conduct of business by the British representatives on the combined boards dealing with assignments of munitions and with raw materials. There was a clear need not only for creating a satisfactory symmetry in the official representation of the two countries, but for seeing that British representatives on the combined

¹ See Duncan Hall and Wrigley: *Studies of Overseas Supply*, *op. cit.*

boards possessed knowledge and authority sufficient to match that of their American counterparts.

The Combined Munitions Assignment Board then was established in January 1942 by a directive of the combined Chiefs of Staff. It consisted of six British and American Service members. Its duties were first of all to maintain full information on the entire munitions resources of Great Britain and the United States and to translate such resources into combat forces and their material reserves. The combined Chiefs of Staff were to be kept informed of all developments. A parallel organisation, the London Munitions Assignment Board, was set up in London. The theory of assignment was that the entire production of Britain and the United States was pooled and divided among the United Nations in accordance with strategic needs. It was contemplated that the production of other countries, for example Canada and India, would by stages be included in the pooling. Practical considerations dictated the system of two parallel boards and it was found convenient to group the claimant countries and services, some forty in number, and the assignable production into two groups, one managed by the Washington Board and one by the London Board. The Washington Board made a block 'assignment' to the London Board in respect of countries included in the British group and received a block assignment from the London Board for the American group. Each board then 'allocated' among the countries for which it was responsible the balance of the production controlled by it plus the assignment received. British and American aid to Russia within the limits of available transportation facilities was dealt with separately by a special protocol.

The system of assignment boards as a whole introduced an essential element of order into the relations of the United Nations and, in respect of munitions, answered very well. There were nevertheless various points which, in the early stages, attracted criticism. We may note two. In the first place the operations of the boards were limited to assignable stores and therefore British requirements of non-common type weapons and still more of components for the production of weapons in the United Kingdom were in an anomalous position. Indeed this question of common types and components formed one of the main items on Mr Lyttelton's agenda on the occasion of his first visit to Washington. The second criticism was aimed at the planning horizon of the Combined Munitions Assignment Board. The chairman at the second meeting of the board emphasised the intention of dealing 'both with immediate emergency and with long-term planning'. The munitions situation early in 1942 was felt by the United States Services as one of acute shortage, and major elements in the situation, especially the ultimate extension to be given to the American armed forces, had to remain unsettled.

Hence the establishment of month-by-month assignments with a horizon of two months beyond that. Nor was it until December 1942 during Mr Lyttelton's second visit that the first major step towards long-term planning was undertaken, namely the agreement as regards aircraft and ground munitions. These were points of criticism, more or less specific; it was also perhaps disappointing that the planning side did not develop as largely as might have been expected from the terms of its directive, i.e. the adjustment of requirements and resources to give the maximum furtherance to strategic aims, although the statistical side took a decisive initiative in the establishment under the authority of the Combined Munitions Assignment Board and Mr Nelson, of a single set of American output figures and forecasts of production which, combined with the British figures, provided the sole authoritative datum for assignments and planning.

When all this is said, however, the value of the Combined Munitions Assignment Board in the allocation of United States production (including reference to the Canadian production) can hardly be exaggerated. Although assignments were generally agreed between British Service representatives and their opposite numbers in the American Service departments, and although therefore the Board was not an arbiter of policy, it provided a forum for discussion, and an indispensable instrument for deciding differences and where necessary for approaching the combined Chiefs of Staff for the strategic directions needed for making decisions.

The natural complement of deeming munitions to be in a common pool was to establish some joint control of raw materials, and we have already seen that a Combined Raw Materials Board was also set up in January 1942. Its terms of reference were wide—to plan the best and speediest development, expansion and use of the raw materials resources under the jurisdiction or control of the British Government or the United States Government, and to make the recommendations necessary to execute such plans; and to work with others of the United Nations for the best utilisation of their raw material resources. Wide, and perhaps somewhat too wide, for since there were other bodies all rather loosely connected also dealing with raw materials, the functions and procedure of the board remained obscure. They finally established themselves, however, as the bringing under authoritative review of the combined supply and requirements position for materials necessary to the combined war effort which were in short or precarious supply. Its practical recommendations applied to allocations, controls, production and utilisation, and in carrying out these duties the board proved to be an efficient piece of machinery.

The Combined Shipping Adjustment Board was a part of the same system. Just as munitions and raw materials were to be pooled, so were shipping resources. The London Board consisted of the Minister

of War Transport and the head of the United States Mission in London, or their deputies. On the Washington Board the Minister of War Transport was represented by a deputy, who acted in conjunction with a representative of the United States.

A step that was to have more immediate consequences for the Minister of Production resulted from the presidential directive early in 1942 for a review of programmes for the armed services. Mr Nelson forthwith invited His Majesty's Government, through the British Supply Council, to put forward a review of British requirements on the United States of America for certain critical items of materials, and suggested a comparison of the two countries' programmes for 1942 and 1943 'so as to obtain the best possible utilisation of our joint resources and at the same time make certain that we are meeting combined strategic needs'. The programmes staff of the British Supply Council proceeded to collaborate with the Statistical and Planning Division of the War Production Board in the task of putting together the British and American programmes and testing them for feasibility in relation to some fourteen critical materials and certain alleged choke-points.

This consultation brought to light some disturbing facts. The British forecasts of production were, on the whole, realistic, but the American programmes, partly cranked up to meet the President's objectives, considerably outstripped production possibilities. A consequence of these unrealistic programmes was a lack of balance between the output of finished weapons and the components programmes. Lack of balance between long-term investment and current production was another serious general defect in the American economic programme.

Such was the situation when Mr Lyttelton became the Minister of Production. His duties, as we have seen above, consisted at this time in directing the negotiations of the Combined Boards and seeing that they were supplied with information. Later on, in the second quarter of 1942, the control of the appointment of the chairman of the British Supply Council, and the functions of the Council were also vested in Mr Lyttelton. Under the Minister of Production it was the Joint War Production Staff which was given the duty of considering whether the planned programmes could be fulfilled and what changes were necessary. It was to consider special adjustments or priorities for the 1942 summer campaign, and to negotiate a long-term understanding on production with the United States. Its first task was to investigate the limitations set by labour, raw materials, plant and shipping. These requirements were based on the 'Victory Programmes' of September 1941, modified by the Russian protocol. But the situation had been radically changed by the Japanese war and the J.W.P.S. accordingly invited the Chiefs of Staff to lay down, in a new directive,

as a basis for this study, an assessment of the forces to be equipped and maintained by the British Government in all theatres of war to meet the strategical requirements for spring 1943, and the peak figures for victory. This request was complied with as far as related to April 1943 and the area of British strategic responsibility.

The J.W.P.S. made its first report on 30th May in the form of a 'Memorandum on Resources in relation to the Fulfilment of the War Programmes and the Policy required to meet the Present Situation', a document produced primarily as a background to Mr Lyttelton's proposed visit to Washington. This paper marked a real turning point in the official notions about the relations between strategy, war industry and manpower, for it contained the first comprehensive argument about the inevitable readjustments of combatant strength and industrial efforts. With it, Britain may be said at one step to have entered upon the global planning of production resources. It began by comparing the British programmes with the resources available for their fulfilment, in the light of the effect of recent strategical decisions. The salient fact was that between the first quarter of 1942 and the fourth quarter of 1943 the munitions production of the United Kingdom had to be increased by 60 per cent. (this total figure concealing a 100 per cent. increase on the air side). The machine tool situation was now generally comfortable, though there might be specific shortages and any reduction in American supplies might be a serious matter. Labour supplies would be tight but this would not be an insuperable problem. The real problem was the difficulty in securing raw materials and this, as far as Britain was concerned was mainly a shipping problem. Indeed, if the shipping position did not improve it was expected to be down to rock bottom by mid-1943. All these difficulties were aggravated by the new strategic plans. The paper consequently went on to review the field in which integration of British and American programmes was necessary. More concretely it disclosed the necessity for the transfer to the military sector of the United Kingdom economy of a larger proportion of total resources; for definite long-term arrangements with the United States; and a search for economies within the military sector. Its realistic tenor was maintained in its recognition of a critical period extending say to 30th June 1943 in which drastic measures should be taken to bring arms output to a maximum even at the cost of drawing on stocks and pursuing policies which would be harmful if long maintained.

Britain had some peculiar grievances. These were mainly concerned with the fact that British requirements for non-common type weapons and components were not included in the presidential directive of 8th June given to the Army and Navy Munitions Board whereby they were to select from the Services programmes material

completing the equipment of a task force of one million men to be ready at the end of March 1943 and to give this the requisite priority. British civilian requirements, as might be expected, suffered even more from the effects of this directive despite Mr Nelson's conviction that top priority for some types of civilian supply was an essential condition of munitions production.

Mr Lyttelton's visit to America, to discuss the priorities question and the points for and against the solution by a combined production authority, to discuss these moreover with an authoritative voice, was obligatory. He was, in fact, fulfilling the *raison d'être* of the Ministry of Production.

CHAPTER XXI

THE MINISTRY OF PRODUCTION:

1942-43

(i)

Organs of Interdepartmental Co-ordination

THE FLEDGLING PERIOD of the Minister of Production's office may be said to have finished by the time—June 1942—that Mr Lyttelton paid his first visit to Washington. Pre-occupation with constitutional responsibilities and limitations, experiments with forms of organisation, deliberations as to whether certain positions were best filled by industrialists or civil servants, were now to give place to the determination of the Ministry's activities by the main trend of national events. From now on, the Ministry's history was to be a direct reflection of Britain's general economic problems. These offered, in June 1942, an aspect singularly disheartening. British economy was indeed at this date upon the rack. The curve of war expenditure expressed as a percentage of national income had flattened out in what was in effect a maximum by the beginning of the year. The intervening six months, with a loss of over $4\frac{1}{2}$ million gross tons available to the United Nations, had been disastrous for shipping. The loss of twenty-two out of a convoy of thirty-three merchant ships which sailed for the White Sea ports in that month threw into prominence the economic strain of supplies for Russia. Manpower problems generally were severe and perhaps seemed even worse because their dimensions had not yet been accurately measured. The naval construction programme was gravely in arrears. There was a coal crisis brewing. The War Cabinet was considering bread rationing.¹

We shall see how the Ministry of Production was shaped by these problems and by the part which it played in surmounting them. Even so there was still one intractable problem which, because it in fact contained the essence of the difficulty about the Minister's constitutional role, remained in being under the semblance of an 'organisational' difficulty. This was the question of the Ministry of Production's direct authority in industrial matters.

The advent in August of the new Secretary of what was now the

¹ See Hancock and Gowing: *British War Economy*, *op. cit.*, pp. 360-361, 369 (table), 414, 440, 426, 467.

Ministry of Production however brought a new determination to grapple with the problems of creating a suitable organisation for giving effect to this. The theory gained currency in the Ministry that any conflict with the supply departments might be bypassed if their ministers would agree to the exercise of Mr Lyttelton's powers 'in commission' by the supply departments and the Ministry of Production. The practical expression of this view was the proposal to form an organisation which would be a kind of equivalent, in the industrial sphere, of the Joint War Planning Staff and its Planning Group in the sphere of planning. In the proposed new organisation however it was the Joint Industrial Staff which was to be the opposite number of the Planning Group, while it was the Joint Production Council (afterwards Committee) which worked on the higher level of the Joint War Planning Staff. The Joint Industrial Staff was to consist of an industrialist of high standing with a 'brains trust' of several technical assistants and contingents seconded for full time or part time by the three supply departments. The composition of the proposed new council differed radically from the earlier proposals for a production council. In the first place the membership was limited strictly to the representatives of the three supply departments and the Ministry of Production, the Ministry of Labour being excluded on the ground that the function of the council was to bring the supply executives together to take decisions in common about their proper business. Secondly, the head of the Joint Industrial Staff was to be a member of the council, but—the point was emphasised—not its chairman. To stiffen the authority of the council, a senior minister was at first thought to be essential for the role of chairman and at one point the idea of a ministerial chairman other than Mr Lyttelton himself seemed to be favoured. Indeed Mr Lyttelton actually suggested the name of the Minister of Food, but it was thought that public confidence might not sustain this duality of positions. Finally all thought of a ministerial chairman was dropped in favour of an independent chairman with outstanding industrial qualifications.

The plan had conceived the functions of the Joint Industrial Staff on an ambitious scale. They were to include, first, the examination of sundry technical problems such as changeover in production, equalisation of load, efficiency methods, phasing and so forth; and secondly the collation of programmes as approved by the Joint War Production Staff and progress reports from the supply departments so as to present 'an overall progress picture'. It will be observed that both these functions impinged on the work of the Joint War Production Staff, but in dealing with this complex and delicate problem the organisers of the Ministry of Production hardly expected to achieve a plan so clear and free from overlapping as to win the approval of an administrative purist.

Within the department itself enthusiastic support was accorded to the idea of developing the functions of the Minister in the technical production sphere, but a certain uneasiness was felt about the creation of a new body for this purpose. Could not a section of the Joint War Production Staff be hived off for the purpose of discussing, with the Minister's representative, certain technical production matters? The question was asked, and the advantages of an affirmative answer demonstrated. Such a group could easily use for its purposes the supply officers attached to the Joint War Production Planning Group with the addition of technicians and the Programmes Division of the Ministry. The new group thus formed might be given the task of advising and directing the new 'Five-Man Board' which was then being set up.¹ So profitable an association might secure for the new group an easy lead in questions of economy and labour which it would then only have to retain. In the end it was this modified plan which was officially accepted.

This acceptance however was not gained until the middle of December, and in the meantime criticism of the functions of the new group had been gathering in the department. Members of the Regional Organisation Division were anxious to extend its authority and suggested that it should undertake on its own account the clearing of problems which came up from the regions. Although it was conceded that questions of principle were to be reserved formally for the Joint Industrial Staff, there would clearly be a departure from the ideal of a very high level survey of regional problems from the point of view of total production. Nor was there satisfaction in the department with the Secretary's assertion that the spheres of operations of the Joint Industrial Staff and the Industrial Division would not impinge.

It must be borne in mind that the fundamental principle was not disputed within the department itself—that to secure the best performance of the Minister's functions in the execution of production programmes some new form of organisation was needed, whether interdepartmental like the Joint Industrial Staff or departmental, taking the form, according to one proposal, of a progressing department and a labour department. There appeared to be an administrative gap which required filling. This theory of 'the gap' which had to be filled in one way or another was to play an important part eventually in producing some result from the negotiations. It is true that it was not accepted everywhere; even within the Ministry of Production there were some who considered the discussion unreal; if

¹ This was a new interdepartmental committee set up to pursue certain recommendations of the Joint War Production Staff for increasing war production. See later in this section.

there had really been a gap would not the supply departments be agitating about it? Yet they remained calm, and their calm at any rate gave colour to suggestions that 'the gap' was rather a theorists' nightmare than a real point of failure. The question within the department itself resolved itself into a discussion as to which organisation was best fitted to fill the gap. The Joint Industrial Staff, however, was to be an interdepartmental body and everything depended upon its acceptance by the supply departments.

These departments had originally regarded the plan benignly, but in the interval between the genesis of the plan and its acceptance by the Minister's Production Council their attitude had grown progressively cooler. The issue came to a head at a meeting on 13th November (while Mr Lyttelton was still in America), between the supply representatives and officials from the Ministry of Production. Discussion took place on a note, prepared by the Ministry of Production's representatives, which set out the theory of the gap and the alternatives for closing it—first, the Joint Production Council with a reduced version of the Joint Industrial Staff and, secondly, the development in the Ministry of Production of a Labour Efficiency Department and a Progress Report Centre. At this meeting the issue was fairly joined on how far the Ministry of Production was entitled to supervise the execution of production programmes, and it emerged that the supply departments were not prepared to concede any right of interference or to entertain any common organisation for control of the processes intervening between the approval of requirements and the output of material. Indeed they denied the existence of the gap as an interdepartmental phenomenon and made a pointed comment to the effect that if such a gap existed in the Ministry of Production, the remedy lay in Mr Lyttelton's own hands. They would concede no case for a Joint Industrial Staff and although *ad hoc* meetings were admitted to be advantageous, they displayed impatience at the idea of regular meetings between the chief executives. This meeting killed the project of a Joint Industrial Staff, although it remained formally *sub judice*. It left as a residue an unopposed project for a Progress Report Centre within the Ministry, and those concerned were most anxious to initiate both this and the Labour Division. A proposal was also made for a third body drawing its information from the various divisions within the Ministry of Production, with the task of reviewing the production possibilities in relation to the requirements, the adequacy of the steps taken to meet such requirements, and the results of the arrangements made to fulfil them. This body itself, as proposed, was somewhat elaborate, since it was to consist both of executive and non-executive members.

It was not only in the discussions about the Joint Industrial Staff that the question of the gap emerged. The practical day-to-day work

of the department frequently engendered suspicions about its existence. Sir Ernest Lemon, for instance, was uneasy on this score, but considered that planning on the factory floor and phasing of production were the real means of getting to grips with the problem. But it transpired that access to the production plans of the supply departments and their first-hand progress reports, and to the factories and the factory managements, was not to be had for the asking. All that the Progress Division could supply to further the ends of Sir Ernest Lemon were figures throwing up cases of lack of balance and failure in performance, based on disclosed discrepancies between production forecasts and actual output. This in turn confirmed the initial suspicion that something more in the way of organisation was needed.

Meanwhile the whole issue had been laid before the Minister. On 7th December he was advised that the choice lay between the modified Joint Industrial Staff propounded at the meeting on 13th November or the establishment of a strong progressing department within the Ministry of Production. If the second alternative were adopted it was proposed that the head of the Progressing Department should be styled the Minister's Chief Adviser on Production Progress. At the same time it was thought that the independent chairman of the Chief Executives Committee¹ should be appointed to act as the Minister's Industrial Adviser in a consultant capacity. This would permit the appointment to the position of Chief Adviser on Production Progress of an officer who would work full time and be directly concerned with detailed control. In fact, an industrialist might be made available to the Minister as Industrial Adviser in a consultant capacity.

But in fact the project for a Joint Industrial Staff was dead, and at a meeting of the Minister's Production Council on the 15th December appointments were made to the post of Industrial Adviser to the Ministry of Production and the control of the new Progressing Department. The new Progress Division was, in fact, set up in January 1943. A chief assistant of principal assistant secretary rank was posted to this division and later two or three technical assistants. Its functions were conceived of as advisory rather than executive—the comparison of requirements, programmes and actual output; the elucidation of queries on such matters as shortfall, surplus, lack of balance in related items and so forth. It was to keep Mr Lyttelton well acquainted with all developments.

So much for this particular attempt to close the gap. Meanwhile, of course, the Production Division had been settling down to its job. A summary of its work up till April 1943 would reveal that the principle of the autonomy of the supply departments was still unchallenged. There was still no direct participation in their work and

¹ See later in this section.

the scope of the new organisations within the Ministry of Production was conditioned by this premise.

To answer the question how far the Production Division was acquiring a solid knowledge of facts about industry we must look at the work of the Regional Organisation Division.¹ It may fairly be said that the work of this division brought the Ministry into fairly close touch with the actual production arrangements of the supply ministries. Moreover, the revision of programmes (mainly Ministry of Supply programmes) in the first quarter of 1943, in which the J.W.P.S. took a steering part, brought the Ministry into fairly close touch with the actual production arrangements of the supply ministries. Thus—if perhaps in comparatively unexpected ways—the department's concrete knowledge of production tended to improve.

The work of the Joint War Production Staff and what Sir Robert Sinclair later called its 'mainspring', the Programmes and Planning Division, was indeed vital in the history of the Ministry of Production. The role of the Programmes and Planning Division had come under consideration in the spring of 1943, when it had been suggested that it had three main functions. There was, first, the adjustment, from the central position which they occupied, of the production programmes for the three Services. Secondly the Division should decide the policy where allocations were at stake. For example they should guide the Raw Materials Department of the Ministry of Supply. Similarly—so it was argued—with labour. The Ministry of Labour could not possibly know enough of the Service programmes to be able to judge the importance of the various claims. The Programme Division of the Ministry of Production should therefore work hand in glove with the Director General of Manpower in the Ministry of Labour. The need for tact on the part of the Ministry of Production was—as usual—emphasised. As usual too the reference to tact meant that the Ministry of Production, or individuals within it, were thinking of their real power and its sources. The control of raw material appeared as one of those sources: 'The lever by which the Minister of Production will operate upon the supply departments', as one individual wrote.

The shape foreshadowed in these spring discussions for the Programmes and Planning Division was in fact very closely the shape which it assumed. To analyse the departments' requirements in the—rather chilly—light of a wide knowledge of the whole economic situation; to co-ordinate these programmes and keep them in harmony with Government policy; and to feed the J.W.P.S. with the information which it needed to operate—these were the tasks. They were exceedingly important tasks lying at the heart of the central function of the Ministry of Production.

¹ Described in Section (ii) of this chapter.

It may be recalled that, in one of the pre-war debates about the proposal to found a Ministry of Supply, Mr Churchill had remarked that in the next war it would be supply which dictated strategy. It may be said therefore that the Joint War Production Staff, in making both their original global study of resources presented in May 1942¹ and their later study dealing with 1943 production which they presented in September 1942, were approximating very closely to the military function which was implicit in their name. The study outlined the difficulties inherent in the 1943 production programme, and drew attention to the limits set by the approaching absorption of available resources. These were likely to affect raw materials and to be most serious in manpower. The J.W.P.S. had conceived measures to deal with shortages, consisting of a much greater economy in the use of manpower and raw materials, the placing of as many orders as was practicable in overseas countries, especially in Canada, and an attempt to secure agreement with the United States on a combined production programme and on the long-range assignment of finished munitions. It so happened that the Minister of Labour was at this time making a manpower survey and the J.W.P.S. urged that this survey should take into account the decisions reached in the combined planning of production, making full allowance for all the economies they had themselves recommended. This allocation was to determine the ceiling of manpower for the munitions industries and thus to lead to a decision on the final scale of the Services.

These recommendations were promptly adopted by the War Cabinet in the same month. This brings us to the Munitions, Management and Labour Efficiency Committee, known originally as the 'Five Man Board', which Mr Lyttelton now planned to set up to deal with certain issues arising from these manpower problems. Mr Lyttelton had already proposed to the War Cabinet that a board of five persons representing the three supply departments together with a representative of the Ministry of Production should be set up to carry out, in collaboration with the appropriate authorities, the recommendations of the J.W.P.S. Its task would be to employ the most drastic steps to get the best results from labour in the munitions industries including the greater utilisation of existing manufacturing facilities. The name 'Five Man Board' did not meet with approval and was discarded in favour of Mr Bevin's 'Munitions, Management, and Labour Efficiency Committee'. The choice of representatives and chairman was not an easy business, but at last, on 16th December 1942, the committee was actually set up. By the 31st March, it had held three meetings, the first of which considered procedure and the second and third the reports of the Industrial Panel on the case of a particular firm. No other business had been considered by the

¹ See p. 455.

committee but the Ministry of Labour (in accordance with an understanding reached at an official level in November) had submitted a memorandum with suggestions for a programme of work.

The Five Man Board, the Progress Division, even the Industrial Division and the Joint War Production Staff—all these were not merely new bodies under the ægis of the Ministry of Production. They were, or were intended to be, new *kinds* of bodies, undertaking roles in the administration of British war production which, before their creation, had largely gone unfilled. Such new creations, however, were not the only measures which the Ministry of Production took to secure co-ordination. When, in June 1943, Sir Robert Sinclair returned from Washington—where he had been head of the British Supply Mission—his great experience in the Army and Supply Councils was brought into the Ministry of Production as Chief Executive. At the same time Mr J. H. Woods of the Board of Trade became Permanent Secretary in succession to Sir Henry Self and the occasion was taken of carrying through what proved to be the final reorganisation of the Ministry of Production.

Under this reorganisation the Progress Division disappeared, and the Ministry was divided into eight pieces—three divisions under the Secretary and five under Sir Robert Sinclair as Chief Executive. Sir Robert's five divisions were Programmes and Planning; Raw Materials and Priorities; Regional; Production; and Non-Munitions and Commonwealth Supplies.¹ The meetings with the chief officials of the supply departments, which had taken place, *ad hoc*, from the founding of the Ministry of Production, were now given an institutional basis as Chief Executives' meetings. These meetings, attended by the Controller of the Navy, the Controller General of the Ministry of Supply, the Chief Executive of M.A.P., the permanent secretaries of the Ministries of Labour, War Transport, and Fuel and Power, and the D.C.I.G.S., brought a strong concentration both of authority and of knowledge to bear on the problems that came before them. From the outset the meetings were much concerned with programme changes, and at the second meeting the chairman referred to the 'particular responsibility of the Minister of Production for arranging direct transfers between the Ministries of Supply and Aircraft Production'.

But the changes—the developments—which characterised the Sinclair-Woods régime were not only organisational. Attitudes also developed. Time, and the co-operative spirit of the supply departments, had brought a growth of confidence; and in the autumn of 1943 a document was circulated in the department under the signature of the Minister which suggested that the Ministry's accepted role

¹ A chart showing the organisation of the Ministry of Production in August 1943 will be found at Appendix IV B.

of co-ordinating the work of other departments involved a 'measure of both guidance and direction'. The new confidence however did not banish discretion or realism; the Minister was aware that 'co-ordination is not always readily appreciated by those whose work is co-ordinated'.

So the process of moulding the Ministry of Production to the shape of Britain's developing war economy continued. Work on departmental labour requirements in relation to programmes went on during October and November, and the ministerial discussions conducted by the Lord President resulted in the Prime Minister's Manpower Directive of 1st October, which fixed ceilings of manpower for each of the three Services and for the three supply departments. The fixing of labour ceilings involved in the case of the three supply departments an inevitable restriction of their plans, which could not but have momentous consequences. There had to be a readjustment of labour both as regards geographical distribution and the apportionment of different types of labour to particular establishments and production groups. The J.W.P.S., with general acceptance, presided over this grand programme-revision, employing a small working committee with strong contacts in the supply ministries and reporting on the position in February and again in April.

But even the prospect of labour stringency was less alarming than the prospect of a shortage of materials arising from scarcity of shipping. This seemed likely to be so severe that at the beginning of January the Prime Minister wrote a minute calling for a reduction in consumption of at least 350,000 tons per month in 1943. This problem was undertaken by the Joint War Production Staff through a sub-committee consisting of Sir Walter Layton and Lord Portal, which in its interim report in the same month budgeted for economies of 200,000 tons a month without reducing the impact on the enemy or causing a serious lack of balance between labour discharges and intake in the general revision which was taking place. It was through the regions that the Ministry made its main attack upon some of these problems.

(ii)

The Problems of Regional Organisation

The measures taken to implement the recommendations of the Citrine Report were discussed earlier in general outline. The new, regionally administered capacity register had just come into being. At its best the register could only be a source of information and it could not in itself settle the fundamental problems of location of industry. But it was precisely this kind of problem that was destined

to become really pressing in the second half of 1942, since the programmes of all three supply departments at that date were calculated to reach a peak in 1943 and all had planned to employ more labour. Although it was found possible subsequently to cut the total programme of the Ministry of Supply, the Admiralty and the Ministry of Aircraft Production professed themselves unable to abate their demands. In the case of both departments, but more particularly the M.A.P., these plans for the intake of labour could not help but affect regions already severely congested. The situation was further aggravated by the Prime Minister's Manpower Directive of October 1942. The new call-up and the programme readjustment began prospectively to affect the labour map for 1943, and the transfer of firms, key men and plant became urgent.

The Ministry of Production was naturally very much alive to these developments. It had already carried out a survey of the regions in July and August and had shown that the variation between regions in the ratio of load to capacity was very great and that questions of block transfer of key men and plant to places where there was existing factory space and available labour were bound to arise. The remedies suggested to relieve congestion implied a considerable extension of powers—namely control over intensification both of load and capacity at least in the worst areas, and powers to close or merge small firms including power to prohibit the setting-up of new small firms. It was with these powers that the new interdepartmental Location of Industry Committee was vested. This committee, with supply department representation, had as its chairman the Parliamentary Secretary of the Ministry of Production, and it worked closely with the regional boards both by handling recommendations from them and employing them in making surveys of towns in which congestion was severe. By the end of February it had designated eighteen areas in which extension of load was barred unless by approval of the committee. It had also laid down procedure for creating new capacity; for placing additional production load not involving the creation of new capacity, and for the transfer of undertakings from more to less congested areas. Its work, although considered to be on the whole successful, was hampered not only by the inherent difficulties of moving labour but also by the constant changing of production programmes. This was particularly true in the early part of 1943 when the revision of programmes which was under way raised new and more complicated problems of location and transfer. The main emphasis was the diversion of new projects to the more lightly loaded regions. The call-up, the reduction of production lines, the measure to secure transfers, e.g. between non-essential and essential industries, and between employment by the Ministry of Supply on the one hand and by M.A.P. and the Admiralty on the other, altered the labour

map once more. These changes raised more acutely the problem of transferring concerns from regions where the labour supply had become depleted to regions where immobile labour, either whole- or part-time, perhaps existed. This in turn raised questions of the provision of buildings (possibly new standard factories or new trading estates) to take advantage of the immobile labour. The transfer of labour from one area to another, though a simple-sounding issue, was in fact part of an extremely complex total situation. In these matters the principles and general procedure were the part of the Location of Industry Committee, and so attached, rather loosely, to the Ministry of Production. But operatively they were the concern of the supply departments in collaboration with the Ministry of Labour. Given these complications it is not surprising that the impression in the Ministry of Production in April 1943 was that volume of movement from heavily loaded into lightly loaded regions was below expectation. To improve matters the Minister introduced in his Council a scheme to close down inefficient firms, but it was feared that this would excite far too much political and public outcry to be successfully put into operation. Reliance had instead to be placed on such oblique methods as the strategic placing of contracts and by affording protection to efficient firms through the operation of the Essential Work Orders.

This sluggishness of transfer may have been partly due to the general ignorance of the existence and functions of the regional organisation, and to remedy this ignorance the Ministry—with the Ministry of Labour—produced a periodical known as the Production and Engineering Bulletin. The Minister also made a practice of visiting the regions to open new centres, and took the opportunity at the same time of visiting factories.

A feeling was abroad however that these measures were not reaching the roots of the problem. Were there inherent faults in the regional organisation? The matter was destined to come under discussion at the highest level in the February of 1943 and it will be as well to examine some of the foundations on which the organisation rested. First of all the regional controllers themselves. The most notable feature was perhaps the importance of the role now thrust upon them. The success of the boards in the larger problems on which they were expected to advise or warn or in some cases take action, depended on their collaboration, and of course on the information the Controllers themselves had contrived to obtain. Several problems were implicit in this. First of all, there was the relationship of the supply departments' regional controllers to the regional boards on the one hand and their own departments on the other. Formally this was simple enough. Besides playing their part as committee members in forming the views and decisions of the Executive Committee, their duties were to represent their departments' views to the

boards on the one hand and the local view to their department on the other. Nor was there in fact any disagreement as to this on the Regional Organisation Committee, where the Ministry of Supply representative observed that what the supply departments wanted from their controllers was tact in disagreement and not servile agreement on all points. Thus in fact as well as in form there was no basic difficulty in developing this aspect of the role for which the regional controllers were cast.

The question of information was far more stubborn. The difficulty lay as between the regional controller and his department, or more particularly, the production directorates thereof, since they were the main source of information. The kind of information to be supplied had already been formulated and agreed at an early stage of the proceedings of the Regional Organisation Committee, adopted by the supply departments and set out in a Regional Office Circular. But in fact the information did not come through at all in the way that had been envisaged. The regions reported in this sense as early as October to the Regional Organisation Division and the Regional Organisation Committee deliberated on the matter. Finally, in January 1943, collective representations to headquarters were made on the position of the regional boards by their chairmen.

This resulted in the Minister's bringing before his colleagues in Council some criticisms of the degree of efficiency in joint working which was being achieved by the regional organisation. The deficiencies were not at headquarters where the Regional Organisation Committee had established close co-operation, but emerged 'down the line' on the points which have been indicated. Deficiency of information was the sorest point. It was alleged that the headquarters directorates of the supply departments were not carrying out the procedure relating to the supply of information except in particular cases in which the regional controllers took the initiative and asked for it. The whole system was thus endangered.

The second point was a matter entirely within the competence of the individual supply departments. There was not, it was alleged, a sufficient devolution of executive authority to the regional controllers, a complaint which echoed the view of the Citrine Committee that the relationship between the regional representatives of the production directorates and the regional controllers was one of the major weaknesses in the system. The minutes of the Council suggest that the difficulty here did not lie in any anxiety that the supply ministers may have felt about their constitutional responsibilities. The ministers were genuinely concerned that the regional organisation should function effectively, and they in their turn suggested that the difficulties had arisen at a lower level, partly through the growth of the Minister of Production's regional technical staffs and their

penetration into matters which had formerly been peculiarly the province of the supply departments. Even so it was believed to be confusion rather than obstinacy which was the cause of the trouble. The question of the devolution of executive authority was finally remitted to the Regional Organisation Committee.

The use of Capacity Offices also came under fire. It was felt that departments were not using the Capacity Offices as freely as they should, although it was conceded that the Capacity Offices had only for a short time been in a position to handle enquiries effectively. The supply departments handed this problem also to the Regional Organisation Committee which finally reported that 'it is specially necessary to secure concerted action at the regional level on capacity, labour, and premises. . . . This consideration should guide the departments in their arrangements for transmitting information to their regional officers and for the regional handling of their business generally'.

Nevertheless by the end of March the difficulty with the regional controllers had still not been solved. Two remedies were proposed. The first provided for a thorough knowledge of the progress of individual firms to be available to the regions. The second suggested administrative measures in the supply departments which would bring all seconded production-directorate officers under the control of the appropriate supply department regional controllers for general administrative purposes instead of, as hitherto, merely for discipline. Neither of these proposals was accepted, the former not being even mentioned outside the Ministry of Production. The latter won the sympathetic hearing of the supply departments, but they came to the conclusion in the middle of March that 'no material increase in the devolution of authority to the regions would be practicable, without a fundamental change in the organisation of the supply ministries which had been built up on a foundation of centralised control'. This conclusion was not accepted without some bitterness. Indeed it was regarded as a defeat for the attitude adopted by the regional controllers and the National Production Advisory Council.

The body which now appears under this name has already been introduced under another, for it was the direct descendant of the Central Joint Advisory Committee, which, as we have already seen,¹ had failed, or had not been permitted, to realise its ambitions *vis-à-vis* the Production Executive. The Citrine Committee had accordingly been asked to examine its constitution and functions. The story has already been told of how the committee had been established by Mr Bevin as chairman of the Production Executive in July 1941 to

¹ See p. 421 *et seq.*

advise the Executive on general production difficulties and on matters relating to production arising from the proceedings of the regional boards and referred to it by the Executive. It held five meetings, but of some fifteen topics of major importance only two were initiated by the Government. This was a matter of regret to the Citrine Committee on the grounds that a properly constituted committee could play a valuable part in promoting the central community of interest of the three parties, the Government, the employers and the workpeople, in encouraging the maximum effort in the production of munitions. The Citrine Committee therefore recommended the reconstitution of the committee as the National Production Advisory Council, with the same terms of membership as its predecessor, but more broadly phrased. The Council consisted of eleven members, one from each of the regional boards, appointed by the Minister of Production from the vice chairmen of the boards; three representatives of the British Employers' Confederation, three representatives of the Federation of British Industries and six representatives of the Trades Union Congress, appointed by the Minister from nominations submitted by those bodies. The duties of the Council were to advise the Minister of general production questions (other than those which were normally handled by the joint organisations of trade unions and employers in connection with wages and conditions of employment), and on subjects concerning production that arose from the proceedings of the regional organisation.

In this matter the changes of nomenclature, and the different points which were raised from time to time, may give an appearance of complexity to what was basically a simple issue, just as the polite and optimistic official expressions which were employed glossed over a good deal of ill-feeling. The anxiety of the men in industry—and both sides were united in their anxiety—to make 'Whitehall' pay attention to their specialised or local knowledge was only equalled by the determination of the responsible officials and ministers to exercise an untrammelled authority in the exercise of their responsibilities. If for the word 'information' as it was employed in these discussions, the information about requirements and output and labour supply, there was substituted the word 'knowledge', and if it be accepted that here as elsewhere knowledge is power, then the real object of the struggle may be clearly seen. The task of the Minister of Production on the home front had indeed as one of its most important elements that of maintaining a balance of power—his own power, that of the supply departments as a whole, that of each supply department individually, that of 'Whitehall' and that of industry. We have seen how that balance of power on the home front stood in the spring of 1943. But the home front was not the only front; and now we must turn to the other.

(iii)

American Supplies and 'Total' Planning

We return once again to that momentous event in the history of the administration and organisation of war production—Mr Lyttelton's first visit to America in June 1942. The most important immediate result of this visit was the adjustment of the difficulties which had arisen in connection with the Presidential priorities directive of 8th June to which reference has been made in the preceding chapter. It will be recalled that this directive had been issued to the Army and Navy Munitions Board, charging them to select, from the Services programmes, material completing the equipment of a task force of 1,000,000 men to be ready at the end of March 1943, and to give this requisite priority. This directive would obviously have a profound effect upon British supply interests, and a vigorous attack upon the problems which it involved was launched by the Supply Mission, who made a complete list of outstanding requisitions on United States resources for weapons, equipment and stores of non-common type, that is, of types other than those under procurement in the Army Supply Programme for use by American forces, and parts and components required for British production. This was the first comprehensive review of such a kind which had been available in Washington and thus marks another step towards global planning. A small select list of items of paramount importance was extracted from this list and a directive was issued by the Combined Chiefs of Staff after discussion with the Combined Production and Resources Board enunciating the principle that the British-type weapons and components should be given the same priority as the corresponding American items. This, of course, was not a final list, and during the ensuing weeks a detailed review of the requisitions carried out by the American authorities in conjunction with the British Service delegations led to the revision of certain priority ratings.

The question of priorities was, of course, but part of the great task of concerting the resources and production of the two great allies, and it was the necessity of launching an attack along the whole length of the front that led to the setting up, by a joint directive from the President and the Prime Minister, of the Combined Production and Resources Board on 9th June 1942. The Board consisted originally of two men only, the supreme controllers of production in their respective countries, Mr Lyttelton and Mr Nelson. On 19th November Mr Howe, Canadian Minister of Munitions and Supply, was appointed as a third member.

The Board, according to its official terms of reference, was given

the task of combining the production programmes of the United States and the United Kingdom into a single integrated programme, adjusted to the strategic requirements of the war and to all relevant production factors. Organisationally it was a Washington agency with a London committee, staffed by a British and an American Chief Executive Officer and a British and American secretary. Its aim was, emphatically, to work as a unified organisation. Its staff was not elaborate. It did not, for example, employ any statisticians of its own, although a planning group had been set up for its purposes consisting of officers of the War Production Board and the British planning and statistical staff. The Board expanded as the need arose. At a later date, for example, when the question of non-munition supplies became of major importance, a principal assistant secretary was seconded from the Board of Trade.

Thus equipped with the widest terms of reference, and having in the forefront of its thought the decision of the President and the Prime Minister that there should be maximum impact upon the enemy in the spring of 1943, the Board, at its first meeting in June, invited the Combined Chiefs of Staff to prepare a detailed statement of arms and munitions required to be produced by 31st December 1942. At the same time they called for a review of critical raw materials. This review, apart from its immediate purpose, was also instrumental in leading to the exchange of steel missions. The Board also was able to give guidance to the Combined Munitions Assignment Board and the Combined Raw Materials Board, both of which in the beginning tended to refer to the Board for determination of certain cases where production and strategical considerations were concerned. This was to prove a useful function.

The attention of the Combined Production and Resources Board however, in the first few months of its existence, was focused mainly on requirements, based on the British side on an Order of Battle worked out by the Chiefs of Staff for April 1943, and newly reviewed about the middle of 1942 with regard to current figures of stocks and wastage. There was some discrepancy between the figures thus produced and the British requirements as registered in Washington through the supply missions, but the point was that this essential datum was available. Preparations were by no means so far advanced on the American side. Although it had been agreed in the course of General Marshall's visit to London in March that a Combined Order of Battle should be drawn up, and the British Order of Battle referred to had been quickly produced in response to this decision, it was many months later before the American equivalent was ready. The Americans were accordingly inclined to rely upon figures already set out in the Army supply programme. It was not until the end of October that a thorough revision of the American Army programmes

was put in hand by direction of the American Chiefs of Staff. The size of the Army and Air Force had by then been determined, but the underlying motive for the revision was the Presidential directive on the aircraft programmes necessitating substantial revisions in the existing Army supply programme. The effect of this as far as Britain was concerned was that certain reductions in British requirements on the United States were formulated in London for discussions by Mr Lyttelton in Washington in conjunction with an attempt to obtain long-period assignments covering 1943. This was all very well in its way, but the revision of the American requirements was not part of a combined study and no Combined Order of Battle had been drawn up. The ideal of establishing a relationship between such a Combined Order of Battle on the one hand and production possibilities on the other accordingly remained an ambition only.

This being so it was not unnatural that there should have been a certain re-orientation of the activities of the Combined Production and Resources Board. Its scope was envisaged as narrower than hitherto with more emphasis upon specific problems and co-ordinating functions. At the same time the Board's relations with the Combined Munitions Assignment Board were clarified, a procedure which was necessary in order to delimit the respective jurisdictions in respect of specific problems. It is clear also that a certain shift of balance had taken place as between the two bodies in respect of responsibility for the relation of requirements to strategic needs. The Combined Production and Resources Board had somewhat changed its ground. It had got farther away from a combined version of the position occupied by the Joint War Production Staff in Britain than might at one time have been hoped. But equally the Combined Munitions Assignment Board had not developed the J.W.P.S. function in the degree that its original plan of operation had foreshadowed.

Whether or not these boards fell short of the hopes that had been entertained for them it was at any rate certain that they would have important effects on those organs of British policy which had already been established in the United States. This was exemplified in the case of the chairmanship of the British Supply Council, a post which had recently fallen vacant. The control of this appointment and of the functions of the Council had been vested in Mr Lyttelton at some date in the second quarter of 1942, and when the question arose of his appointing a deputy to represent him on the Combined Production and Resources Board questions were raised which bore upon the relations between the supply missions and the system of combined boards in general.

A solution was devised of forming a standing committee of the heads of the missions concerned with supply with the addition of

three representatives of the Service delegations and M. Monnet. The object was to keep the Combined Production and Resources Board informed about the general progress made in the obtaining and shipment of the supplies for Britain and to consider regularly any major questions of policy which ought to come within the ambit of that body. This committee, known as the British War Supplies Committee, met regularly from August onwards. Joint secretaries were appointed from the British Supply Council and the British Staff Mission, and a regular system of progress returns was instituted. An alternative solution to the problem of the Supply Council chairmanship had been considered, namely, doubling the office of the Minister's deputy on the Combined Production and Resources Board and the chairmanship of the British Supply Council. Since this idea was rejected it is of no great interest in itself, but it is worth noting as a *ballon d'essai* for the idea of a Minister Resident for Supply in Washington, a project that was soon to come into prominence.¹

Mr Lyttelton had meanwhile incurred other obligations with regard to the United States. The distinction observed throughout this narrative between matters affecting home production and American affairs is nowhere more difficult to maintain than in dealing with the circumstances which gave birth to the Non-Munitions Supply Division. In a memorandum which appeared in July 1942 Mr Lyttelton refused to accept as valid any longer the distinction between war and civil production. Industries known as civil had now, he considered, been cut so far that further contraction would be likely to cause harm to the war effort. In many cases the Services and the civil population required the same article, so that the requirements of one could not be catered for without taking into consideration those of the other. The most obvious example of this was textiles. It was just as important to assure materials, capacity and labour to the textile and similar industries as to those industries producing military supplies.

These arguments constituted the Minister's reasons for setting up a Non-Munitions Supply Division. Pressure for such a division, or less exactly, for an agency to present a programme of British civil requirements, had also been exerted by America since about the middle of 1941, so that these requirements might be fitted into the American production situation. It was indeed perfectly clear that with total war the planning of non-munitions supplies was essential. Machine tools and agricultural machinery in particular were items where the need for examination of programmes was felt at an early stage. Upon America's entry into the war the forcible contraction of

¹ For a full account see Duncan Hall and Wrigley: *Studies of Overseas Supply*, *op. cit.*

American civilian supplies to accommodate increased war production pointed with yet greater urgency to the necessity of co-ordinating 'Defence Aid' with domestic supply.

As we have seen, the decision on supply, in every case where there was a question of limitation of allocation, lay after December 1941 with machinery set up by Mr Nelson. The final arbiter was the American Requirements Committee, an associated body of the Combined Raw Materials Board, to which the British and Commonwealth authorities had direct access. The Combined Raw Materials Board moved at an early date for an extension of planning to cover essential civilian requirements, but it was not until October that a Civilian Supply Committee of the Combined Production and Resources Board was set up. An under secretary of the Ministry seconded from the Board of Trade was posted to assist Sir Robert Sinclair in Washington in the Combined Production and Resources Board on non-munitions requirements at about that date.

The Non-Munitions Supply Division of the Ministry of Production was the administrative manifestation in London of all this activity. The new division was to keep itself informed of military and essential civilian requirements from the non-munitions industries and to initiate any necessary interdepartmental action. Like the Joint War Production Staff in another field, it was to serve as a focus for placing requests for American assistance, and to collect the information required for planning that part of the combined production programme of the Combined Production and Resources Board which was devoted to non-munitions requirements. It was also to collect relevant information for the Combined Boards. The task of finding out the requirements of the other United Nations and of neutrals for the products of the non-munitions industries was entrusted to the Empire Clearing House, the Non-Munitions Supply Division collating such information. There was of course no intention that the new division should duplicate work already being done by any other departments such as the Ministry of Supply or Board of Trade. Its work was confined to co-ordination. Nor was the whole field on non-munitions supplies to be covered at once. Textiles and clothing were the most urgent consideration but others were to be included as occasion required. Raw materials and foodstuffs were to remain permanently outside its purview.

These were the main functions of the new division and it made a quick beginning upon its task, both the parts of it which were wholly new and the parts taken over from existing bodies. Thus among its first activities was the picking up of the requirements for certain stores, possessing both a civilian and a military complexion, which were being handled by the Assignments Boards in Washington and London. An Engineers Stores Assignments Sub-Committee of the

London Munitions Assignment Board was set up and held its first meeting on 10th August.

The arrangements for raw materials were carried out as planned. In November 1942 the Empire Clearing House extended its machinery to include munitions and non-munitions requirements. The Commonwealth Supply Council was accordingly set up which itself formed three committees dealing with raw materials, munitions, and non-munitions. No problem arose on the work of the Raw Materials Committee of the Commonwealth Supply Council, which continued as it had done under the style of the Empire Clearing House. A strong case was made by Sir Walter Layton for the idea that the Munitions Committee when it met should meet substantially in joint session with the Joint War Production Staff. This was agreed and the first meeting took place in April 1943.

The Non-Munitions Committee of the Commonwealth Supply Council was not destined to have so smooth a passage. On its first meeting on 26th November 1942, it decided to concentrate on twelve critical products, the combined Commonwealth and British domestic requirements of which were to be presented to Washington. The centralising in London of Commonwealth requirements other than weapons and raw materials gave rise to diverse problems. On what might be called the political side the Commonwealth Governments were apt to believe that through their own missions in Washington they could obtain larger quantities of supplies from the Americans. On the more technical side of supply there were questions of duplication and loss of time, not entirely answered in Commonwealth eyes by any procedure of sending requirements simultaneously to London and to Washington. Washington of course favoured a single source of demands, for convenience, but above all to avoid competition between the Commonwealth countries. Another question to be settled was the part of the total requirements of the Commonwealth which should be supplied from the United Kingdom (or the rest of the Commonwealth) and the part which should be supplied from the United States, and in the earlier stages at least the Commonwealth missions presented in Washington their total requirements without any precise indication of what the division between American and other sources of supply would be, an indication of course that it was not in their power to give. In some cases the supply which the Americans were prepared to grant of a particular article was below total Commonwealth requirements and the quantities were allotted in Washington by a committee under Sir Louis Beale.

Apart from this question of Commonwealth machinery the difficulties encountered by the Non-Munitions Supply Division came under two heads. The first was the obtaining of accurate estimates, especially for a year or eighteen months ahead, of requirements of

the United Kingdom and of the portion which would be supplied from home production. Secondly, they had under their terms of reference to satisfy the requests for information of the American authorities (and in the last resort the operative divisions of the War Production Board) in the form desired by them. These difficulties were not to be radically dealt with until the appointment of Colonel Llewellyn as Minister Resident for Supply in Washington. We must accordingly return to our central theme.

The pressure of his obligations in the United States was such that Mr Lyttelton was obliged to pay a second visit to Washington in November 1942.¹ The main purpose of this visit was to obtain agreement on assignments to the United Kingdom during 1943 of the major items of military equipment. This was essential for carrying out the final allocation of British manpower resources as between the Services, supply, and civilian departments in accordance with the Prime Minister's Manpower Directive of 1st October, a directive that had necessitated a thorough revision of British production programmes. Discussion of a number of difficult outstanding questions was involved in reaching these agreements, including the American shipbuilding programme, the programme for escort vessels, several major questions on the aircraft programmes, and the combined utilisation of shipping and raw materials. These negotiations were rapid, businesslike and successful, and they settled, at least in principle, the allocations for the year 1943.²

The great importance and wide range of all these negotiations served to confirm in their opinion the advocates of the proposal for a Minister Resident for Supply in Washington. Such a Minister, it was thought, was required to represent H.M. Government in the whole range of economic problems and particularly supply problems. He would have to have control of the British organisations dealing with such matters and would in that capacity work in collaboration with the Ambassador whom he would relieve of direct responsibility in the supply field. This project was increasingly prominent during the early months of 1942 owing to the dominating importance and wide extension which economic problems had assumed and the difficulty of the Ambassador's doubling the roles at the highest level of political and economic plenipotentiary. The loose organisation of the supply boards also called for ministerial co-ordination at the top. In principle the British Supply Council was, so to speak, the federal organ of the supply missions and its chairman was their representative—subject to the authority of the Ambassador—with the highest

¹ See Duncan Hall: *North American Supply*, *op. cit.*, and Duncan Hall and Wrigley: *Studies in Overseas Supply*, *op. cit.*

² H. of C. Deb., Vol. 335, Col. 1916, 16th December 1942.

United States authorities. The Supply Council included most of—but not at all times all—the heads of missions, as well as representatives of the British Service delegations, the Treasury representative, and a permanent member without portfolio. But except as arising out of its control of the general negotiations for lend-lease assistance it had no means of control over the missions, and no effective right of supervising their organisation or—again except as regards lend-lease procedure in the most general way—their conduct of business.

The satisfactory working of this system had, in fact, depended greatly on the outstanding character of the chairman. The authority of the Council tended to vary according to the circumstances, chief of which was the force of personalities within and outside its own ranks. The question at issue was whether these difficulties would be solved by the appointment of a resident minister. The post was an unusual and highly responsible one, calling for a combination of qualities and experience which was not easy to come by, and this difficulty, combined with lingering doubts about the value of such an appointment at all, retarded a decision until late in the year. In the interval some of the problems solved themselves. The co-ordination of the supply missions was in a large measure accomplished by the setting up of the British War Supplies Committee. The development of the system of combined boards—including particularly in this context the Combined Food Board and the extension of the work of the Combined Production and Resources Board in the direction of combined planning of essential civilian supplies—tended in the second half of 1942 to reduce the economic problems if not to a simpler, at least to a more manageable form. The idea of integrating in some way the work of the British representatives on the combined boards continued to be a subject of discussion in connection with the British Supply Council.

Meanwhile the Cabinet changes in England at the end of the year made available the services of Colonel Llewellyn, at the time Minister of Aircraft Production, and previously—in addition to other appointments—closely concerned with the building up of the priority and materials allocation systems in England. This opportunity was taken to crystallise the project of a Minister Resident in Washington for Supply.

Colonel Llewellyn was accordingly appointed to this position, and given the status of a Minister of the Crown although, since his duties were to act as Mr Lyttelton's deputy in the United States, he reported to the War Cabinet through the Minister of Production. He was to become the Chairman of the British Supply Council and to see that action was taken on all Anglo-American economic and supply problems not covered by existing machinery. It was his responsibility to consider questions of policy or procedure arising out

of the work of the civilian combined boards or committees established in Washington. He was to keep in touch with the Ambassador and Field-Marshal Sir John Dill so that the civilian activities of the British representatives in Washington might be properly co-ordinated with the work of the chief political and military representatives of the Crown. His role however was a delicate one—so delicate that the decision to make the appointment at all came in the end as a surprise, despite all the discussion there had been of such a possibility. The autonomy of the various British supply missions had by this time been endowed with a kind of almost constitutional inviolability, and it is perhaps doubtful whether, but for the Cabinet shuffle in Britain, the appointment would ever have been made. Colonel Llewellyn's experience as a supply minister however, besides providing him with the authority of experience, had involved a good deal of arbitration work in connection with priorities, and he was accordingly not unaccustomed to the kind of role which he was now called upon to play.

Colonel Llewellyn took up his duties in January 1943. Before this chapter closes, a foretaste may be given of the kind of problem that engaged his attention in connection with the Non-Munitions Supply Division. In February 1943, Colonel Llewellyn in Washington set up a Principal Commonwealth Supply Committee to co-ordinate action in Washington and to establish direct contact with the Commonwealth Supply Council in London. The system was exhibiting the signs of weakness that we have described above. The principle that a joint 'screening' of Commonwealth requirements should take place in London was finding even less favour with all the Commonwealth governments, notably Australia. Programming had been established for part only of the range of commodities and the formal machinery, for example the kind of information to be given and problems of coding and definition, was still somewhat unsettled. Moreover production planning in the United States was lagging, quite apart from the screening and acceptance of programmes. What was perhaps of more importance, the entire question of trade policy had again come into view. With both nations in the war, lend-lease (not forgetting reciprocal lend-lease) had been eclipsed by the principle of entire pooling of resources. A tendency therefore which developed on the American side in combined planning to limit production in the United Kingdom to its domestic requirements and allocated to the American economy the whole of any export trade to the non-Axis world could no longer be regarded as reasonable. It was no longer fair, in the British view, that the United Kingdom should have to devote all its resources to the war whereas America had the liberty to devote part of its resources to the war, and the other part to exports in contravention of British interests. It seemed more reasonable to

argue that, where no special factor such as the release of manpower or factories for other purposes, or shipping considerations arose, exports from one country or the other should be roughly based on pre-war export trades. It was these issues which were under discussion in April 1943 by the Board of Trade, the Treasury and the Bank of England. They were not directly the concern of the Ministry of Production at all, but they served to accentuate such elements of friction as already existed in the machine.

But all this is anticipating. The appointment of Colonel Llewellyn as Minister Resident in Washington coincided with a new phase in the administration of American supplies, and thus in the history of the administration of war production as a whole. For one of the effects of the American entry into the war, as has been indicated, was to give cohesion and reality to the British planning. Thus in our account of Anglo-American relations and the part played in them by Mr Lyttelton we have had occasion to notice that British data were always ready to hand and usually comprehensive. The credit of this belongs to the Joint War Production Staff, and if Mr Lyttelton and the Combined Boards were able to speak with knowledge and authority it was due in no small measure to the material provided by the Joint War Production Staff in their first study. Thus American supplies and American planning began to be integrated with British, and the Ministry of Production began to play the role which had been laid down for it with increasing ease and certainty. The Ministry as a whole, like the organs which composed it, was at the beginning of 1943, entering into maturity.

CHAPTER XXII

THE LAST PHASE

(i)

Dealing with the Manpower Famine

MR LYTTTELTON's visit, the appointment of Colonel Llewellyn as Minister Resident for Supply in Washington, and the system of combined boards had, in the spring of 1943, disposed of the most serious administrative problems of co-ordinating Anglo-American supplies. They had also, by disclosing the limits of the resources, served to introduce a certain change of attitude at home. There had always existed, among those responsible for supplies, a temptation to behave as though there were no limit to the size of the supply cake, and to pretend that the slice taken by one's own department would somehow not affect the amount that was left. So long as the size of the cake had been unknown, the tendency was both natural and healthy. When the limits were clearly seen it ceased to be either, and the Ministry of Production, in its role of co-ordinator and arbitrator, then appeared in a more acceptable light. In the supply departments at any rate the initial uneasiness and suspicion very largely passed away.

These departments were now anxious that the things which the Ministry of Production had demonstrated that it could do well, it ought to go on doing, and even do more thoroughly. Within the Ministry itself there was a tendency for emphasis to be shifted to making the existing organs of the Ministry work so well that the supply departments would hasten to avail themselves of its services. There were two spheres in which the Ministry of Production had firmly established itself by its own achievements. First, and of supreme importance, was that of global planning. It was the J.W.P.S. which had first grasped the need to relate the demands of the Services for manpower to the demands of the production programmes needed to support them in the light of the forecasts of shortages of manpower and raw materials, and had been entrusted with the guidance of programmes revision following the Prime Minister's manpower directive of October 1942. The importance of this contribution to the administration of British war production can hardly be overestimated. The other sphere was that of regional organisation, which was structurally sound, enjoyed the goodwill of the supply ministers and

was really the only Ministry of Production agency capable of taking part in supervising production at close range. Moreover the newly-created Location of Industry Committee was vested with very wide powers. Our concern now is to see how this administrative machinery responded to the stresses it had to bear in the next two years, and a necessary prelude to such an undertaking is a glance at Britain's economic position in 1943.

It goes without saying that the outlook was bleak. It is true that certain outstanding problems had been solved as the national industrial machine was eased into top gear. Generally speaking capacity had by this time ceased to be the limiting factor in industrial expansion, especially as the British effort was now being supplemented by machine tools and plant which were coming in from America. Not of course that all capacity problems were solved. Certain local ones remained, and these, as we shall see later, were peculiarly to affect the aircraft production programme. The raw materials position was disheartening. In November 1942 Mr Lyttelton had taken a letter to the President asking for a 27-million-ton import programme for 1943, but America's own demands were rapidly rising and the measure had not yet been taken of the U-boats. It had already seemed probable in 1942 that it would not be until the second half of 1943 that America could greatly increase her shipping assistance. In the first few months of 1943 the position deteriorated. By the end of March stocks of imported raw materials were only 1½ million tons above the essential minimum required for distribution and it was held unofficially in the Ministry of Production that it would not be possible to import during 1943 more than 11 million tons of raw materials. Relief came in May when a great victory was scored over the U-boats and with the further relief in prospect from the vast American shipbuilding effort, it could be seen that the raw materials problem, though serious, was not to be decisive.

Manpower was a different matter. We have seen that, in 1942, the J.W.P.S. forecast a famine, and that forecast was proving grimly true. The civilian goods industries, particularly since the arrival in Britain of the American forces, could be compressed no further. In any case the manpower famine could not be dealt with in terms of numbers alone. The complications of modern warfare called more and more for specialised training and highly developed skills. Moreover two-thirds of the estimated total deficiency of more than one million arose in the armed forces which could not accept the proportions of older men or of women which industry could accept. The manpower famine was thus the dominating feature of the whole economic situation, and in an even more marked fashion the dominating feature of war production. It was by the way in which it dealt with this problem that the Ministry of Production and its

associated machinery were to be judged. In general terms the solution of the problem was not difficult to see. Indeed it presented itself inescapably: it was to obtain more finished goods from America and to scale down the programme at home.

These concerns impinged on the Minister of Production by virtue of his constitutional authority over allocations and by the right acquired by the Joint War Production Staff to supervise programme conversions. When the Prime Minister wrote his minute of 26th December asking for a reduction in consumption of imported materials to an extent of at least 300,000 tons a month in the early part of 1943 it was the Minister of Production who set in motion the preparation of a general survey within the departments through the machinery of the J.W.P.S., which duly reported that cuts in imports could be carried out successfully if the munitions programmes were revised and lower building programmes accepted. Revision of programmes indeed, whether owing to cuts in raw materials or to the manpower famine, showed the value of the J.W.P.S. They had already been entrusted with the task of revising the Order of Battle for 1st April 1944. They now suggested that a group of representatives from the Ministry of Production itself and the supply departments should work out the hypothetical effects on their programmes of the cuts entailed by the manpower decisions of the War Cabinet. By 21st of June this information was ready and it transpired that the Ministry of Aircraft Production alone was unable to reduce its demands. It had been more keenly affected than the other ministries by local shortages of manpower and lack of certain kinds of key-men, and it declared that it could not reduce its requirements below 212,000 men; and that if it did the heavy bomber programme would suffer severely. Mr Lyttelton was by no means satisfied with this verdict, and it was in the J.W.P.S. that the case was argued. The result was not, on this occasion, an agreement, but reference to the War Cabinet. What the J.W.P.S. had carried out, however, was the service expected of any subordinate agency—that of presenting a clear, well-documented issue for decision, and this service it had certainly carried out to the full. The War Cabinet's decision was that the redistribution of manpower was to be carried out in such a way that if supply up to the end of 1943 proved insufficient to meet all requirements the deficit should not fall on M.A.P.

This discussion had two important consequences. The first was general and indirect, in that the new programmes threw further responsibilities on the regions. The second was specific; it was in fact the calling in question of the effectiveness of the existing allocation system as a whole. That it had served its purpose admirably in the past was admitted, but the deficiency of resources, and above all of manpower, now involved planning and control of a most detailed

and relentless nature, and it was questioned whether the system of the block allocations of resources for departments to do as they liked with was a sufficiently subtle instrument.

The system as it had now been developed depended essentially upon the interdepartmental body known as the Headquarters Preference Committee. This body drew up lists of vacancies in vital industries or services which must have first claim on labour supplies. There was also an optional system in the regions of second or regional preferences.¹ The Headquarters Preference Committee still continued to function but there was now brought into being a revised system under which lists of items of first importance—that is aircraft production items and others held to rank equally—were submitted to the Ministry of Production by the various departments. Those agreed by the Ministry were then 'designated'. The Ministry of Production devoted a good deal of attention to this machinery, and set up a working party to consider the most equitable means of dealing with the various applications for super-preference coming before the Headquarters Preference Committee. The result was the appointment of one representative to the committee as the Ministry's plenipotentiary.

The actual power of the Ministry of Production in the Headquarters Preference Committee, as in so many other fields, was defined by practice rather than on paper. Extensive and grandiose 'paper' powers would have been a greater embarrassment than assistance. Arrangements had been made, however, in that the Ministry had prepared in July 1943, a paper defining the area outside which no firm would qualify for super-preference. Inside this area the Ministry of Labour agreed that the recommendations of the Ministry of Production's representative at the Headquarters Preference Committee as to whether an undertaking should receive super-preference would be final so far as it was concerned; if the representatives of other departments questioned these recommendations, the matter might have to be settled at an *ad hoc* meeting of the interested departments. The Minister of Aircraft Production objected to this, on the formal grounds that the terms of reference of the Headquarters Preference Committee provided that its decision as to the firms to be granted super-preference should be final. The Ministry of Production however pursued the point and it was finally decided that the admission of an undertaking to the ordinary Headquarters list remained the responsibility of the Headquarters Preference Committee operating as it had done in the past, but that overriding preference would not be accorded in respect of any undertaking so admitted without the permission of the Minister of Production.

¹ See Hancock and Gowing: *British War Economy, op. cit.*, Chapter XV, 'Manpower Budgeting'.

Much responsibility fell to the working party, which reduced the applications for super-preference to about one-third and gave detailed reasons for their refusals. In some cases the applicant firm was told to make its own internal arrangements for providing the labour for its designated product. In others the working party recommended an investigation of the industry as a whole. They were suspicious of requests from departments for super-preference for all the firms engaged in a particular industry—the Admiralty's request for torpedoes was an instance of this—and asked for further information. By the beginning of 1943 something between one-quarter and one-third of all munitions production was designated, and by the end of the year the system was giving perhaps as much satisfaction as could be expected. In the nature of things no system of allocation could hope to be very popular. Departments such as the Ministry of Supply which had virtuously scaled down their requirements as they had been requested to do, continued to dislike the priorities within the allocation system made necessary by the tautness of the economy, and above all the overriding priority given to the aircraft production programme. They considered that the system of the designated list offered scant protection against this priority, and still in fact hankered after the unalloyed allocation system.

But events were running against any return to it. Earlier in the war there had been a straightforward issue between quantity and quality, but now the concept of quality was itself complicated. Preparations for 'Overlord' involved the attempt to get a perfect balance of our striking forces and enhanced the urgency of a limited number of types of special equipment, which had to be delivered by a particular date. Moreover the chief objection to the Designated List system was removed when at the very beginning of 1944 the general overriding preference to aircraft production was withdrawn and the list was revised so as to include the most important items in the aircraft programme on the same footing as all the other urgent products and services. At the same time notice was taken of the criticisms of the Ministry of Aircraft Production that the list was too long and too broadly classified. The list was shortened, and the system of first and second preferences was made uniform. First preferences were granted only by the Headquarters Preference Committee and the granting of all second preferences was delegated to the regions. The first list was now in two parts—long-term items and those which presented an immediate problem which could be solved by designation for a limited period. Moreover the complete list was now revised at intervals of about two months.

Within the regions the operations were carried out with a good deal of discretion, so as to prevent particular firms from acquiring—and acting upon—an inflated sense of the importance of their

products. As we have seen supply departments had to apply to the Ministry of Production for designation of products and of all services connected directly with production. Application for designation of other services, for example essential civilian services, had to be made to the Ministry of Labour. Designation was thus a joint responsibility of the Minister of Production and the Minister of Labour and was granted only after the departments had agreed. A list of designated products and services was issued by the Ministry of Production and sent from time to time to all departments concerned and to the senior regional officers of departments represented on regional boards. Designation of a product entitled the department concerned with its production to apply where necessary, and when all other means had failed, for first preference in the supply of labour. When first preference for the supply of labour to an undertaking had been granted, that undertaking appeared on the headquarters preference list which had a similar circulation to the list of designated products. It was then the responsibility of the regional offices of the Ministry of Labour to communicate to the employment exchange particulars of headquarters preference vacancies approved in the area of that exchange only. Thus exchange managers did not see the whole list of designated products nor the whole list of first preference undertakings. Nor was any individual undertaking told that its product was designated.

The development of the system of the Designated List greatly increased the responsibility and authority of the regional organisation. The strain on headquarters staff of dealing with hundreds of applications made it inevitable that much of the work should sooner or later be delegated. A question of 'designating' the employment of bus conductresses was, as it happened, the final demonstration of the importance of local knowledge in all the labour problems that lay at the periphery of munitions production, and finally led to the delegation to regional officers of the Ministries of Labour, War Transport and Production of the responsibility of recommending first preference where necessary. In November 1943 Regional Preference Committees were established and to them was left the responsibility for according preference to the whole wide field of non-designated products and services. It was further laid down that first preference in respect of designated products would not normally be granted unless these local committees had certified that possibilities of internal reorganisation had been explored and that second preference had been given a reasonable trial without success. Later the grant of first preference for road transport vacancies was handed over to these committees.

Mr Lyttelton had already in December 1942 taken some steps to prepare the regions for the burdens about to be laid on them. They

were to be provided with all the information they needed. As the Minister observed, even if all changes were made with the least possible friction and waste, even if all manpower released was quickly absorbed and there was no large problem of idle capacity, public opinion—and more particularly public opinion in industry—was still likely to be critical of the mere fact of changes of programme. For this reason the National Production Advisory Council was to be given a full explanation of the reasons for the changes. Similarly the regions were to be provided with general information as to programme policy and the manpower problem from its headquarters as well as its regional aspects. The regional controllers of all departments, including the Ministries of Production and of Labour, were to consult together to see how best to make clear to those concerned how their own piece of the jigsaw puzzle fitted into the great picture of Britain's production effort. Officially, at least, the days of Whitehall secretiveness were over. Conversely the headquarters of the Ministry of Production were to be informed of all capacity changes that occurred. In consonance with this tendency proposals involving the cutting down of production by particular firms were, whenever possible, to be discussed regionally between officers of the three supply departments, the Ministries of Production and Labour so that all might present a common front in explaining these actions to recalcitrant firms. It was clearly hoped that by vesting the regional controllers with more authority any parochial trend of thought would be discouraged. It was made quite clear to them that there was no special regional claim to labour set free in their region. This was to be regarded as part of the general pool for allocation to meet national and not purely regional needs. Much then had been done, particularly in the way of smoothing out the old grievance about lack of information, to help the regions to play the larger part which they were now called upon to play in organising war production. The J.W.P.S. had indicated how heavy this task would be. It had been estimated that 42 per cent. of the recent labour requirements fell in zones which included the most difficult labour areas, the so-called 'scarlet' areas, and the Minister of Supply further pointed out that his department was left with very little choice in selecting areas in which further reductions could be made. Formerly, he pointed out, it had been possible to make programme cuts fall predominantly in difficult labour areas, but it now seemed likely that a large proportion of the new cuts would fall in easier labour areas where the manpower released was not likely to be eligible for the Services or for transfer. In view of all these factors the importance of decentralisation to the regions was stressed by the J.W.P.S. A large part of the field, particularly sub-contracting and the finding of new capacity, could not be covered by headquarters planning. It was thought that

the regions would be particularly useful in bringing about local readjustments so that large contractors would unload work by sub-contract rather than seek additional labour within their own works. It was also decided that wherever practicable the regions were to be given an opportunity to comment before final decisions were made on cuts involving block transfers or factory switches.

The Minister himself took action on these points. In a memorandum to the J.W.P.S. he asked for guidance to be given to the regional controllers about local difficulties in determining priorities for labour supply. He also pressed the Admiralty and the Ministry of Supply for a list of top priority requirements which could be sent to the regional controllers.

That headquarters confidence in the regional organisation was justified was shown when headquarters sought information from the regions. A notable occasion occurred in 1943, when the Ministry of Production sent out a questionnaire to the regional controllers. The questions were sharply realistic. Had the programme changes been carried out without special difficulty and so as to achieve a better balance over the region as a whole? Were small pockets of unemployment forming and were programme changes leaving unused capacity to an important extent? Could all the firms asking for large quantities of labour actually absorb them or were they failing to take into account the effect on their requirements of rising production efficiency? In fact, how reliable were labour forecasts? These were questions that the regional controllers could take in their stride. They had at their disposal a mass of information provided by the controllers of the other supply departments and of the Ministry of Labour. Their replies were, accordingly, exact, comprehensive and illuminating. They were not, in content, wholly satisfactory, but from the organisational point of view they demonstrated that in its regional organisation the Ministry of Production now possessed an instrument capable of ascertaining, recording, and when necessary advising on all the minute fluctuations on which Britain's ability to surmount the manpower famine so greatly depended.

On the main question of the accuracy of the labour forecasts the regional controllers reported that the requirements of additional labour as given by firms in the first instance were usually over-stated and the process of 'vetting' by consultation between the Ministry of Labour and the supply department concerned normally led to reductions of the order of 15 to 25 per cent. and that even then these secondary estimates were themselves often inflated. Statements of immediate requirements were of considerable value but statements of long-term demand were little more than indicative of trends. One region had given particular attention to the problem and had prepared figures showing over a period the very considerable extent

to which the additional labour actually supplied had fallen short of the stated requirements. On the other hand there were practically no well-authenticated cases in which production was being vitally affected by the shortage of labour. Nevertheless there were many firms with rising programmes whose demands would have to be met to an extent not possible from the region's own resources and this report suggested that importation on a much increased scale would be necessary to meet these demands. The effect of rising productivity, unfortunately, was not likely to ease the labour demand but to induce firms to take on more production. On one important point the controllers were able to give an opinion which—since the employment exchanges saw only displaced workpeople—was of particular interest and value; they reported that the workpeople affected had accepted the changes with understanding and goodwill.

These developments in the higher administration or central control of war production during the year 1943 were not spectacular. They attracted very little attention from outside the ranks of those who, in the departments or in industry, were directly concerned. Only a few people were so placed as to be able to see the wood rather than the trees. If we look at the whole activity of running British war production, in Whitehall, the regions, and the factories, the planning activities of the J.W.P.S. were an esoteric activity, and the supreme importance of the figures which they produced in giving a clear picture of the global supply position was appreciated only by ministers and by a small number of the most highly-placed advisers, officials, and serving officers. The activities of the regional organisation were another matter. They affected everybody, from the chief executives of the supply departments to the bus conductresses whose case has already been mentioned. To production officers and personnel managers intent upon the production of a particular item, they were, if sometimes helpful, frequently a nuisance. Yet there is evidence that they were accepted as being on the whole necessary and equitable. More than this, there is evidence, less tangible but impressive, that during 1943 the production machinery, not only central but also departmental, had at last run itself in, and that a very larger number of those concerned realised that this was happening. Impediments had been knocked away, anomalies corrected, instruments devised; hard the job might be, but the production authorities had got the tools for it. It was well that this was so, for the last great test was at hand.

(ii)

‘Overlord’

In a sense the preparations for the invasion of Europe, which were carried out under the historic code name of ‘Overlord’, were only an extension and climax of the effort of the preceding years. It was for this that the Army had been provided with its tanks, artillery and infantry weapons; the ultimate if not the initial aim of the whole bomber production programme was one of ‘softening-up’ for invasion; the programme of escort vessels, even, was a means of protecting the shipping which enabled these preparations to go on. Production had in this sense been organised for invasion from the time of Pearl Harbour; the more recent organisational devices such as designation were specifically intended to give the supply machine the sensitivity and speed of action which the supreme effort demanded. There were of course important programmes of special items and spectacular projects—it is with the organisation which lay behind the production of these that we are now to be concerned—but in production and the organisation of production the specialised features of ‘Overlord’ were only an excrescence on the existing body. Since attention is now to be turned upon the excrescence it is well to bear its proportions in mind.

The organisation of supplies for ‘Overlord’ first began to appear as an interdepartmental problem in December 1943 when the Admiralty submitted to the Labour Co-ordinating Committee a memorandum pointing out that the preparations for invasion might require the supply of labour more quickly for certain purposes than it could be provided by the normal preference machinery. The point was taken up by the Ministry of Supply, which suggested that certain items might be so important that dates should be assigned to them by which the labour required must at all costs be provided. This idea gained general approval and at a meeting held at the Ministry of Production it was agreed that certain items on the Designated List should receive this treatment. It was further agreed that to qualify for it items must be of particular importance and urgency in connection with ‘Overlord’, and must be in need of rescue from the danger of serious labour shortage. When the Ministry of Supply submitted the items which they wished to receive this ‘Overlord’ treatment, they divided their list into two classes, A and B, the former containing those items which required or would soon require additional labour, and the latter those items which did not require additional labour but could not afford to lose any of their existing labour. This distinction was retained and applied

generally by the Ministry of Production, who found it valuable.

These were the initial departmental arrangements. In January the high-level moves were made. In that month the War Cabinet set up an 'Overlord' Preparations Committee under Mr Churchill's chairmanship, and also approved a proposal made jointly by the Ministers of Labour and Production that they should act together in examining special requirements of materials, equipment, and labour, making plans to meet them, and deciding in detail how any further needs should be met as and when they arose. A few days later Mr Lyttelton reported on these matters to the Defence Committee (Supply). He emphasised that normal items of equipment were catered for by the normal machinery, and said that lists of items requiring special treatment would be prepared. A suggestion for something in the nature of super-designation was discussed, but turned down when Mr Lyttelton said that he believed that 'Overlord' items could get on without it. He had in fact, in December 1943, agreed with the Ministry of Labour upon three grades of preference—'bottleneck' for emergencies, first preference, and second preference—and it was improbable that the existing system could endure further refinements. On the other hand there were some areas where labour was now so scarce that no degree of priority of allocation could produce it. It was therefore realised that two distinct kinds of action were necessary—a general acceleration of the application of first preference to these special items, and the adoption of emergency measures in the worst labour areas. Having obtained the agreement of his colleagues to these methods, the Minister of Production settled to his task with the knowledge that the 'Overlord' Preparations Committee was ready to act as an arbiter in cases of dispute either about the items which were to receive special treatment or about the nature of the special treatment to be given to them.

The Ministry of Production took action accordingly. Much of what was done was done through the regional organisation, whose part in these affairs will be referred to separately. First preference procedure was duly accelerated, and the emergency measure mainly relied upon was the direct and immediate transfer of labour from less important work to the special items. This, it was thought, would not present difficulties as an emergency measure where only one department was involved; where more than one was involved the call for help was to be made by the Regional Controller of the Ministry of Labour in conjunction with the Regional Controller of the Ministry of Production. Labour released in response to such a call did not of course pass through the pool; it was sent directly from the sacrificing to the gaining department.

Meanwhile the lists of special equipment were being compiled, and by February the measure of the situation had been taken. Each

department had listed a number of items. On the Admiralty list were the Bombardon,¹ landing craft, and the conversion both of naval and of merchant ships. The Ministry of Supply was concerned about some of the components of the Mulberry harbour, about equipment for sweeping mines on land, about certain classes of ammunition, and about the latest types of tank which were just going into production. The Air Ministry list included some aircraft equipment, with special reference to radar, and some armament and other items. Of the items and services not directly operational railway transport was the most important. The lists were thus gratifyingly short, and short as they were they were composed of items which it was thought would need special efforts to keep them up to programme and not of items of which a serious deficiency was feared. Very few of what might be called directly operational items caused anxiety, the main exception being the Air Force 8-lb. bomb.

If there was some relief in the Ministry of Production about the comparatively small field for which special treatment was sought, it was soon replaced by concern about the adequacy of the special treatment itself. By March there was anxiety about List A. Time was too short before 'Overlord' was launched to allow much to be done; would it not be wise therefore to place severe restrictions on List A? Transport more than anything else was destroying the effectiveness both of List A and of designation. There was a suspicion in the Ministry of Production that the Ministry of Labour was proposing to use List A more and more to implement the total manpower allocation, and that it was accordingly being used as an undercover means of extending the 1943 M.A.P. priority into 1944. Whether this suspicion was in any way justified or not is immaterial to this history; as a suspicion it was among the factors which led the Ministry of Production to propose to the Ministry of Labour a limitation of List A. In reply the Ministry of Labour pointed out that the regional controllers were sending in fortnightly reports which included a statement of the rate at which vacancies were being filled in the most important individual firms to which the special arrangements were applicable. From these reports the position seemed satisfactory. In many cases the demand for labour had already been satisfied; in others good progress had been made and the demands were expected to be satisfied within a short time either by normal methods or by the special arrangements. There was not one case in which the Ministry of Labour regional controllers had suggested that there was going to be a failure to meet approved demands within a reasonable time. Also there was very good regional co-operation between the departments in dealing with this problem. At an interdepartmental meeting held on 23rd May to consider List A

¹ The outer breakwater for the Mulberry harbour.

procedure from this point of view it was agreed that the list should continue in being, but that it should be confined to quantities required for delivery within three months of date of application, and that the inclusion of items in it should be related to specific operations.

But already the 'Overlord' supply arrangements had come under fire from another quarter. The Ministry of Labour, in view of the disappointing yield of men for the Services, proposed, subject to certain safeguards, to improve the yield by calling up men engaged on designated work. This excited serious concern in the Ministry of Production and the supply departments, who were always anxious to combat the idea which they believed to be held in some quarters that their demands could be drastically reduced after D-Day. This was a separate issue and it was taken by the Minister of Production to the Defence Committee (Supply). He proposed that List A should be retained, that the Service departments should state their requirements under this special procedure and that these requirements should be added to List A and thereafter rank for first priority of labour. The definition to be employed by the Service departments would be that the stores were urgently required in the quantities stated within the next three months. Either at the end of that period or before the operational requirements were met, the store would be taken off List A unless special representations were made that it should continue there. List B should be dropped. Items might either be moved to List A if they qualified, or, if necessary, might be retained as part of the Designated List.

These recommendations were approved save for the dropping of List B. In fact, however, the crisis of 'Overlord' supplies was passing, and List B soon died a natural death from inanition. The emergency procedure as a whole had fulfilled the need for which it had been brought into being, and on 10th June 1944 the Ministry of Production, after consultation with the supply departments, arranged to replace the 'Overlord' priority list by a War Office urgency list, with effect from the end of the month. It might be said that the new list, which was to consist of items which were of operational importance, and which were in short supply, was only a perpetuation of the 'Overlord' list under a new name, and in fact perpetuated emergency procedure. The evidence is negative; from June 1944 onwards there were few expressions of concern or even of great interest in emergency procedure, and from this it may at least be said that it had come to be a matter of routine.

In the preparations which have just been described the regions had finally and fully come into their own. The operations involved a very high degree of specialised local knowledge. The finding of a firm which could carry out an order at a moment's notice, the strategic placing of a small group of workers, the thorough investigation of a

firm's capacity, these were all essentially local matters. The ability of the regions to carry out the special tasks of 'Overlord' were recognised in the additional powers that were given to them for the purpose. The year 1944 opened, as we have seen, with the confirmation of the powers of the regional controllers of the Ministry of Labour to grant second preference. At the time when it was decided to accelerate first preference and employ special measures, there was delegated to these controllers authority to grant provisional first preference for items on the special short list and they were instructed to carry out a survey procedure when it was found that other means of filling vital vacancies had proved inadequate. In specially difficult areas the regional controllers of the Ministries of Labour and Production had the right to enlist the help of other supply departments in releasing men for important work. The supply departments were also enjoined by the Ministry of Production to issue promptly to their own regional representatives lists of special items and to identify to these representatives the firms which were engaged in production of these items.

Much depended on supplying the regional representatives with all the information they could require. We have seen that this was an important issue, but the disadvantages of the wide dissemination of knowledge which now appeared were hardly important; they caused annoyance rather than anxiety. Firms were not told of the Designated List on the grounds that its composition changed from time to time, and that there were different classes of priority even within the general field of designated products which might give rise to confusion. Moreover it was thought that unscrupulous manufacturers might take advantage of the knowledge to redistribute among the jobs which they had in hand young employees who might otherwise be liable for military service. It was also thought that disclosure would lead to approaches to exchange managers by firms for labour on the grounds that their work was designated. But it was the essence of the regional organisation that it worked very closely with the firms, and it was very difficult to limit knowledge of this sort to the official side. Unauthorised disclosures occurred and an interesting consequence was noted by the Ministry of Production regional controllers, some of whom said that the growing use of Capacity Offices was largely attributable to the fact that a large number of sub-contractors were now very knowledgeable about designation and related machinery, and were unwilling to accept sub-contracts for work which did not carry designation and consequently protection for their labour force. The result was that main contractors who wanted to place sub-contracts for other work now frequently had to look elsewhere, and they therefore turned to the Capacity Offices.

Whether this explanation was correct or not, the administration by

the regional controllers of the Capacity Offices, Designated List and other machinery was sufficiently impressive to provoke, in January 1944, a suggestion that the regions should assume the powers of the Headquarters Preference Committee. It was suggested by the Ministry of Production representative on the working party of this committee that since the list of designated products was fairly closely defined and since the rule that 'internal switches' were to be tried before preference was granted was well understood, the work of the Headquarters Preference Committee had largely disappeared. The Regional Preference Committees seemed in his view to be working well, and since the grant of first preference for gas production, bus conductresses, wagon repair and railway operation was virtually done by them already, it was worth considering whether the grants of all first preferences could not be delegated to them. Arguments in favour of this move were frequently heard in the Ministry of Production. It was urged that the working party spent much time in the business of selection although it would have been natural for the regional organisation to carry out this task. It was the regional representatives on the spot who could decide if the firm really did need the labour it asked for and who could say if it was making a proper use of its existing force and had really tried the device of the 'internal switch'. It was the regional representatives of the Ministry of Labour who could best say whether or not labour was likely to become available in a district at a rate adequate to meet a demand. Given the Designated List and the list of products circulated as suitable for regional preference, the Regional Preference Committees were at least as well able to list demands for filling in order of priority as the Headquarters Committee.

No complete answer was put forward to these arguments, but their acceptance would clearly have involved a still greater delegation of powers by the supply departments, and for this these departments were not yet prepared. The Ministry of Supply representative at a meeting held under the ægis of the Ministry of Production said that it would not be possible for the Ministry of Supply to leave to its regional controllers discretion as to which classes of production should suffer withdrawals of labour. The programme had to be looked at as a whole and reference back to headquarters was essential. The most that headquarters were prepared to accept was a recommendation. The project accordingly remained in cold storage until June when it was revived at a high level within the Ministry of Production. The record of the regional representatives now spoke for them even more strongly, and there seemed little doubt that they could be relied upon to keep the overall programme well in mind when granting first preference. Still the proposal was unacceptable. It was not heard of again.

The tenacity with which this proposal was pressed upon the supply departments by the Ministry of Production is a measure of the success of the regional controllers. The regional organisation advanced to a high level of authority, and just failed to reach an even higher level. There is no doubt that the organisation won the confidence of industry, and this confidence was strengthened by the visits which the Minister of Production paid each year to each region. The capacity register scheme, although it had nothing to do with the placing of main contracts, had much to do in a quiet way with avoiding industrial friction and providing the right man for the job at a moment's notice. Altogether it was responsible for placing about 2,500 medium and small contracts a month.

The successful launching and carrying through of the invasion and the apparent ease with which the special supply problems were handled, do not invalidate the statement with which this account was introduced, that 'Overlord' provided the supreme test of the supply arrangements. The first quarter of 1944 saw British production running at a very high level.¹ The number of workers employed on Admiralty orders in the engineering and metals industries had reached a peak just before the end of 1943, but had not fallen perceptibly in the first quarter of 1944; aircraft production as a whole peaked in March; production of armoured vehicles other than tanks was higher during that quarter than in any earlier quarter of the war. Thus 'Overlord', with its call for improvisation and special arrangements, was superimposed upon a period in which the administrators responsible for supplies were still fully engaged, as were the workers, in their heavy routine tasks. It is true that the strain was not unexpected as a whole, and it is also true that anything in the nature of a crisis was avoided, but if the test of an organisation lies in its ability to leave scope for inspiration and improvisation, then the organisation of British war production during the 'Overlord' period may certainly be said to have passed the test.

(iii)

Civilian Goods and 'Adjustment'

In the course of the year 1943, and thus even before most of the events which have just been described, the final problem of the administration of war production began to show itself. In its mature form this problem was nothing less than that of turning industry

¹ See Postan: *British War Production*, *op. cit.*, and *Statistical Digest of the War*, prepared by Central Statistical Office (H.M.S.O. 1951); Section (vii).

from war production to its great task of reconstructing a peace economy. But the full dimensions of the problem appeared only gradually. Ministers were well aware of its approach, but there was no disposition among them to divert their main attention from the more urgent and critical problems of fighting the war. Thus the problem was taken as it came, and in its first appearance it was associated with the problem of maintaining the minimum output of civilian goods, which, in a 'total' war, were themselves in a sense munitions. The first reaction to these problems in the field of organisation was as we have seen the constitution of a Non-Munitions Division in the Ministry of Production. In the earlier months of its existence the Non-Munitions Division had been largely concerned with working out Commonwealth allocations of civilian goods supplied under lend-lease. By the summer of 1943 however Mr Lyttelton was drawing the attention of the Prime Minister to the important task which this division would have in 'making adjustments between civilian and military output'. Once used by Mr Lyttelton, the word 'adjustment' began to appear more and more frequently, and with a wider and wider meaning attached to it. Its use in fact marked the beginning of the end of war production.

In 1943 that culmination was still a long way off, but by the end of the year further important steps had been taken to safeguard and organise the output of civilian goods. As early as May the Minister of Production had put up to the Lord President's Committee a paper in which he pointed out the extent to which the industrial capacity of the United Kingdom was committed to munitions production, and the extent to which the country's economy was becoming unbalanced by the consequent transfer to the United States of a steadily increasing proportion of the export trade in civilian goods. Britain however must continue to export; it was an economic necessity; and the Minister of Production was concerned to see that machinery existed for bringing into Anglo-American planning all the considerations which lay outside the strict criterion of efficiency in war production. The danger mark had already been reached in the concentration of British resources on war, and it was desirable that the remaining resources of civilian production should be regularly reviewed. Mr Lyttelton therefore proposed the setting up of a Civilian Goods Committee, to be under the chairmanship of the Minister of Works in his personal capacity, and to be composed of representatives of the Foreign Office, Ministry of Labour, Ministry of Production, Treasury, Board of Trade, Ministry of Supply, Ministry of War Transport, and Department of Overseas Trade. The committee would consider the level of civilian goods production which ought to be maintained and the utilisation of the capacity that could be devoted to this end. In cases where the production fell short of essential requirements the

committee would refer the matter to a combined Anglo-American committee sitting in London.

The attitude of Mr Lyttelton's colleagues towards his proposal was one of cautious approval. The need for some machinery was recognised, and the machinery proposed was approved in principle, and subjected to official examination. This examination served to emphasise the complexities of the situation. The Commonwealth countries had their own procurement arrangements in Washington, and these were co-ordinated by the Commonwealth Supply Council, which had been set up as early as 1942, with a Ministry of Production representative in the chair, in order to undertake this responsibility. It was important that the proposed new committee—which emerged from this discussion as the Civilian Goods (Supplies) Committee—should not interfere with or duplicate the Council's task of estimating the total requirements of the Commonwealth. Its primary interest would be in determining what the United Kingdom could provide to meet these requirements. But it would not be concerned exclusively with the technical factors of production, and the departments concerned with political, financial and economic factors should be clearly entitled to bring them before the committee. Even when the official discussion had resulted in agreement upon the proposed terms of reference there was some residual anxiety. The Ministry of Supply in particular was concerned lest the ambitions entertained for the committee should lead it into attempting to deal with questions which had been, and ought to be, disposed of at higher levels. The balance between military and civilian production, it was argued, was a matter of high political policy; even the question of the production of civilian goods for the Services was one which would require the Service departments to be represented in discussion. And there were further expressions of anxiety about Commonwealth reactions to a machinery which they might feel to be cutting them off from Washington. There were in fact, at the official level, two distinct grounds for apprehension. The first was that United Kingdom production and American procurement—the combined Commonwealth-American production economy—was already sufficiently regimented, and that new machinery might only be a fifth wheel on the coach. The second ground of apprehension was about the expansionist tendencies of the Ministry of Production. Changes in organisation which tended to place a Ministry of Production fence between Ministers on the one hand and the War Cabinet and its committees on the other, were now, as always, particularly suspect.

The next move was towards pacifying the apprehensions. The Minister of Production and the President of the Board of Trade jointly assured the Lord President's Committee that in the prevailing conditions of manpower it was unlikely that the Civilian Goods (Supplies)

Committee would have any occasion to enter into the larger sphere of 'adjustment'. It would in all probability have enough to do in dealing with extreme cases of United Nations civilian production deficiencies. The two new committees, it was pointed out, would perform an important service for the Commonwealth Supply Council. The main interest of the Council lay in meeting the requirements of its members; in so far as these were met from United Kingdom resources the new committee would provide an assurance that the best use was being made of these resources.

Whether all the doubts had been removed or not, the two committees were in fact set up, and a very complex machinery for determining the 'level' and the allocations of civilian supplies was brought into being. Not all the original plans were carried out; the Civilian Goods (Supplies) Committee never obtained the 'combined' status which had been proposed for it, and was in the main restricted to dealing with goods produced in Britain which fell outside the sphere of combined planning. Yet if it fell short of the ambitions which had been entertained on its behalf the committee played an important part in the administration of the affairs with which it was concerned. Much of it was done by small interdepartmental working parties, or *ad hoc* committees, which met to discuss items ranging from hand tools to bakery equipment. At such meetings the chair was generally taken by a representative of the Ministry of Production. The machinery of allocations was complex, but broadly speaking the various claimants were allowed to place orders up to a given sum within a given period.

If the creation of the Civilian Goods (Supplies) Committee revealed nervousness about the expansionist tendencies of the Ministry of Production, this nervousness was not without some justification. Mr Lyttelton had in fact raised the fundamental issue very soon after that committee was brought into being. In October he put it to the Prime Minister that the supply of civilian goods already ranked almost equally with munitions of war. He himself was giving more and more of his time to the problems of civilian production, not only within the United Kingdom, but, because of his responsibility of linking British with North American production, in the Empire. His increasing occupation with civilian goods brought out sharply the limits of his co-ordinating authority. Although he was responsible for composing the programmes of machine tools and raw materials, and for allocating them to all departments, his authority for co-ordinating production programmes extended only to the three munitions supply departments. Mr Lyttelton accordingly now made a proposal which he had been nursing for some time—that the Board of Trade should be placed under his co-ordinating authority in so far as the President of the Board had power to dispose of production resources.

This was a proposal which was bound to raise serious objections. If it appealed to the Prime Minister it did not come well out of the examination which he asked the War Cabinet Office to make of it. Its theoretical administrative advantages were admitted; although it might have been expected that the powers which the Minister of Production possessed of allocating industrial capacity and settling production priorities would give him a co-ordinating authority over the Board of Trade hardly inferior to the direct co-ordinating authority which he possessed over the supply departments, it had not worked out so in practice. Authority over capacity and priorities was comparatively indirect and crude; it could be exercised only on a rule of thumb basis. But a proposal to give the Minister more direct powers was very unattractive. The concept of a 'supervisory minister' had never managed to free itself from the distrust of the ministers who were to be, or might be, supervised. It was tolerated when it was limited to war production, but ministers were exceedingly sensitive about their own direct and exclusive responsibility to Parliament, and the Board of Trade, which had a general responsibility for commercial policy, was particularly uneasy about any compromising of this responsibility. Official advice, therefore, was against any formal raising of what were in effect constitutional issues. A means might be found of enabling the Minister of Production to increase his authority as he wished; the manpower famine clearly entitled him to full details of civilian production programmes, and discussion of these would no doubt give him an occasion to exert his influence. But dormant uneasiness should not be awakened.

The discussion was taken a little further, but attention was already, at the beginning of 1944, being turned elsewhere, and the project of a minister of production with authority to guide British industry as a whole through the transition period did not mature. It was raised again in the autumn of 1944, but with the invasion of Europe an accomplished reality, and the strategical course of the European war clearly turning towards an end of which only the timing was hidden, the atmosphere had changed. The Board of Trade had emerged with its independence unimpaired—a War Cabinet Office paper of September remarked upon the slightness of the control which the Minister of Production exercised over its activities—and was clearly destined to resume its full peace-time position. Indeed the idea now mentioned in the War Cabinet Office was that the Ministry of Production and the Board of Trade might both fare best in the same hands. When in 1945 this came to pass it was for a very brief period only that Mr Lyttelton held both offices, and that of Minister of Production did not long survive the war. Did it bequeath something of its nature to the Board of Trade? It is perhaps fair to say that the conception of a post-war Board of Trade concerned as much with production and

distribution for internal consumption as with overseas trading relations was a conception which came naturally to those who had seen the war-time Ministry of Production at work. Further than this an historian of war production cannot trespass upon the post-war period.

It is the task of ministers and of highly placed officials to attempt to foresee events, and the decisions and movements of opinion about the organisation of production in the last phase of the war naturally anticipated, in some cases by long periods, decisions about current production. Even in 1944 the Ministry of Production approached the question of diverting capacity to civilian production with the most extreme caution. A circular issued to the regions in January it is true drew attention to the importance of non-munitions production and called for information about marginal capacity for the production of civilian goods. The marginal capacity, however, was so modestly defined that the circular was barely more than a hint about future possibilities. There was no slackening of the effort—there was certainly no slackening of the administrative effort—until the very end.

The history of the administration of war production, with which we have been concerned in this volume, is essentially the history of the expansion of war production, the history of the build-up. It was in this great effort of expansion, beginning with rearmament and going on, in the field of administration, until some indeterminate date in the latter part of the war, that the great achievement of planning, of ingenuity and of effort took place. In this field there are no statistics to tell us when the peak was reached. Yet the impression is very strong that the last two years of the war represented a peak, or, as it would be more accurate to say, a high plateau of achievement.

Upon this plateau the administration of the supply departments, which had constantly laboured, often been uncertain, and sometimes slipped, now began to stride out freely. If this period is associated with the maturity of the Ministry of Production the nature of the association should be understood. To the extent that the creation and development of the Ministry of Production provided a solution to the problem of co-ordinating war production, the solution was, in Professor Postan's words 'historical, not rational'.¹ It applied to the particular situation of mid-war; it was not designed to meet the situation of 1939 or the situation of 1945. It was an improvisation, and may be thought to be a successful improvisation: it was far from being what the pre-war planners of war production had in mind; and its interest is not that of a model or archetype.

We have been speaking of a plateau. A plateau is of its nature featureless, and if we have shown some strains and stresses inside the Government organisation for production in this period, its history is

¹ See Postan, *British War Production*, *op. cit.*, p. 269.

certainly comparatively featureless in point of criticism from outside. Some time during the second part of 1943, it would seem, the supply departments, the Ministry of Production, and the committees, had emerged from all the experiments as a machine ready to run on for as long as it was required without further attention. Since much has been said in this volume about the experiments, it is right that in conclusion the final long phase of successful running should be emphasised.

Appendices

APPENDIX I

List of Ministers of Admiralty, War Office and Air Ministry from 1931-45 and in Ministries of Supply and Aircraft Production from their foundation to 1945

ADMIRALTY

Month and year appointment was taken up

FIRST LORDS OF THE ADMIRALTY

Rt. Hon. Sir Bolton Eyres-Monsell, G.B.E., M.P.	Nov. 1931-June 1936
Rt. Hon. Sir Samuel Hoare, Bart., M.P.	June 1936
Rt. Hon. A. Duff Cooper, D.S.O., M.P.	May 1937
Rt. Hon. The Earl Stanhope, K.G., D.S.O., M.C., D.L.	Nov. 1938
Rt. Hon. Winston Churchill, C.H., M.P.	Sept. 1939
Rt. Hon. A. V. Alexander, M.P.	May 1940
Rt. Hon. Brendan Bracken, M.P.	May 1945
Rt. Hon. A. V. Alexander, M.P.	July 1945

CIVIL LORDS

Capt. D. Euan Wallace, M.C., M.P.	Nov. 1931-June 1935
Kenneth Martin Lindsay, Esq., M.P.	June 1935
Lt.-Col. John Jestyn Llewellyn, O.B.E., M.C., M.P.	May 1937
Capt. Austin U. M. Hudson, M.P.	June 1939
Capt. R. A. Pilkington, M.C., M.P.	March 1942
Walter James Edwards, Esq., M.P.	July 1945

PARLIAMENTARY SECRETARIES*

Rt. Hon. Lord Stanley, M.C., M.P.	Nov. 1931-June 1935
Sir Victor Warrender, Bart., M.P.	June 1935
Rt. Hon. Lord Stanley, M.C., M.P.	Nov. 1935
Geoffrey M. Shakespeare, Esq., M.P.	May 1937
Sir Victor Warrender, Bart., M.C., M.P.†	April 1940
John Dugdale, Esq., M.P.	July 1945

* Combined post with that of Financial Secretary.

† Raised to the Peerage as Lord Bruntisfield in 1942.

WAR OFFICE

Month and year appointment was taken up

SECRETARIES OF STATE FOR WAR

Rt. Hon. Lord Hailsham	Nov. 1931-May 1934
Rt. Hon. Viscount Halifax, K.G.	June 1935
Rt. Hon. A. Duff Cooper, D.S.O., M.P.	Nov. 1935
Rt. Hon. L. Hore-Belisha, M.P.	May 1937

	<i>Month and year appointment was taken up</i>
Rt. Hon. Oliver Frederick George Stanley, M.C., M.P.	Jan. 1940
Rt. Hon. Robert Anthony Eden, M.C., M.P.	May 1940
Capt. Rt. Hon. Henry David Margesson, M.C., M.P.	Dec. 1940
Rt. Hon. Sir James Grigg, K.C.B., K.C.S.I., M.P.	Feb. 1942
Rt. Hon. John James Lawson, M.P.	July 1945
UNDER SECRETARIES OF STATE	
Rt. Hon. the Earl Stanhope, K.G., D.S.O., M.C.	Nov. 1931—April 1934
Lord Strathcona and Mount Royal	May 1934
The Earl of Munster	Jan. 1939
Viscount Cobham, C.B.	Sept. 1939
Brig.-Gen. Sir Henry Page Croft, Bt., and Sir Edward William Macleary Grigg, K.C.M.G.	May 1940
Brig.-Gen. Sir Henry Page Croft, Bt., and Arthur Henderson, Esq., K.C., M.P.	March 1942
Brig.-Gen. Lord Croft, C.M.G.	Jan. 1943
Lord Nathan	July 1945

AIR MINISTRY

	<i>Month and year appointment was taken up</i>
SECRETARIES OF STATE FOR AIR	
Most Hon. the Marquess of Londonderry, K.G.	Nov. 1931—June 1935
Rt. Hon. Sir Philip Cunliffe-Lister, M.P. (became Rt. Hon. Viscount Swinton of Masham, 1935)	June 1935
Rt. Hon. Sir Kingsley Wood, M.P.	May 1938
Rt. Hon. Sir Samuel Hoare, M.P.	April 1940
Rt. Hon. Sir Archibald Sinclair, Bart., C.M.G., M.P.	May 1940
Rt. Hon. Harold Macmillan, M.P.	May 1945
Rt. Hon. Viscount Stansgate, D.S.O., D.F.C.	July 1945
UNDER SECRETARIES OF STATE	
Rt. Hon. Sir Philip Sassoon, Bart, M.P.	Aug. 1931—May 1937
Lt.-Col. Anthony J. Muirhead, M.C., M.P.	May 1937
Capt. Harold H. Balfour, M.C., M.P.	May 1938
Lord Sherwood and Capt. Harold H. Balfour, M.C., M.P.	Nov. 1941
Lord Sherwood and Commander Rupert Brabner, R.N.	Nov. 1944
Lord Sherwood and Hon. Quintin Hogg, M.P.	April 1945
Rt. Hon. Earl Beatty, D.S.C., and Hon. Quintin Hogg, M.P.	May 1945
John Strachey, Esq., M.P.	July 1945

MINISTRY OF SUPPLY

Month and year appointment was taken up

MINISTERS OF SUPPLY

Rt. Hon. E. Leslie Burgin, LL.D., M.P.	April 1939
Rt. Hon. Herbert Morrison, M.P.	May 1940
Rt. Hon. Sir Andrew Rae Duncan, G.B.E., M.P.	Oct. 1940
Rt. Hon. Lord Beaverbrook	June 1941
Rt. Hon. Sir Andrew Rae Duncan, G.B.E., M.P.	Feb. 1942
Rt. Hon. John Wilmot, M.P.	July 1945

PARLIAMENTARY SECRETARIES

Col. John J. Llewellyn, O.B.E., M.C., M.P.	June 1939
Harold Macmillan, Esq., M.P., and Lord Portal, D.S.O., M.V.O.	May 1940
Ralph Assheton, Esq., M.P., and Lord Portal, D.S.O., M.V.O.	Feb. 1942
Ralph Assheton, Esq., M.P., and Charles Urie Peat, Esq., M.C.	March 1942
E. Duncan Sandys, Esq., M.P., and Charles Urie Peat, Esq., M.C.	Jan. 1943
John Wilmot, Esq., M.P., and Charles Urie Peat, Esq., M.C.	Nov. 1944
John Wilmot, Esq., M.P., and J. A. de Rothschild, Esq., D.C.M.	April 1945
Robert Villiers Grimston, Esq., M.P.	May 1945
William Leonard, Esq., M.P.	July 1945

MINISTRY OF AIRCRAFT PRODUCTION

Month and year appointment was taken up

MINISTERS OF AIRCRAFT PRODUCTION

Rt. Hon. Lord Beaverbrook	May 1940
Col. Rt. Hon. J. T. C. Moore-Brabazon, M.C., M.P.	May 1941
Col. Rt. Hon. John J. Llewellyn, C.B.E., M.C., M.P.	Feb. 1942
Rt. Hon. Sir Stafford Cripps, K.C., M.P.	Nov. 1942
Rt. Hon. Alfred Ernest Brown, M.C., M.P.	May 1945
Rt. Hon. John Wilmot, M.P.	July 1945

Amalgamated with the Ministry of Supply in December 1946.

PARLIAMENTARY SECRETARIES

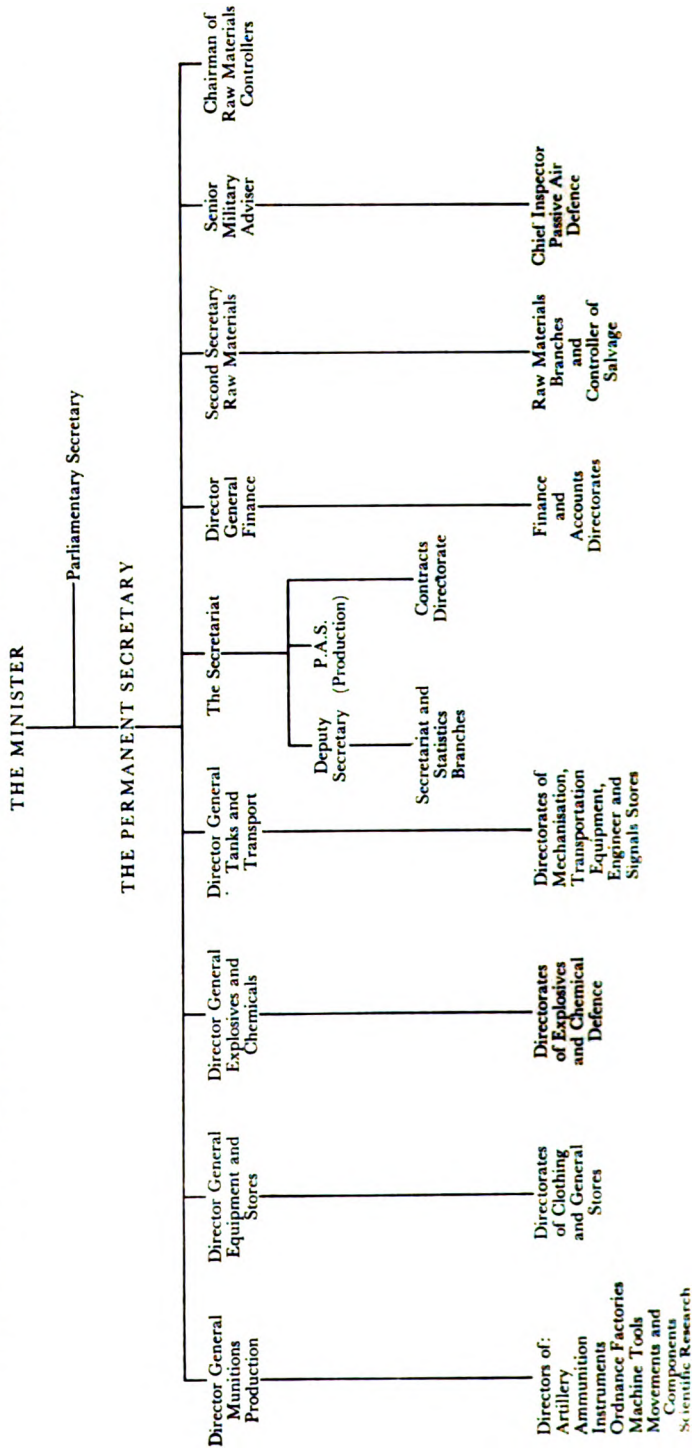
Col. John J. Llewellyn, C.B.E., M.C., M.P.	May 1940
Frederick Montague, Esq., M.P.	March 1941
Ben Smith, Esq., M.P.	March 1942
Alan T. Lennox-Boyd, Esq., M.P.	Nov. 1943
Arthur Woodburn, Esq., M.P.	July 1945

Amalgamated with the Ministry of Supply in October 1946.

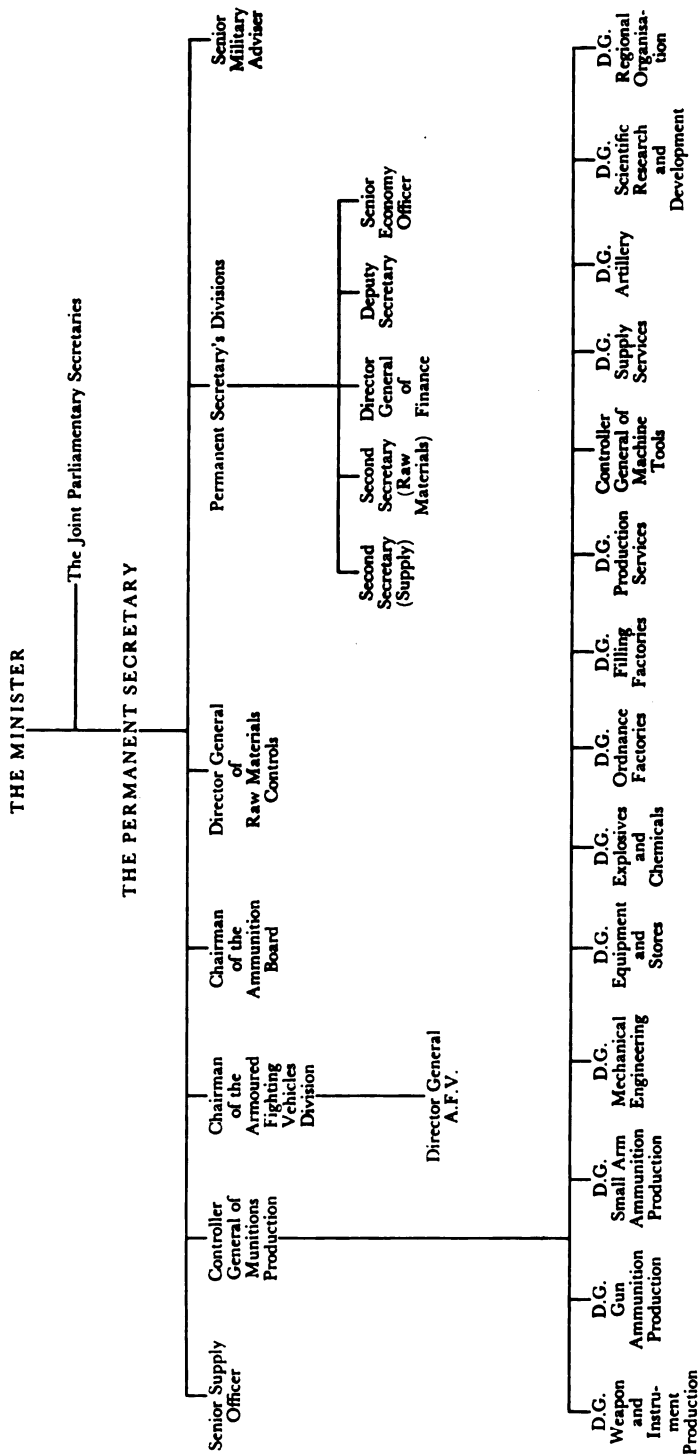
APPENDIX II

Organisation charts of Ministry of Supply

A. CHART OF THE HIGHER TIERS OF THE ORGANISATION IN OCTOBER 1939



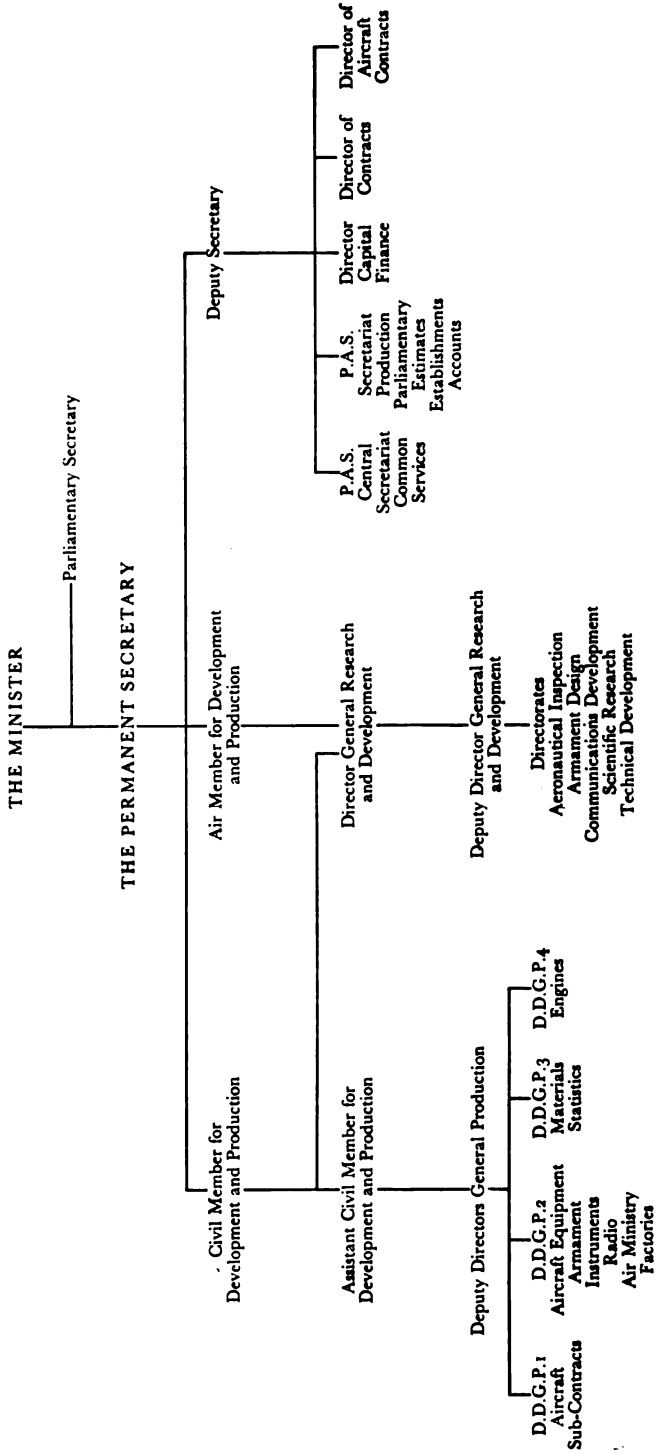
B. CHART OF THE HIGHER TIERS OF THE ORGANISATION AT THE TIME OF ITS FULLEST EXPANSION (AUGUST 1944)



APPENDIX III

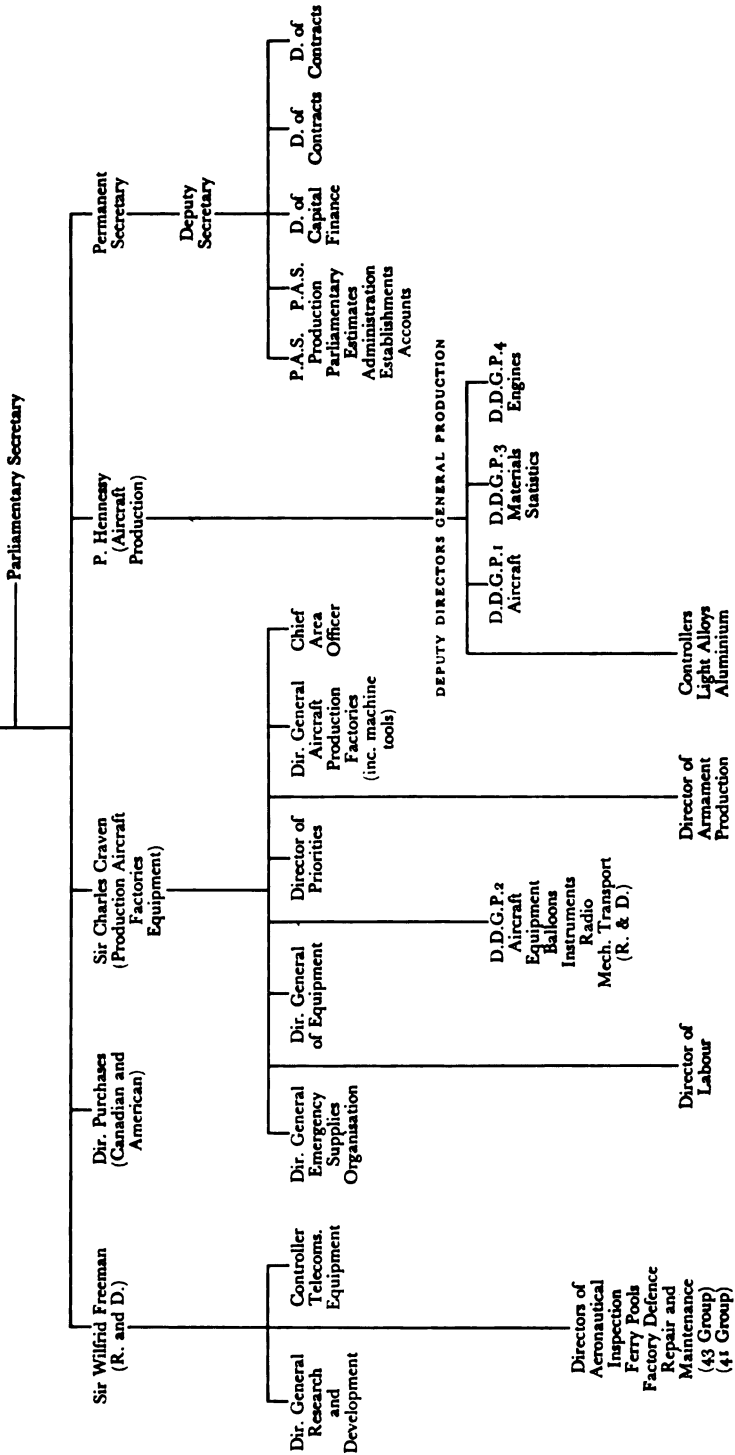
Organisation charts of the Ministry of Aircraft Production

A. AS FIRST CONSTITUTED IN MAY 1940



B. AS AT AUGUST 1940

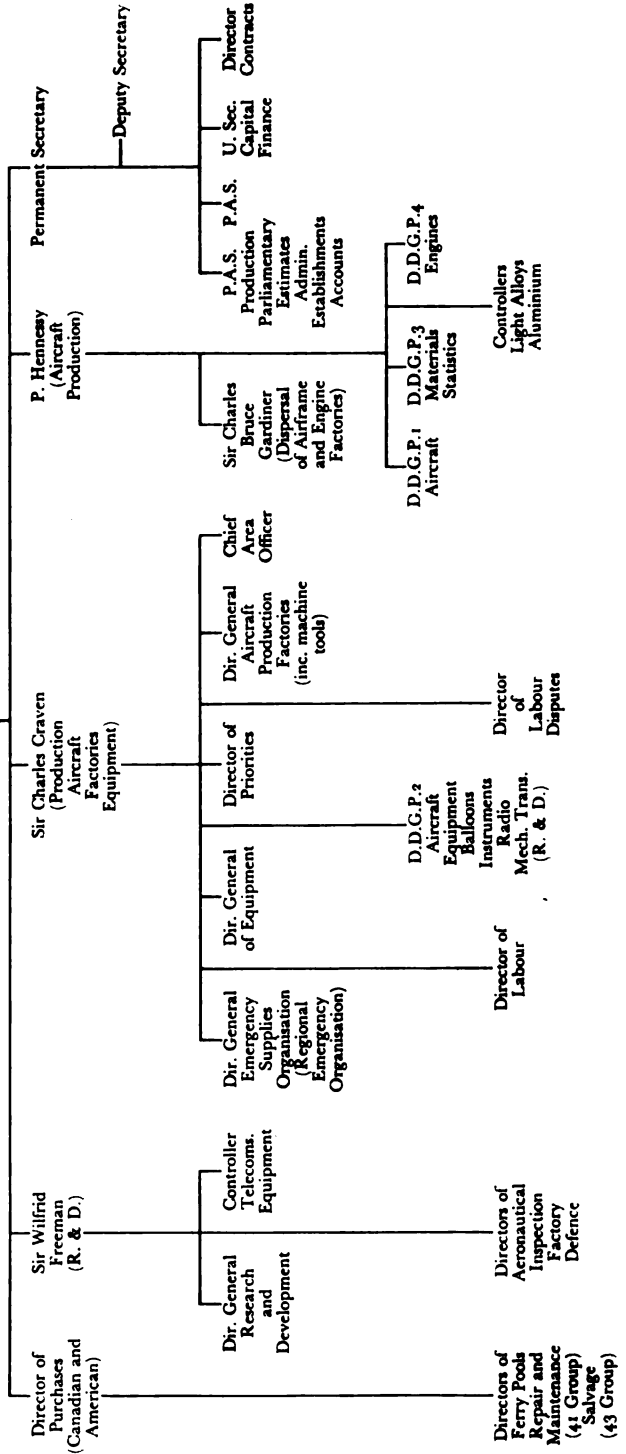
THE MINISTER



C. AS AT OCTOBER 1940

THE MINISTER

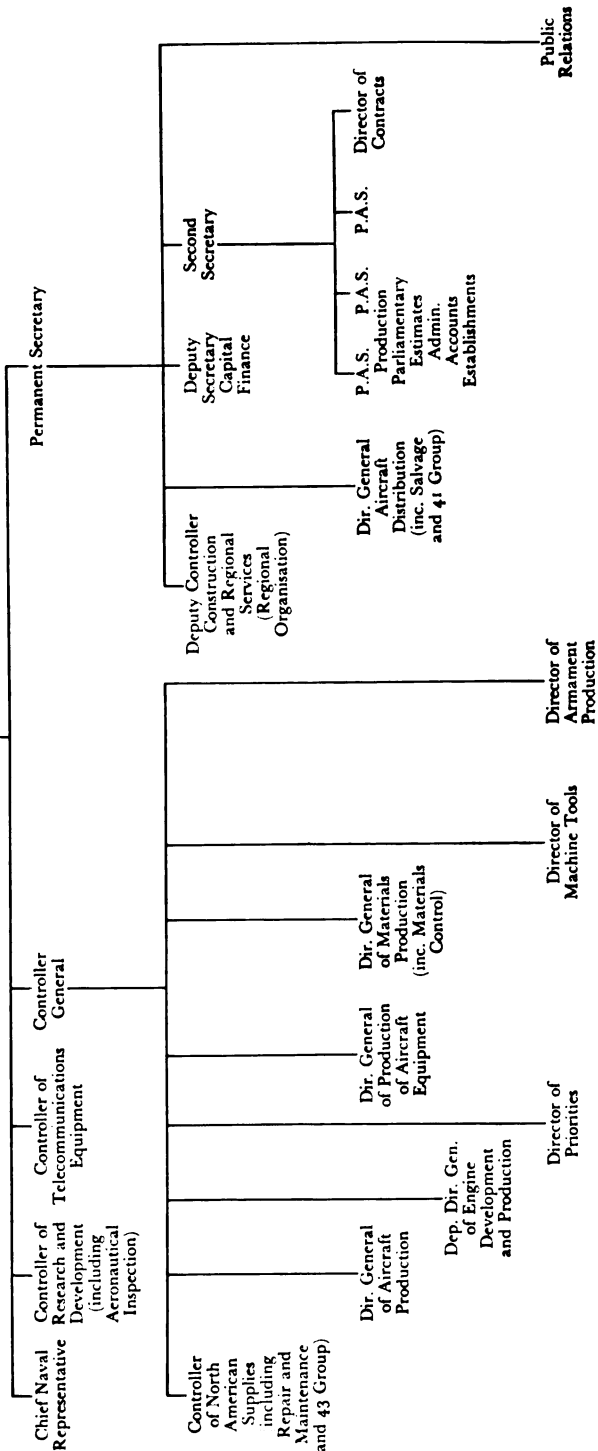
Parliamentary Secretary



D. AS AT JULY 1941

THE MINISTER

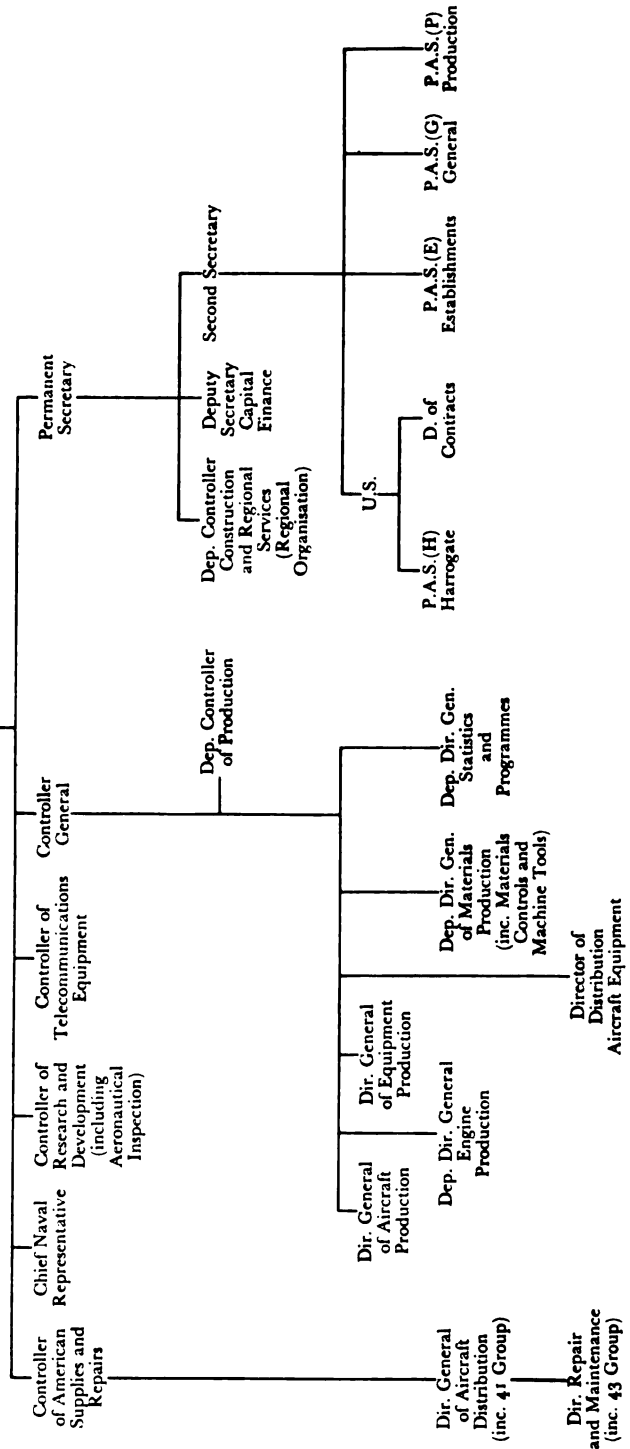
Parliamentary Secretary



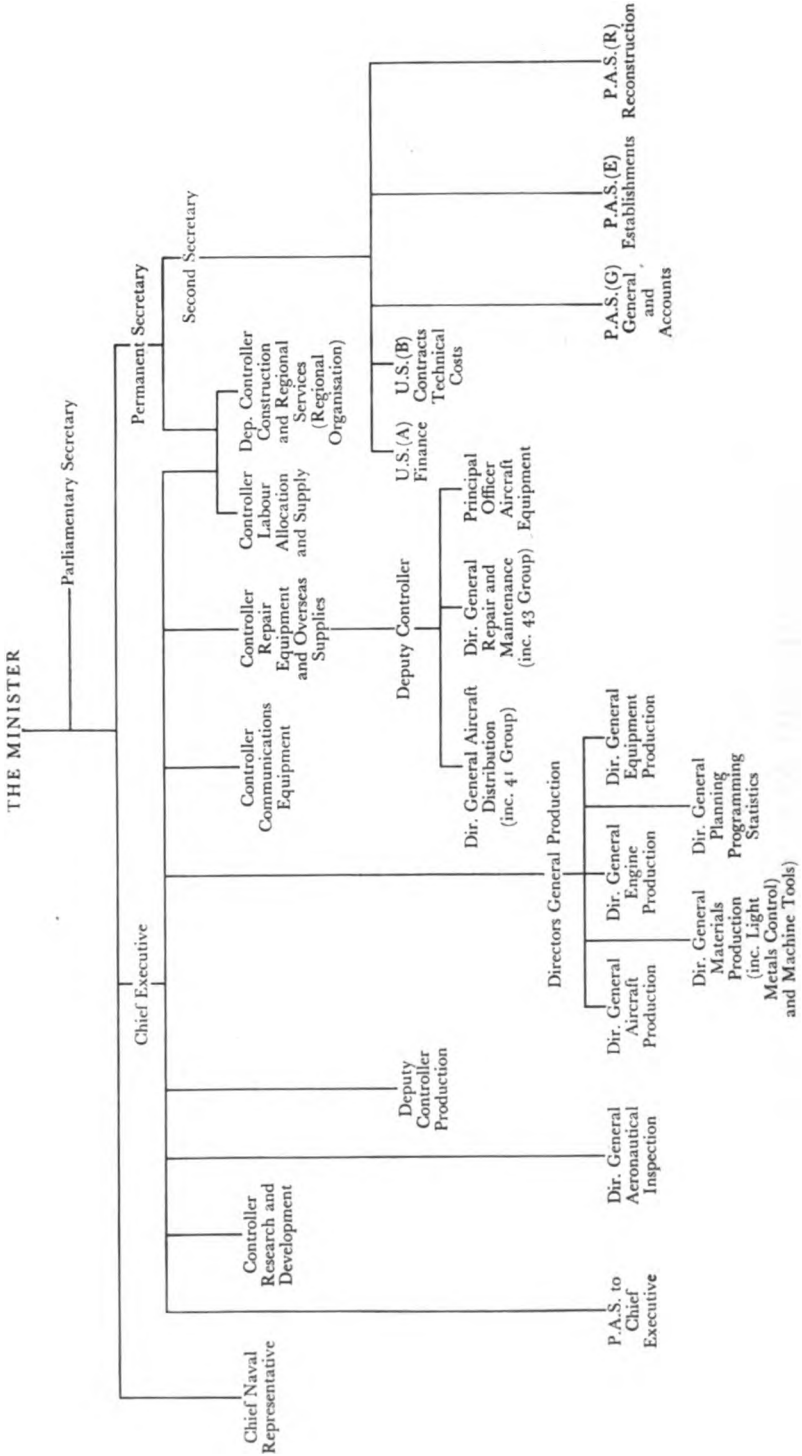
E. AS AT SEPTEMBER 1942

THE MINISTER

Parliamentary Secretary



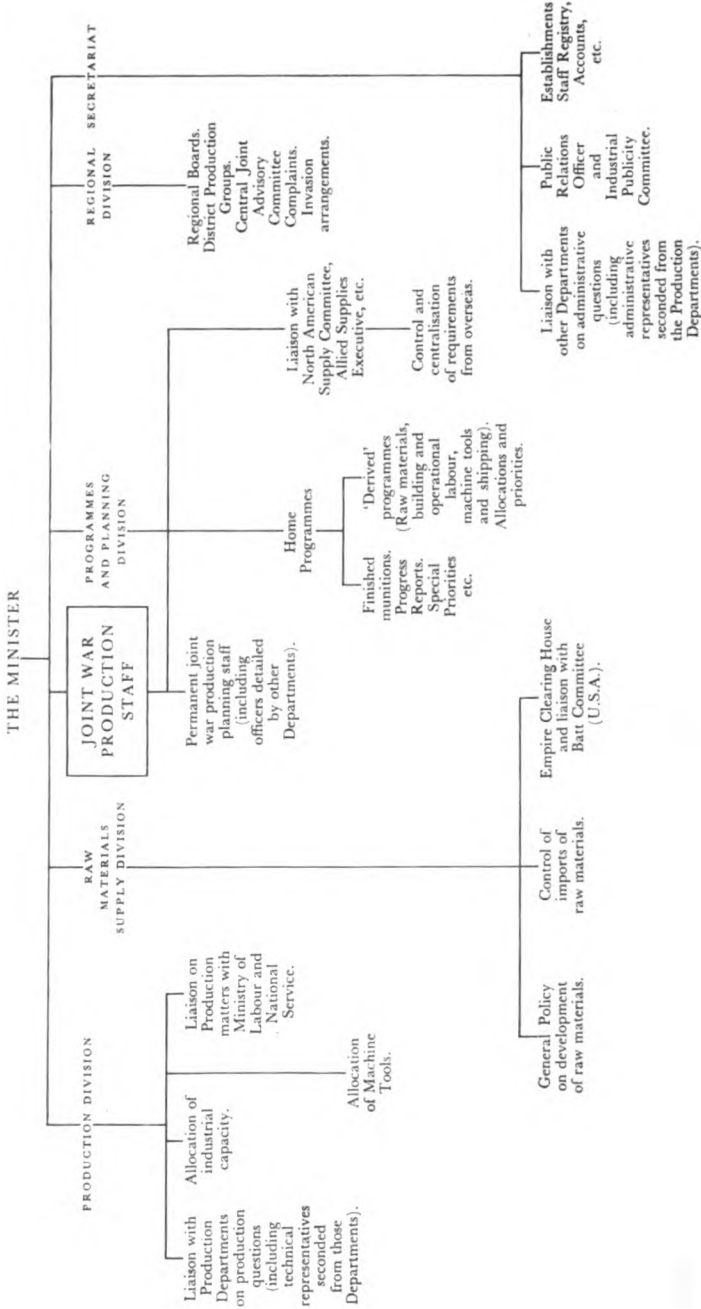
F. AS AT DECEMBER 1943



APPENDIX IV

Organisation charts of the Ministry of Production

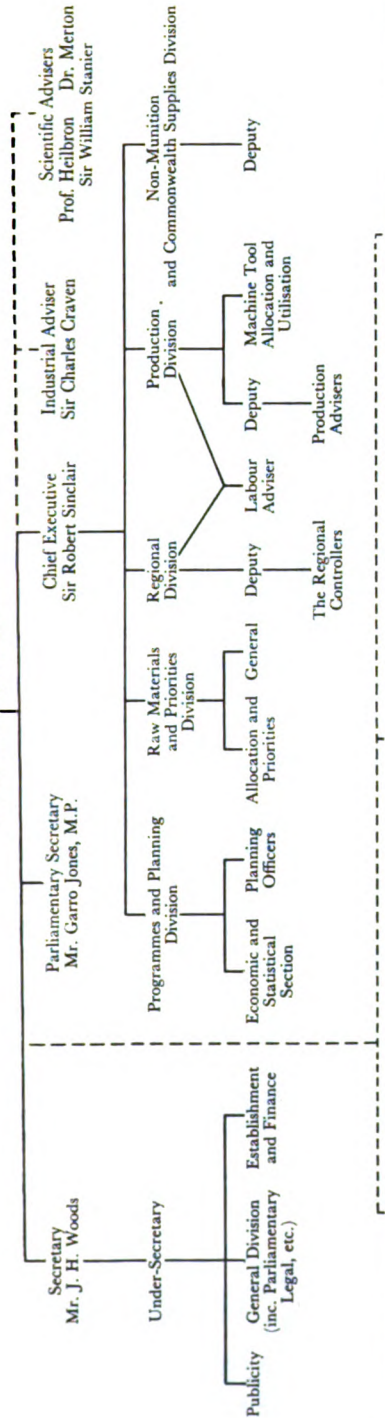
A. THE OFFICE OF THE MINISTER AS AT MARCH 1942



Note: The Office supplies a joint secretariat for:

- (1) Raw Materials Allocation Committee (Chairman: Lord Portal) working in close touch with the Raw Materials Supply Division and the Programmes and Planning Division.
- (2) Central Priority Committee (Chairman: Colonel Llewellyn) working in close touch with the Production Division and the Programmes and Planning Division.

THE MINISTER
Rt. Hon. Oliver Lytton, M.P.



A. COMMITTEES OF WHICH THE MINISTER IS CHAIRMAN

- Joint War Production Staff
- London Munitions Assignment Board
- Allied Supplies Executive
- London Committee of Combined Production and Resources Board
- National Production Advisory Council
- Minister of Production's Council
- Commonwealth Supply Council
- Committee on Military Overseas Requirements

B. COMMITTEES REPORTING TO THE MINISTER

- *Civilian Goods Supply Committee
- Combined Civilian Goods Committee
- Materials Committee
- Central Priority Committee
- Munitions Management and Labour Efficiency Committee
- Industrial Advisory Panel
- †Anglo-American Packaging Committee
- §Radio Board
- Location of Industries Committee
- Engineering Advisory Committee
- Regional Organisation Committee
- *Committee on Allied African Economic Affairs
- Chemical Planning Committee
- Paper Economy Committee
- **Reporting also to President of Board of Trade
- *Reporting also to Mr Harriman
- *Reporting also to Foreign Secretary
- §Reporting also to C. of S.C.

C. COMMITTEES ON WHICH THE DEPARTMENT IS REPRESENTED OTHER THAN THOSE IN A AND B

- Labour Co-ordination Committee
- Labour Preference Committee
- Technical Personnel Committee
- Engineers Stores Assignments Committee
- Machine Tool Industry Committee
- Council for Industrial Productivity
- Commonwealth Supply Council
- Raw Materials Committee
- Railway Equipment Committee
- Non-Munitions Committee
- Machine Tool Committee
- Munitions Committee
- * Farm and Food Machinery Committee
- African Committee
- China Supplies Sub-Committee of A.S.E.
- Scientific Sub-Committee
- Official Committee on Post-War Internal Economic Problems
- Committee on Post-War Commodity and Relief
- Production Department's Sub-Committee on Internal Economic Problems
- Anglo-American Co-ordination Committee (Supply)
- Shipping and Supply Sub-Committee of the A.T.(E) Committee
- Shipping Committee
- Conservation Sub-Committee of L.C.P.R.B.
- * Joint Committee of London Food Committee and Non-Munitions Committee of C.S.C.

*As: Levels on this chart do not indicate comparative gradings.

APPENDIX V
Tables of Non-industrial Civilian Staff
A. MINISTRY OF SUPPLY

Date	Adminis- trative	Executive	Clerical and Typing	Professional, Scientific and Technical	Ancillary Technical	Miscellaneous Grades	Total	Numbers of staff in the R.O.F.s (the numbers are included in the pre- vious columns)
1st January 1940	111	1,009	7,232	1,967	4,763	892	15,974	4,910
1st April 1940	124	1,108	8,695	2,344	5,380	1,078	18,729	5,664
1st July 1940	143	1,500	10,693	3,052	6,304	1,251	22,943	6,868
1st October 1940	164	1,670	12,344	3,911	7,496	1,452	27,037	8,832
1st January 1941	177	1,770	14,286	4,286	8,541	1,469	30,549	10,520
1st April 1941	207	2,215	17,419	5,051	10,296	1,837	37,025	12,684
1st July 1941	211	2,473	19,420	6,070	12,075	1,562	41,811	15,519
1st October 1941	244	2,769	22,045	7,002	14,250	1,874	48,184	18,890
1st January 1942	298	3,283	24,604	7,697	15,982	2,257	54,121	21,936
1st April 1942	300	3,752	26,021	7,866	18,121	2,489	58,558	24,665
1st July 1942	318	4,146	26,805	7,986	19,342	2,563	61,186	26,107
1st October 1942	298	4,556	27,384	8,230	20,985	2,756	64,209	26,998
1st January 1943	308	5,153	27,869	8,609	22,291	3,097	67,327	27,410
1st April 1943	331	5,461	28,012	8,624	22,732	2,933	68,093	27,578
1st July 1943	339	5,769	27,274	8,567	22,781	2,823	67,245	27,245
1st October 1943	355	7,680*	26,926	6,771*	22,900	2,763	67,395	27,005
1st January 1944	337	7,668	25,637	6,680	22,845	2,679	65,846	25,925
1st April 1944	312	7,650	24,246	6,483	22,057	2,662	63,410	24,723
1st July 1944	318	7,685	23,755	6,464	21,609	2,666	62,497	23,691
1st October 1944	308	7,790	23,164	6,385	21,233	2,595	61,495	23,105
1st January 1945	309	7,887	22,993	6,224	20,866	2,616	60,925	22,734
1st April 1945	236	7,994	22,528	6,075	20,600	2,617	60,070	22,212
1st July 1945	224	7,985	21,764	5,779	19,692	2,559	57,983	20,767

* The variation in the numbers of staff in the Executive and the Professional, Scientific and Technical groups compared with the previous quarter is mainly due to a reclassification of certain grades.

B. MINISTRY OF AIRCRAFT PRODUCTION

Date	Admin- trative	Execu- tive	Clerical and Typing	Profes- sional, Scientific, Technical	Ancillary Technical	Miscel- laneous Grades	Total
1st July 1940	77	246	3,499	1,447	1,450	5,640*	12,359
1st Oct. 1940	84	275	3,640	1,619	1,547	734	7,899
1st Jan. 1941	77	329	4,054	1,868	1,604	977	8,909
1st Apr. 1941	95	416	4,619	2,081	1,724	1,097	10,032
1st July 1941	96	487	5,110	2,284	1,839	1,111	10,927
1st Oct. 1941	96	517	5,522	2,559	1,973	1,291	11,958
1st Jan. 1942	100	613	5,993	2,832	2,053	1,329	12,920
1st Apr. 1942	90	720	6,289	3,085	2,196	1,404	13,784
1st July 1942	94	766	7,031	3,405	2,215	1,458	14,969
1st Oct. 1942	102	781	6,892	3,701	2,541	1,461	15,478
1st Jan. 1943	105	797	7,115	4,020	2,688	1,510	16,235
1st Apr. 1943	106	803	7,024	3,882	2,672	1,539	16,026
1st July 1943	105	831	7,834	4,020	3,127	2,638	18,555
1st Oct. 1943	107	851	8,045	4,302	3,353	2,715	19,373
1st Jan. 1944	107	870	8,143	4,402	3,613	2,847	19,982
1st Apr. 1944	108	879	8,191	4,464	3,673	2,993	20,218
1st July 1944	106	918	8,319	4,649	3,699	2,962	20,653
1st Oct. 1944	107	949	8,389	4,674	4,047	2,947	21,113
1st Jan. 1945	104	945	8,269	4,707	4,089	2,951	21,065
1st Apr. 1945	104	965	8,148	4,716	4,159	2,916	21,008
1st July 1945	96	1,010	7,881	4,643	4,113	2,870	20,613

* The figure for Miscellaneous Grades on 1st July 1940 includes Examiners in the Aeronautical Inspection Directorate who were subsequently classified as industrials.

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